Draft

Environmental Impact Statement for the Sacramento Peak Observatory Sunspot, New Mexico

National Science Foundation

February 2018

Cover Sheet

Draft Environmental Impact Statement

Sacramento Peak Observatory, Sunspot, Otero County, New Mexico

Responsible/Lead Agency: The National Science Foundation

Cooperating Agency: The United States Forest Service

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Public Comment Period: February 8, 2018 through March 26, 2018

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Abstract: The National Science Foundation (NSF) has produced a Draft Environmental Impact Statement (DEIS) to analyze the potential environmental impacts associated with proposed operational changes due to funding constraints for the Sacramento Peak Observatory in Sunspot, Otero County, New Mexico. The four Action Alternatives analyzed in the DEIS are as follows: 1) continued science- and education-focused operations by interested parties with reduced NSF funding, 2) transition to partial operations by interested parties with reduced NSF funding, 3) mothballing of facilities, and 4) demolition and site restoration. Environmental resources and concerns considered in the DEIS are biological resources, cultural resources, visual resources, geology and soils, groundwater, hazardous materials, solid waste, health and safety, noise, socioeconomics, and traffic and transportation.

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Executive Summary

ES.1 Introduction

This Draft Environmental Impact Statement (DEIS) has been prepared for the National Science Foundation (NSF) to evaluate the potential environmental effects of proposed operational changes due to funding constraints for the Sacramento Peak Observatory in Sunspot, New Mexico. The DEIS was prepared in compliance with the National Environmental Policy Act of 1969 (NEPA) (42 United States Code §§4321, *et seq*.); Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (Title 40 *Code of Federal Regulations* [C.F.R.] Parts 1500–1508); and NSF procedures for implementing NEPA and CEQ regulations.

Public and agency scoping on the preliminary proposed Alternatives and issues of concern was initiated with the publication of a Notice of Intent (NOI) to prepare a DEIS in the *Federal Register* on July 5, 2016. Public meetings on this topic were held on July 21, 2016, in Alamogordo, New Mexico. NSF considered the public and agency comments in developing the scope of the analysis in this DEIS.

The Sacramento Peak Observatory is an NSF-owned scientific research and education facility located in Sunspot, New Mexico, within the Lincoln National Forest in the Sacramento Mountains. The project area is located on National Forest System lands, managed by the United States (U.S.) Department of Agriculture, U.S. Forest Service (USFS), Lincoln National Forest, and Sacramento Ranger District. There are 71 NSF-owned structures located on the Sacramento Peak Observatory, along with associated infrastructure, including utility lines, roads, sidewalks, rock walls, and fencing. The flagship facility at the Sacramento Peak Observatory is the Richard B. Dunn Solar Telescope (DST), constructed in 1969 and currently managed by the National Solar Observatory (NSO). DST is a high-spatial resolution optical solar telescope that allows solar astronomers worldwide to obtain information about the Sun. The Sacramento Peak Observatory infrastructure includes instrumentation for solar astronomy, office and laboratory buildings, a visitor and education facility, and lodging facilities for visiting scientists. Approximately 20 individuals are currently employed at the Sacramento Peak Observatory. The Sacramento Peak Observatory hosts approximately 15,000 visitors per year, primarily at the Visitor Center.

The 4-meter Daniel K. Inouye Solar Telescope (DKIST) is currently under construction on Haleakalá in Maui, Hawai'i, and is planned to replace the function of DST for NSO. NSO anticipates ending operations of DST and exiting from the Sacramento Peak site in 2018. DKIST is slated to begin operations in 2020.

ES.2 Purpose and Need

NSF needs to maintain a balanced research portfolio with the largest science return for the taxpayer dollar. NSF's Division of Astronomical Sciences (AST) is the federal steward for ground-based

astronomy in the United States. Its mission is to support forefront research in ground-based astronomy, help ensure the scientific excellence of the United States astronomical community, provide access to world-class research facilities through merit review, support the development of new instrumentation and next-generation facilities, and encourage a broad understanding of the astronomical sciences by a diverse population of scientists, policy makers, educators, and the public at large. AST supports research in all areas of astronomy and astrophysics as well as related multidisciplinary studies. Because of the scale of modern astronomical research, AST engages in numerous interagency and international collaborations. Areas of emphasis and the priorities of specific programs are guided by recommendations of the scientific community, which have been developed and transmitted by National Research Council (NRC; now National Academies) decadal surveys, other National Academies committees, as well as federal advisory committees, such as the Astronomy and Astrophysics Advisory Committee (AAAC) and the Advisory Committee for the Directorate for Mathematical and Physical Sciences (MPSAC). The need for NSF to reduce its participation in the Sacramento Peak Observatory has been established through a number of reviews and surveys conducted by the science community.

In 2006, the AST Senior Review (SR) Committee, a subcommittee of the MPSAC, delivered a report to NSF. This committee of external scientists was charged with examining the AST investment portfolio and finding $30 million in annual savings, primarily from the facilities portion of the AST budget, while following the priorities and recommendations of community reports. The SR made the following recommendations (Section 6.3.4 and Recommendation 7):

> …the Dunn Solar Telescope and its user support should likewise begin ramping down prior to the ATST [Advanced Technology Solar Telescope] construction phase, to allow the NSO staff maximum concentration on the all-essential ATST effort (which might include, for example, use of the Dunn to test components of the ATST AO [Adaptive Optics] system)…The National Solar Observatory should organize an orderly withdrawal of personnel and resources, including the Synoptic Optical Long-term Investigations of the Sun telescope, from Kitt Peak/Tucson and Sacramento Peak and start to close down operations at these sites as soon as the Advanced Technology Solar Telescope funding begins.

In 2010, the NRC conducted its sixth decadal survey in astronomy and astrophysics. In its report, *New Worlds, New Horizons in Astronomy and Astrophysics*, the NRC committee recommended that:

> NSF-Astronomy should complete its next senior review before the mid-decade independent review that is recommended in this report, so as to determine which, if any, facilities NSF-AST should cease to support in order to release funds for (1) the construction and ongoing operation of new telescopes and instruments and (2) the science analysis needed to capitalize on the results from existing and future facilities. (NRC, 2010)

In response to this recommendation, the NSF Directorate for Mathematical and Physical Sciences (MPS), which includes AST, commissioned a subcommittee of the MPS Advisory Committee to assess the AST portfolio of facilities. This subcommittee, composed solely of external members of the scientific community, was charged with recommending a balanced portfolio to maximize the science recommended by the decadal surveys under constrained budget scenarios. The resulting Portfolio Review Committee (PRC) Report was released in August 2012 and included recommendations about all of the major AST telescope facilities (NSF, 2012). The PRC Report recommended divestment of a number of telescopes from the federal portfolio and maintenance of a balance of small, medium, and large programs that would best address the leading-edge scientific questions prioritized by National Academies' decadal surveys. With respect to the Sacramento Peak Observatory, the PRC Report made the following recommendation (Recommendation 9.11):

> AST and NSO should plan for the continued use of the Dunn Solar Telescope (DST) as a world-class scientific observatory, supporting the solar physics community, to within 2 years of ATST [now the Daniel K. Inouye Solar Telescope, DKIST] first light, as well as utilize it as a test bed for development of critical ATST instrumentation.

The continued importance of the NSF response to the PRC Report was highlighted by the annual report of the congressionally chartered Astronomy and Astrophysics Advisory Committee in March 2016, which recommended that "[s]trong efforts by NSF for facility divestment should continue as fast as is possible." More recently, in August 2016, the National Academies mid-decadal report, *New Worlds, New Horizons, A Midterm Assessment*, provided their Recommendation 3-1: "The National Science Foundation (NSF) should proceed with divestment from ground-based facilities which have a lower scientific impact, implementing the recommendations of the NSF Portfolio Review, that is essential to sustaining the scientific vitality of the U.S. ground-based astronomy program as new facilities come into operation." (National Academies, 2016)

At present, the Sacramento Peak Observatory serves the solar physics community as the only high-resolution solar facility with extensive spectroscopic capabilities open for community access in the United States and as a development test bed for the high-order AO capability needed for DKIST. However, in a funding-constrained environment, NSF needs to maintain a balanced research portfolio with the largest science return for the taxpayer dollar. Therefore, the purpose of this Proposed Action is to allow NSF to substantially reduce its contribution to the funding of Sacramento Peak Observatory; the need of the Proposed Action is to retain the balanced program recommended by the PRC.

ES.3 Public Disclosure and Involvement

NSF notified, contacted, and/or consulted with agencies, organizations, and individuals during the development of the DEIS. Details of public disclosure and involvement regarding the Proposed Action

include pre-assessment notification letters to agencies and stakeholders, social media announcements, website updates, scientific digests and blogs, newspaper public notices, and a public scoping meeting that was conducted on July 21, 2016, in Alamogordo, New Mexico. The public was encouraged to comment during the comment period associated with the scoping process. NSF gave consideration to public comments when developing the scope of the analyses in this DEIS. USFS requested to be a cooperating agency in the NEPA process. Additional information on the scoping process is provided in Section 5.0, *Notification, Public Involvement, and Consulted Parties*.

ES.4 Alternatives under Consideration

The following Alternatives are considered in detail in this DEIS; additional alternatives that were not considered in detail are also discussed in this DEIS. The basis for the Alternatives includes the public comments received during the public scoping period and input received from the scientific community.

ES.4.1 Alternative 1: Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding

Alternative 1 would involve the transition of site operations of the Sacramento Peak Observatory to interested parties for continued solar astronomy research. NSF would reduce funding of the Sacramento Peak Observatory and the interested parties would be responsible for future maintenance and any future upgrades. Alternative 1 would involve the least change to the current facility and the majority of the telescopes and related research and support facilities would be kept and maintained. This Alternative includes mothballing[1] the John Evans Facility, Grain Bin Telescope, and two Storage facilities, and demolishing the Residential House Trailer and Relocatable Housing, including the Recreation House (21 units). Table 2.3-1 provides a list of the facilities that would remain in operation, or would be mothballed or demolished, for this and the other Alternatives considered. Existing utilities would be maintained. The demolition and mothballing activities described below are meant to describe the most inclusive and conservative (in terms of environmental impacts) scenario, but none of these activities, or a subset of these activities, may ultimately be chosen based on the needs of the interested parties, should this Alternative be selected.

The anticipated activities to implement Alternative 1 include the following:

- Finalize interested parties' operational agreements and maintenance plans.
- Ready designated buildings and structures to be mothballed and turn off nonessential utilities.
- Conduct hazardous materials assessment for asbestos-containing material (ACM), lead-based paint (LBP), and other conditions of concern for structures to be demolished. Remediate as necessary.

[1] Mothball: Remove a facility or structure from daily use while maintaining the general condition for a defined period. Equipment and structures are kept in working order but are not used.

- Demolish and remove the Residential House Trailer and Relocatable Housing (including the Recreation House) to approximately 4 feet (1.2 meters) below existing ground surface grade.
- Re-landscape disturbed areas consistent with the other maintained grounds, as necessary.
- Implement best management practices (BMPs) for each resource area as described in Section 4.0, *Environmental Consequences*.

Operations and maintenance (O&M) activities for Alternative 1 would be comparable to current operations. Under Alternative 1, some onsite staff could potentially be retained by interested parties.

Under Alternative 1, NSF would retain the title to the facilities, but operations would be conducted by the interested parties.

It is anticipated that implementation of Alternative 1 would take approximately 24 weeks to complete. Note that, due to funding constraints, activities under this Alternative may have to occur as multiple discrete events over a longer period of time instead of a single continuous 24-week period.

ES.4.2 Alternative 2: Transition to Partial Operations by Interested Parties with Reduced NSF Funding

Alternative 2 would involve transition of partial operations of the Sacramento Peak Observatory to interested parties. Operations would continue to focus on scientific research and Science, Technology, Engineering, and Mathematics (STEM) education. NSF would reduce funding of the Sacramento Peak Observatory and the additional interested parties would be responsible for future maintenance and any future upgrades. Facilities not needed to meet the anticipated operational goals of the interested parties would be mothballed or demolished. Table 2.3-1 provides a detailed list of the facilities that would remain in operation or would be mothballed or demolished. Existing utilities would be maintained. The demolition and mothballing activities described below are meant to describe the most inclusive and conservative (in terms of environmental impacts) scenario, but none of these activities, or a subset of these activities, may ultimately be chosen based on the needs of the interested parties, should this Alternative be selected.

The anticipated activities to implement Alternative 2 include the following:

- Finalize interested parties' operational agreements and maintenance plans.
- Ready buildings and structures to be mothballed and turn off nonessential utilities.
- Conduct hazardous materials assessment for ACM, LBP, and other conditions of concern for structures to be demolished. Remediate as necessary.
- Demolish and remove the Residential House Trailer and Relocatable Housing (including the Recreation House) to approximately 4 feet (1.2 meters) below existing ground surface grade.

- Re-landscape disturbed areas consistent with the other maintained grounds, as necessary.
- Implement BMPs for each resource area as described in Section 4.0, *Environmental Consequences*.

O&M activities for Alternative 2 would be less than Alternative 1 but would generally be comparable to current operations with regard to the types of activities carried out (i.e., scientific research). Under Alternative 2, some onsite staff could potentially be retained by the interested parties.

Under Alternative 2, NSF would retain title to the facilities, but operations would be conducted by the interested parties.

Implementation of Alternative 2 would be expected to last approximately 24 weeks. Note that, due to funding constraints, activities under this Alternative may have to occur as multiple discrete events over a longer period of time instead of a single continuous 24-week period.

ES.4.3 Alternative 3: Mothballing of Facilities

Alternative 3 would involve mothballing facilities for the purpose of maintaining operational readiness in the event a new operator is identified. This includes mothballing all buildings, with the exception of the Residential House Trailer and Relocatable Housing (including the Recreation House), which would be demolished under this Alternative. Mothballing activities involve removing a facility or structure from daily use while maintaining the general condition of equipment and structures. The intent is to preserve the equipment and structures such that operations could be restarted at some future date without requiring significant repairs. At this time, it is not known what type of operations would be implemented after the mothball period ends, but it is assumed that operations would be similar to the scientific research and educational activities currently occurring at the Sacramento Peak Observatory, with no major change in land use. Mothballing is practical to reduce costs when operating a facility is more expensive than not using the facility. Mothballing would not occur indefinitely, as it is inconsistent with NSF's mission and science priorities to maintain mothballed buildings in perpetuity. If no viable options are identified for operations to be transferred to a new operator, NSF would consider other methods of disposition in coordination with USFS and would complete any additional required environmental analysis at that time, if necessary. Table 2.3-1 provides a detailed list of the facilities that would remain in operation or would be mothballed or demolished. To avoid the costs of mothballing and maintenance for those facilities that would likely not be needed for future operations, this Alternative includes demolition of the Residential House Trailer and Relocatable Housing, including the Recreation House (21 units).

NSF would coordinate with USFS to develop a maintenance and security plan to protect the facilities from deterioration, vandalism, and other damage. The plan NSF would implement may include measures such as closing the road at the entrance to the facility, regular security patrols, and/or other measures to ensure safety and security of the site. If the road is gated, the closure would block access only to the buildings at the Sacramento Peak Observatory and no USFS roads would be impeded. Common

mothballing measures, such as providing proper ventilation, keeping roofs and gutters cleaned of debris, and performing ground maintenance and pest control, would be implemented. All items not needed for periodic maintenance would be removed from the site. Equipment, tools, machinery, furniture, and ancillary items that are no longer needed for operations and that have salvage value would be disposed of in accordance with federal law, transported to another NSF facility, made available as surplus items for other federal agencies, or donated. Select utilities (see Table 2.3-1) would be retained for use by USFS or other nearby entities, if necessary, and maintenance activities for these utilities would be performed by others.

The anticipated activities to implement the demolition components of Alternative 3 include the following:

- Prepare buildings and structures to be mothballed and turn off nonessential utilities.
- Establish site security and conduct periodic facilities maintenance of mothballed buildings and structures.
- Conduct hazardous materials assessment for ACM, LBP, and other conditions of concern for structures to be demolished. Remediate as necessary.
- Demolish and remove the Residential House Trailer and Relocatable Housing (including the Recreation House) to approximately 4 feet (1.2 meters) below existing ground surface grade.
- Re-landscape disturbed areas consistent with the other maintained grounds, as necessary.
- Implement BMPs for each resource area as described in Section 4.0, *Environmental Consequences*.

Operational activities for Alternative 3 would be suspended during the period of time that the facilities are mothballed. It is anticipated that technical staff responsible for operating the facilities would not be retained. Under Alternative 3, some onsite staff responsible for facility maintenance could potentially be retained during the mothball period to keep equipment from deteriorating.

Under Alternative 3, NSF would retain title to all facilities during the mothball period.

Implementation of Alternative 3 would be expected to last approximately 33 weeks. Note that, due to funding constraints, activities under this Alternative may have to occur as multiple discrete events over a longer period of time instead of a single continuous 33-week period.

ES.4.4 Alternative 4: Demolition and Site Restoration

Alternative 4 would involve the removal of all structures to approximately 4 feet (1.2 meters) below existing ground surface grade to enable the restoration of the ground surface topography without limiting future surface operations or activities. All above-grade structures would be removed and demolished, with below-grade structures and foundations stabilized, filled, and abandoned in place. Safe demolition of the aboveground portion of the DST would be accomplished using explosives (in the form of shaped charges,

single detonation event) and conventional demolition equipment. Use of explosives in demolition would be conducted in accordance with a Blast Management Plan developed in coordination with USFS to identify and control safety risks associated with blasting. Excavated areas will be reclaimed using fill materials that are free of known contaminants. Fill materials may contain concrete, masonry, and pavement from onsite or fill material from offsite. If USFS identifies a need to retain any of the buildings, NSF would transfer title and all future maintenance responsibilities for those buildings to USFS, subject to negotiation.

Select utilities may be kept and retained for use by USFS or nearby entities, if necessary (see Table 2.3-1) and maintenance activities for these utilities would be performed by others. Limited site restoration, including removal of debris, re-grading, and replanting, would be necessary. Existing utilities not to be used by USFS or other nearby entities would be air gapped and capped at the property line and abandoned in place. Equipment, furniture, supplies, and building materials would be disposed of offsite or recycled for beneficial reuse.

The anticipated activities to implement Alternative 4 include the following:

- Turn off and cap utilities not to be used by USFS or other nearby entities at the property line or source.
- Conduct hazardous materials assessment for ACM, LBP, and other conditions of concern for structures to be demolished. Remediate as necessary.
- Develop and implement a Mercury Management Plan that would be coordinated with USFS to address the handling, removal, transportation, storage, and disposal/recycling of mercury used in DST.
- Develop and implement a Blast Management Plan to identify and control safety and environmental risks associated with blasting.
- Demolish and remove structures to approximately 4 feet (1.2 meters) below existing ground surface grade.
- Conduct site restoration work: re-grade affected areas to desired elevations and contours; use available concrete rubble as necessary; bring in fill as needed to establish grade.
- Segregate waste, load, and transport to appropriate offsite landfills and recycling.
- Develop and implement a Vegetation Restoration Management Plan consistent with the Lincoln National Forest Land and Resources Management Plan to delineate boundaries for restoration, identify measures to stabilize soils and reestablish vegetation onsite, designate plant species to be

used, and establish a monitoring plan that includes target goals and evaluation metrics. This plan would be developed in coordination with USFS.

- Install soil and vegetation consistent with the Vegetation Restoration Management Plan: place soil where needed to support the growth of desired vegetation; seed and transplant native species; install temporary erosion control (biodegradable fiber mats) where needed; maintain (appropriate watering as needed and weed control) until desired vegetation is established.
- Implement BMPs for each resource area as described in Section 4.0, *Environmental Consequences*.

Operations at the Sacramento Peak Observatory would be discontinued. It is anticipated that staff positions would no longer be needed.

Upon completion of all activities under this Alternative, NSF would be fully divested of any interest in the site.

Implementation of Alternative 4 would be expected to last approximately 43 weeks. Note that, due to funding constraints, activities under this Alternative may have to occur as multiple discrete events over a longer period of time instead of a single continuous 43-week period. In addition, vegetation restoration activities may be implemented over a longer period of time if required by the Vegetation Restoration Management Plan.

ES.4.5 No Action Alternative

Under the No Action Alternative, NSF would continue to fund the Sacramento Peak Observatory at current levels. None of the Proposed Action Alternatives would be implemented. However, this Alternative does not meet the intended purpose or need for the Proposed Action. This Alternative will be used as a baseline against which anticipated environmental impacts of the Proposed Action Alternatives in this DEIS are evaluated.

ES.5 Resources Not Considered in Detail

Initial analysis indicated that certain resource areas would not have the potential for noticeable or measurable impacts under any of the considered Alternatives. These resource areas are identified here and not discussed for the individual Alternatives:

- Air Quality: The Proposed Action could involve short-term emissions associated with demolition. However, the Sacramento Peak Observatory is located in an area that is in full attainment for all National Ambient Air Quality Standards (NAAQS) criteria pollutants (U.S. Environmental Protection Agency [EPA], 2017). Therefore, Clean Air Act conformity analysis is not required and there is no potential for the Proposed Action to cause a violation in Clean Air Act NAAQS. Additionally, BMPs for construction activities would further reduce emissions from the demolition associated with any of the Alternatives. These include the use of ultra-low sulfur diesel fuel, use of clean-burning on- and

off-road diesel engines, restricting vehicle idling times to less than 10 minutes where possible, properly maintaining mechanical equipment, and implementing feasible fugitive dust control measures. Any air quality impacts would be negligible on a regional basis.

- Climate Change: It is anticipated that there would be no change in current greenhouse gas (GHG) emissions or a long-term reduction in GHG emissions from the proposed changes to operations. Short-term GHG emissions from demolition activities would not appreciably affect climate change. There would be a long-term decrease in GHG emissions under Alternative 4, as well as under Alternative 3 during the mothball period.
- Land Use: Because of the relatively small area and remote location, the change in land use among the Alternatives would not be noticeable, with the exception of Alternative 4 (Demolition and Site Restoration). Land use controls under the USFS special use permit or land use agreement would restrict development of the site under Alternative 4.
- Surface Waters: There is no potential for direct or indirect impacts to surface water under any of the Alternatives.
- Utilities: No new utility infrastructure would be required and utility usage would either stay the same or be reduced under any of the Alternatives.

ES.6 Mitigation Measures

Under Alternatives 1 through 4, appropriate mitigation measures, including BMPs, have been identified that would be implemented to reduce the potential for impacts. Mitigation measures that would be implemented include the following.

Biological Resources

- All Alternatives: Equipment used during demolition activities would be cleaned prior to entering National Forest lands to remove any debris or dirt on the equipment and to eliminate the potential for the spread of seed or other propagules of noxious or invasive weeds.
- All Alternatives: Any materials (soil, sod, or seed) must be certified weed-free; native species must be used for seeding and plantings and must be approved by the Lincoln National Forest Botanist.
- All Alternatives: BMPs for worksite marking and stormwater controls would be implemented. Stormwater controls would minimize scour and erosion outside the work area that could otherwise affect habitat quality.
- All Alternatives: Seasonal restrictions would be implemented to avoid demolition work from March 1 through September 30, which is when the Mexican spotted owl and northern goshawk may be breeding and rearing young.

- All Alternatives: Idle restrictions on heavy equipment would be enforced to reduce noise during demolition.
- All Alternatives: No clearing of wooded/forested areas would occur.
- All Alternatives: Proposed demolition work would be performed during daylight hours to avoid effects on nocturnal foraging by Mexican spotted owl.
- All Alternatives: Biological inspections would be conducted to determine whether chipmunks or active burrows are in, or adjacent to, work areas prior to the start of demolition work.
- All Alternatives: Biological inspections of facility buildings slated for demolition would be conducted to determine whether any are being used as bat roosting sites prior to the start of demolition work.
- Alternatives 1 through 3: Disturbed areas would be re-landscaped consistent with the other maintained grounds.
- Alternative 4: Prior to demolition, NSF would conduct biological surveys to determine whether the salamander, or active burrows, are in, or adjacent to, work areas prior to the start of demolition work.
- Alternative 4: A Vegetation Restoration Management Plan would be developed and implemented in coordination with USFS.

Cultural Resources

- All Alternatives: Implement stipulations specified in a Programmatic Agreement prepared pursuant to Section 106 of the National Historic Preservation Act (NHPA). These stipulations would also suffice to address the necessary mitigation for major impacts to cultural resources under NEPA. Specific mitigation measures would be developed in consultation with the State Historic Preservation Office and consulting parties.
- All Alternatives: An unanticipated discovery plan would be developed in coordination with USFS prior to demolition to address archaeological resources that might be discovered during demolition.
- Alternatives 1 through 3: Mothballing of historic properties would be completed in accordance with the National Park Service (NPS) Preservation Brief 31, “Mothballing Historic Buildings” (Park, 2013). Similar methods would be used to preserve and protect historic structures. Preservation and protection of historic instruments and equipment would be completed in accordance with *The Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* (Grimmer, 2017).

Geology and Soils

- All Alternatives: A National Pollutant Discharge Elimination System (NPDES) permit would be obtained from EPA for stormwater discharges associated with the Proposed Action. A Stormwater Pollution Prevention Plan (SWPPP) would be prepared in coordination with USFS as part of the NPDES permit.
- All Alternatives: All demolition would be completed in accordance with industry BMPs and the Special Use Permit issued by USFS.
- All Alternatives: Soil-disturbing activities would take place during periods of snow-free and dry conditions. To the extent practicable, heavy equipment would be used only when the soil is relatively dry or when the ground is frozen to prevent rutting.
- All Alternatives: Demolition scheduling would consider the amount and duration of soil exposed to erosion by wind, rainfall, runoff, and vehicle tracking and would seek to minimize disturbed soil area during the rainy season. The sequence of ground-disturbing activities with the installation and maintenance of soil stabilization and sediment control BMPs would be provided in the Demolition Management Plan that would be approved by USFS.
- All Alternatives: In addition to the measures provided in the SWPPP and where practicable, existing vegetation would be preserved to the maximum extent possible and for as long as possible on the site to reduce erosion in those areas. Erosion control measures would be in place and functional prior to commencement of soil-disturbing activities and would be maintained and remain in place until vegetation is reestablished according to the approved Site Restoration Plan developed in coordination with USFS.
- All Alternatives: Equipment would arrive clean and free of weed propagules.
- All Alternatives: Ground-disturbing activities would be conducted in a manner that minimizes the alteration of existing topography.
- All Alternatives: Disturbed areas would be stabilized and revegetated to minimize the potential for erosion after demolition is completed.
- All Alternatives: A Spill Prevention Control and Countermeasures (SPCC) Plan would be developed in coordination with USFS to address risks to karst features and associated groundwater from potential spills. The SPCC Plan would address equipment inspections, equipment refueling, equipment servicing and maintenance, equipment washing, and the use and storage of any hazardous materials, chemicals, fuels, lubricating oils, and other petroleum products. In the event of an accidental spill or if contamination of water resources is suspected, a hazardous materials specialist would assess the situation and determine the corrective actions to take per state and federal standards.

- All Alternatives: Demolition stormwater controls would be implemented and maintained as required to minimize scour and soil loss from runoff.
- All Alternatives: Before any demolition begins, a geophysical survey would be conducted in accordance with industry standards to inspect designated work areas and note any suspected karst features, including sinkholes, solution cavities, and areas of soil subsidence that could be affected by demolition work. The survey would also evaluate soil stability and the vertical and horizontal projection of sinkholes. These features would be avoided when possible and protected with sandbags, nets, and filter fabric. The identified areas would be monitored during the work for changes such as soil subsidence, collapse, water infiltration and clogging.
- All Alternatives: Previously unknown karst features identified during invasive work activities, including subgrade activities, would be addressed as follows:
  - Work would stop within a 100-foot radius of the karst feature and the feature would be assessed to identify its potential for connectivity to and impact on other karst features such as groundwater conduits, surface water conduits, and caves. The assessment method could include visual assessment, geophysical survey, or other techniques for subsurface characterization of karst features.
  - Karst features would be either isolated or temporarily sealed to minimize impacts during demolition work (e.g., blocked with sandbags and protected with baskets, nets, or filter fabric).
  - In the event that a feature cannot be avoided, or activities are observed to result in changes to the karst features, activities within a 100-foot radius of the feature or change would be stopped and necessary surveys and studies would be completed to determine a path forward that would protect the karst feature.
- Alternative 4: Any use of explosives would be limited to low-force, shaped charges that are designed to transfer the explosive force to only the structure that is designated for removal. All necessary surveys and studies would be completed prior to any blasting activities, and appropriately credentialed and accredited personnel would be used to accomplish the blasting event. A Blast Management Plan would be developed and implemented to identify and control safety and environmental risks associated with blasting.
- Alternative 4: A Vegetation Restoration Management Plan would be developed and implemented.

Groundwater

- All Alternatives: Before demolition begins, a geophysical survey would be conducted to inspect designated work areas and note any suspect karst features that could be affected by demolition work. These features would be avoided when possible and protected with sandbags, nets, and filter fabric.

The identified areas would be monitored during the work for changes such as soil subsidence, collapse, water infiltration, and clogging.

- All Alternatives: Stormwater BMPs would be implemented prior to the start of demolition activities. Erosion control measures such as compost blankets, mulching, riprap, geotextile fabrics, and slope drains could be used to protect exposed soil and minimize erosion. BMPs such as check dams, slope diversions, and temporary diversion dikes could be implemented for runoff control. Sediment control measures that could be implemented include compost filter berms and socks; fiber rolls or berms; sediment basins, rock dams, filters, chambers, or traps; silt fences; and weed-free hay bales. As necessary, water drainage features would be designed to divert water runoff from roads to stabilize vegetated areas. Good housekeeping measures would be practiced during demolition. Site-specific stormwater BMPs would be detailed in a SWPPP, which would be prepared before ground-disturbance activities begin.
- All Alternatives: An SPCC Plan would be developed for the project to address risks to groundwater from potential spills. The SPCC Plan would address equipment inspections, equipment refueling, equipment servicing and maintenance, equipment washing, and the use and storage of any hazardous materials, chemicals, fuels, lubricating oils, and other petroleum products.
- All Alternatives: Previously unknown karst features identified during invasive work activities, including subgrade activities, would be addressed as follows:
  - Work would stop within a 100-foot radius of the feature and the feature would be assessed to identify its potential for connectivity to and impact on other karst features such as groundwater conduits and surface water recharge conduits. The assessment method could include visual assessment, geophysical survey, or other techniques for subsurface characterization of karst features.
  - The karst feature would be either isolated or temporarily sealed to minimize impacts during demolition work (e.g., blocked with sandbags, protected with baskets, nets, or filter fabric).
  - Any use of explosives (Alternative 4 only) would be limited to low-force charges designed to transfer the explosive force only to the structure that is designated for removal.

Hazardous Materials

- All Alternatives: Site characterization and removal or remediation of ACM, LBP, or other hazardous building materials would be completed prior to demolition of structures designated for removal.
- All Alternatives: As necessary, abatement work would include establishing roll-off bins, emergency shower units, portable toilets, and other onsite small equipment and safety facilities, and establishing

curtained enclosures for containment of airborne contaminants and worker safety as required by applicable federal and/or state regulations.

- All Alternatives: Waste management and materials pollution control BMPs would be designed to limit or reduce potential pollutants at their source before they come in contact with stormwater. Pollutants such as LBP would be properly contained.
- All Alternatives: During demolition, hazardous materials and wastes would be used, stored, transported, and disposed of in compliance with applicable laws and regulations.
- All Alternatives: Contractors would create and implement a Spill Response Plan that would be coordinated with USFS for managing hazardous materials onsite and transporting hazardous materials.
- All Alternatives: Fill material, as required, would be free of contaminants regulated by state or federal laws and would be from a certified weed-free source whenever feasible. If possible, soil used as fill material would be sourced proximal to the site and be of the same soil type.
- All Alternatives: NSF would require the demolition contractor to create and implement a Demolition Management Plan that would include, at a minimum, a list of contact persons in case of a possible encounter with undocumented contamination; provisions for immediate notification of the observation to construction management; and notification of the regulatory agency with jurisdiction. If previously unknown contamination is found, demolition would halt in the vicinity of the find and the next steps would be decided in consultation with the regulatory agency. In addition, a Demolition Health and Safety Plan (including compliance with Occupational Health and Safety Act [OSHA] safety protocols) would be developed and implemented for the project. The Demolition Health and Safety Plan would be coordinated with USFS.
- Alternative 4: Site characterization and removal or remediation of contamination would be completed prior to implementing the proposed Alternative.
- Alternative 4: A Mercury Management Plan would be developed and implemented to address the handling, removal, transportation, storage, and disposal/recycling of mercury.
- Alternative 4: A Blast Management Plan would be developed and implemented to identify and control safety and environmental risks associated with explosive blasting. Explosive materials would be used in accordance with federal, state, and local regulations pertaining to explosives (29 C.F.R. §1926.900).

Solid Waste

- All Alternatives: Whenever possible, demolition debris (such as concrete, masonry, etc.) would be used onsite for fill and contouring.
- All Alternatives: Demolition debris would be diverted from the landfill through reuse and recycling to the extent practicable.

Health and Safety

- All Alternatives: A Demolition Health and Safety Plan would be developed and implemented.
- All Alternatives: A Traffic Management Plan would be developed in coordination with USFS and implemented.
- All Alternatives: Sacramento Peak Observatory personnel would comply with OSHA safety protocols.
- All Alternatives: Fencing and signage would be installed around demolition sites.
- Alternatives 1 through 3: A maintenance and security program would be implemented by NSF for mothballed facilities.
- Alternative 4: A Blast Management Plan would be developed and implemented to identify and control safety and environmental risks associated with explosive blasting. Individuals handling explosives would be properly trained and industry standard safety protocols would be implemented.
- Alternative 4: A Mercury Management Plan would be developed and implemented to address the handling, removal, transportation, storage, and disposal/recycling of mercury.

Noise

- All Alternatives: All industrial machinery and equipment would be in good repair and maintained in accordance with the manufacturer's specifications in compliance with Otero County Ordinance 95-02 §170-1.
- Alternative 4: Blasting would be limited to a single event conducted during daylight hours. Any use of explosives would be limited to a single detonation event using low-force charges designed to transfer the explosive force only to the structure that is designated for removal. A site-specific Blast Management Plan would be prepared and would provide more details on the location, duration, timing, charge size, etc., of blasting activities. The Blast Management Plan would also provide an estimation of the air blast overpressure and/or modeling of the sound pressure wave and the potential effects of the wave on the noise-sensitive areas (NSAs). Blasting activities would be expected to be designed to minimize the intensity and duration of noise impacts to nearby NSAs.

Traffic and Transportation

- All Alternatives: A Traffic Management Plan outlining measures to reduce potential traffic-related safety issues and transportation conflicts would be developed in coordination with USFS.
- All Alternatives: Personnel would be notified of all potential height restrictions and overhead obstructions along the roadway network leading to the Sacramento Peak Observatory and along the potential route to the Otero-Greentree Regional Landfill.
- All Alternatives: Vehicles used for material transport would be required to comply with local standards for height, width, and length of vehicles, when practicable. If at any time vehicles of excessive size and weight are required on local roads and bridges, permits would be obtained.
- All Alternatives: To minimize the impacts of demolition to local residents, the contractor would coordinate with local public schools to ensure that the potential route to the landfill does not adversely affect school bus traffic.
- All Alternatives: Transport of materials and demolition vehicles would occur during off-peak hours when practicable.
- All Alternatives: Further detailed demolition materials landfill routing and concerns would be addressed during the detailed design phase of the Proposed Action, including verification that all bridge crossings on the delivery route do not have load restrictions in place that would preclude using the bridges to move the demolition materials.

ES.7 Impact Summary

The impacts for each of the considered Alternatives are presented below. The designated impact level under Alternatives 1 through 4 assumes the BMPs and mitigation measures identified previously would be implemented.

ES.7.1 Alternative 1: Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding

Biological Resources: During demolition, impacts to biological resources would include direct minor, adverse, short-term impacts to common vegetation and wildlife, Peñasco least chipmunk, and Sacramento Mountain salamander, and USFS, Southwestern Region, Regional Forester (RF) sensitive bird, bat, and gopher species; direct, negligible, adverse, short-term impacts to migratory birds, neotropical migratory birds, the Mexican spotted owl, and RF sensitive species of insects; and no impacts to protected plant species. There would be no impacts to biological resources as a result of mothballing or during operations.

Cultural Resources: Demolition would result in a major, adverse, long-term impact to known historic properties that would be considered an adverse effect to historic properties under Section 106 of the

NHPA. There would be beneficial, short-term impacts to known historic properties during operations that would be considered not adverse under Section 106 of the NHPA. No impacts to archaeological resources are expected during either demolition or operation activities.

Visual Resources: Demolition would result in moderate beneficial, long-term impacts to visual resources. There would be no impact during operations.

Geology and Soils: Demolition impacts would include minor, adverse, short-term impacts to soils and no impacts to topography, geologic resources, or karst features. There would be no impacts to these resources during operations.

Groundwater: Demolition would result in minor, adverse, short-term impacts from stormwater runoff. There would be no impacts during operations.

Hazardous Materials: A minor, adverse, short-term impact would result from increased use of hazardous materials during demolition. A negligible, long-term benefit would occur from the reduced use of hazardous materials during operations.

Solid Waste: Minor, adverse, long-term impacts to the capacity of the receiving landfill would occur during demolition as a result of disposing of debris from demolished structures that could not be reused or recycled. There would be no impact to the capacity of the receiving landfill during operations.

Health and Safety: Minor, adverse, short-term impacts to public safety and occupational health, and negligible, adverse, short-term impacts to the protection of children would be expected during demolition. There would be no health and safety impacts resulting from operations.

Noise: Negligible, adverse, short-term impacts from construction equipment and increased traffic would be expected during demolition. There would be a reduction in noise during operations due to decreased activity associated with the demolished buildings, resulting in a negligible, beneficial, short-term impact.

Socioeconomics: No impacts to population or housing would be expected. Demolition activities would result in negligible, adverse, short-term impacts to tourism, education, and outreach. There would be negligible, short-term benefits to employment, income, and the economy. There would be no socioeconomic impacts during operations.

Traffic and Transportation: Minor, adverse, short-term impacts to traffic and transportation would be expected during demolition. No traffic impacts would be expected during operations.

Cumulative Impacts: No significant adverse cumulative impacts to resources would occur under Alternative 1.

ES.7.2 Alternative 2: Transition to Partial Operations by Interested Parties with Reduced NSF Funding

Biological Resources: During demolition, impacts to biological resources would include direct minor, adverse, short-term impacts to common vegetation and wildlife, Peñasco least chipmunk, and Sacramento Mountain salamander, and Southwestern Region RF sensitive bird, bat, and gopher species; direct, negligible, adverse, short-term impacts to migratory birds, neotropical migratory birds, the Mexican spotted owl, and Southwestern Region RF sensitive species of insects; and no impacts to protected plant species. There would be no impacts to biological resources as a result of mothballing or during operations.

Cultural Resources: Demolition activities would result in major, adverse, long-term impacts that would be considered an adverse effect to historic properties under Section 106 of the NHPA. Operations would result in moderate, adverse, short-term impacts to known historic properties that would not be considered adverse under Section 106 of the NHPA. There would be no impacts to archaeological resources expected during either demolition or operations activities.

Visual Resources: Impacts to visual resources during demolition would be moderate, beneficial, and long-term. No impacts to visual resources would occur during operations.

Geology and Soils: Demolition impacts would include minor, adverse, short-term impacts to soils and no impacts to topography, geologic resources, or karst features. There would be no impacts to these resources during operations.

Groundwater: Demolition would result in minor, adverse, short-term impacts from stormwater runoff. There would be no impacts during operations.

Hazardous Materials: A minor, adverse, short-term impact would result from increased use of hazardous materials during demolition. A negligible, long-term benefit would occur from the reduced use of hazardous materials during operations.

Solid Waste: Minor, adverse, long-term impacts to the capacity of the receiving landfill would occur during demolition as a result of disposing of debris from demolished structures that could not be reused or recycled. There would be no impact to the capacity of the receiving landfill during operations.

Health and Safety: Minor, adverse, short-term impacts to public safety and occupational health, and negligible, adverse, short-term impacts to the protection of children would be expected during demolition. There would be no health and safety impacts resulting from operations.

Noise: Negligible, adverse, short-term impacts to noise from construction equipment and increased traffic would be expected during demolition. There would be a reduction in noise during operations due to decreased activity associated with the demolished buildings, resulting in a negligible, beneficial, short-term impact.

Socioeconomics: Demolition activities would result in negligible, adverse, short-term impacts to tourism, education and outreach. There would be negligible, adverse, long-term impacts to employment and income, population, and housing. There would be no socioeconomic impacts during operations.

Traffic and Transportation: Minor, adverse, short-term impacts to traffic and transportation would be expected during demolition. No traffic impacts would be expected during operations.

Cumulative Impacts: No significant adverse cumulative impacts to resources would occur under Alternative 2.

ES.7.3 Alternative 3: Mothballing of Facilities

Biological Resources: During demolition, impacts to biological resources would include direct minor, adverse, short-term impacts to common vegetation and wildlife; direct, negligible, adverse, short-term impacts to migratory birds, neotropical migratory birds, the Mexican spotted owl, Peñasco least chipmunk, Sacramento Mountain salamander, and Southwestern Region RF sensitive bird, bat, gopher, and insect species; and no impacts to protected plant species. There would be minor, beneficial, short-term impacts to common wildlife and minor, beneficial, long-term impacts to neotropical migratory birds and migratory birds during the period when the buildings are mothballed.

Cultural Resources: Demolition activities would result in major, adverse, long-term impacts that would be considered an adverse effect on historic properties under Section 106 of the NHPA. Operations would result in moderate, adverse, short-term impacts to known historic properties that would not be considered adverse under Section 106 of the NHPA. There would be no impacts to archaeological resources expected during either demolition or operations activities.

Visual Resources: Impacts to visual resources during demolition would be moderate, beneficial, and long-term. Visual impacts during the mothball period would be minor, adverse, and short-term.

Geology and Soils: Demolition impacts would include minor, adverse, short-term impacts to soils and no impacts to topography, geologic resources, or karst features. There would be no impacts to these resources during operations.

Groundwater: Demolition would result in minor, adverse, short-term impacts from stormwater runoff. There would be no impacts during operations.

Hazardous Materials: A minor, adverse, short-term impact would result from increased use of hazardous materials during demolition. A negligible, long-term benefit would occur from the reduced use of hazardous materials during the period when the buildings are mothballed.

Solid Waste: Minor, adverse, long-term impacts to the capacity of the receiving landfill would occur during demolition as a result of disposing of debris from demolished structures that could not be reused or

recycled. A negligible, long-term reduction in solid waste generated at the Sacramento Peak Observatory would be expected during the mothball period.

Health and Safety: Negligible, adverse, short-term impacts to public safety and the protection of children, and negligible, beneficial, long-term impacts to occupational health would be expected during demolition. Operations would result in no impacts to occupational health or protection of children and negligible, long-term benefits to public safety.

Noise: Negligible, adverse, short-term impacts to noise from construction equipment and increased traffic would be expected during demolition. There would be a negligible, long-term reduction in noise impacts during operations.

Socioeconomics: Demolition activities would result in negligible, adverse, long-term impacts associated with the loss of onsite housing and recreation facilities. Mothballing would result in negligible, adverse, long-term impacts to employment and income, population, and housing. Minor, adverse, long-term impacts to tourism are expected during the mothballed period. There would be minor, adverse, long-term operations-related impacts to tourism and negligible, adverse, long-term operations-related impacts to population, housing, employment and income, and education and outreach while the buildings are mothballed.

Traffic and Transportation: Minor, adverse, short-term impacts to traffic and transportation would be expected during demolition, and minor, beneficial, short-term impacts would be expected during the period when buildings are mothballed.

Cumulative Impacts: No significant adverse cumulative impacts to resources would occur under Alternative 3.

ES.7.4 Alternative 4: Demolition and Site Restoration

Biological Resources: During demolition, impacts to biological resources would include direct, minor, adverse, short-term impacts to common vegetation and Southwestern Region RF sensitive bird, bat, gopher, and insect species; direct moderate, adverse, short-term impacts to common wildlife, the Peñasco least chipmunk, Sacramento Mountain salamander, the Mexican spotted owl, migratory birds, and neotropical migratory birds; and no impacts to protected plant species.

Cultural Resources: Demolition would result in major, adverse, long-term impacts to known historic properties that would be considered an adverse effect on historic properties under Section 106 of the NHPA. No impacts to archaeological resources are expected during or after demolition.

Visual Resources: Impacts to visual resources would be moderate and long-term because the visual character of the site would be noticeably altered. These impacts may be viewed as adverse or beneficial, depending on an individual's preferences.

Geology and Soils: Demolition would result in moderate, adverse, long-term impacts to karst features, and minor, adverse, short-term impacts to geologic resources, topography, and soils. There would be no impacts to these resources after site restoration following demolition.

Groundwater: Demolition would result in minor, adverse, short-term impacts from runoff and no impacts to this resource after site restoration following demolition.

Hazardous Materials: A minor, adverse, short-term impact would result from increased use of hazardous materials during demolition, with the exception of explosives and the removal, storage, and transport of mercury, which would result in moderate, adverse, short-term impacts. A moderate, long-term benefit would occur from the reduced use of hazardous materials after demolition.

Solid Waste: Moderate, adverse, long-term impacts to the capacity of the receiving landfill would occur during demolition due to disposal of the debris from demolished structures that could not be reused or recycled. A negligible, long-term reduction in solid waste generated at the Sacramento Peak Observatory would be expected at the site after site restoration following demolition.

Health and Safety: Negligible, adverse, short-term impacts to the protection of children during demolition would be expected. Minor, adverse, short-term impacts to occupational health and public safety during demolition may occur. Operations would result in no impacts to occupational health or protection of children and negligible, beneficial, and long-term impacts to public safety.

Noise: Implementation of Alternative 4 would result in a short-term increase in noise, though all major noise impacts would be related to a single blasting event. Negligible, adverse, short-term impacts to noise from construction equipment and increased traffic would be expected during demolition. A decrease in noise associated with operation-related traffic would be expected with the elimination of operations activities, resulting in a negligible, long-term impact.

Socioeconomics: Demolition activities would result in negligible, adverse, short-term impacts to housing. There would be minor, short-term benefits to employment, income, and the economy during demolition. Impacts after demolition would include negligible, adverse, long-term impacts to population, housing, the economy, employment and income, education and public outreach. Minor, adverse, long-term impacts would be expected for tourism. No impacts related to environmental justice are anticipated.

Traffic and Transportation: Minor, adverse, short-term impacts to traffic and transportation would be expected during demolition. A minor, long-term benefit would be expected from reduced traffic after demolition.

Cumulative Impacts: No adverse cumulative impacts to resources would occur under Alternative 4.

ES.7.5 No Action Alternative

Under the No Action Alternative, current operations of the Sacramento Peak Observatory would continue. No demolition or mothballing would occur and no change from current conditions would result. There would be no impacts to resources under the No Action Alternative.

SECTION 1.0

Purpose and Need

This Draft Environmental Impact Statement (DEIS) has been prepared for the National Science Foundation (NSF) to evaluate the potential environmental effects of proposed operation changes due to funding constraints for the Sacramento Peak Observatory in Sunspot, New Mexico. This DEIS was prepared in compliance with the National Environmental Policy Act of 1969 (NEPA) (42 United States Code [U.S.C.] §§4321, *et seq*.); Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (Title 40 *Code of Federal Regulations* [C.F.R.] Parts 1500–1508); and NSF procedures for implementing NEPA and CEQ regulations (45 C.F.R. Part 640). The NEPA process ensures that environmental impacts of proposed major federal actions are considered in the decision-making process and that the public has an opportunity to participate.

Public and regulatory agency scoping on the preliminary Alternatives and issues of concern was initiated with the publication of a Notice of Intent (NOI) to prepare a DEIS in the *Federal Register* on July 5, 2016. A public scoping meeting was held on July 21, 2016, in Alamogordo, New Mexico. NSF considered public and agency comments in developing the scope of the analysis in this DEIS. A summary of comments received during scoping is provided in Section 5.0, *Notification, Public Involvement, and Consulted Parties*.

A public meeting will be held in February 2018 to give the public an opportunity to comment on this DEIS. A Final EIS (FEIS) that considers the comments received on the DEIS will then be prepared. NSF will issue a Record of Decision (ROD) at least 30 days following the publication of the FEIS to conclude the NEPA process. Concurrently with this NEPA process, NSF is implementing its compliance with Section 106 of the National Historic Preservation Act of 1966 (NHPA) as amended (54 U.S.C. §306108, formerly 16 U.S.C. §470f), the implementing regulations promulgated by the Advisory Council on Historic Preservation (ACHP) found at 36 C.F.R. Part 800, Section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. §§1531–1544), and the Department of the Interior and Department of Commerce regulations implementing Section 7 on interagency cooperation (50 C.F.R. Part 402).

1.1 Background and Location

The Sacramento Peak Observatory is located in Sunspot, New Mexico, within the Lincoln National Forest in the Sacramento Mountains (Figure 1.1-1). The project area is located on National Forest System lands, managed by the United States (U.S.) Department of Agriculture, U.S. Forest Service (USFS), Lincoln National Forest, and Sacramento Ranger District. Established by the U.S. Air Force via a Memorandum of Agreement (MOA) with USFS in 1950, the facility was transferred to NSF in 1976. NSF and USFS executed a land use agreement, signed in 1980, to formalize this transfer and the continued use of the land for the Sacramento Peak Observatory.

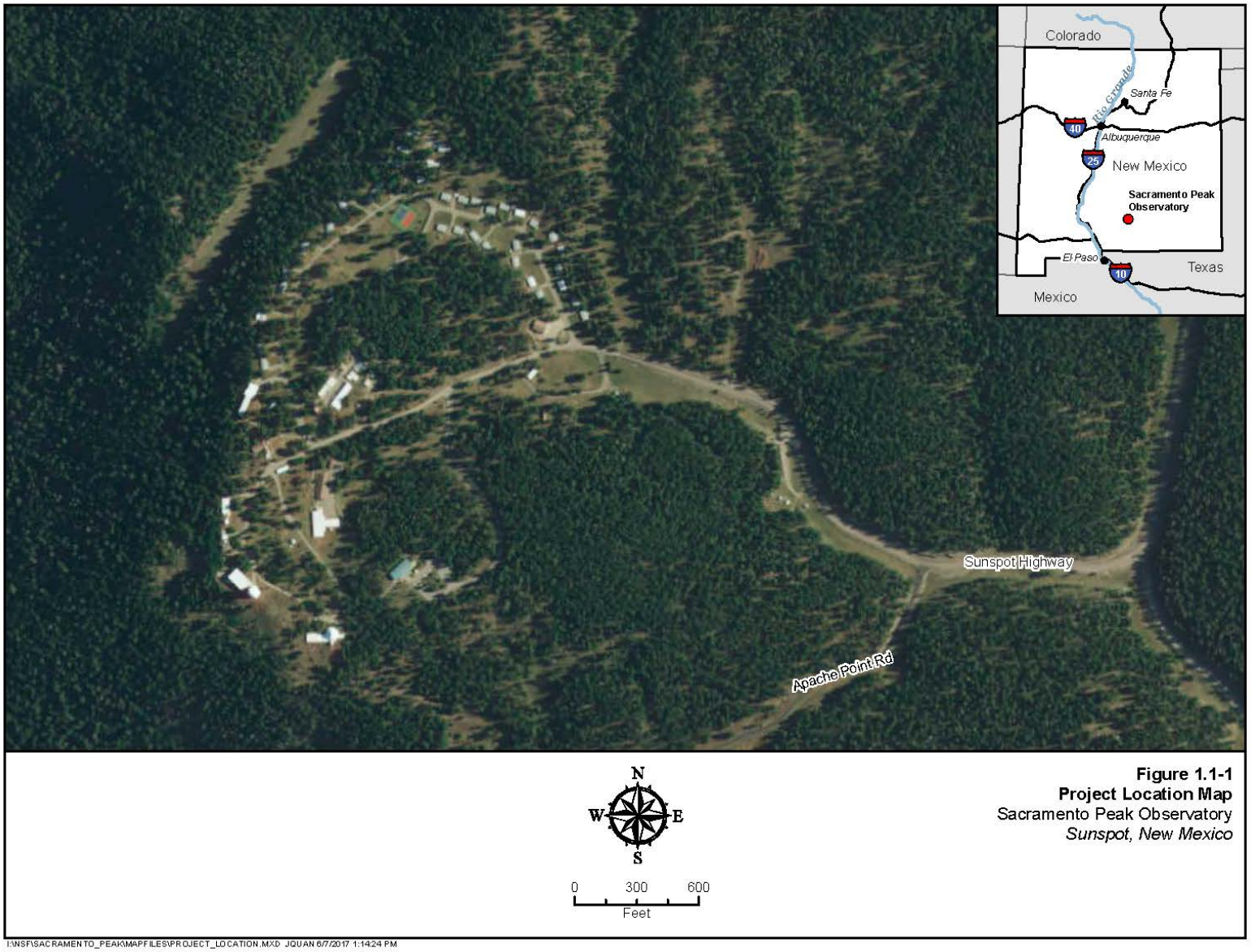


Figure 1.1-1
Project Location Map
Sacramento Peak Observatory
Sunspot, New Mexico

There are 71 NSF-owned structures located on the Sacramento Peak Observatory, along with associated infrastructure, including utility lines, roads, sidewalks, rock walls, and fencing. Two additional structures are located on the property but are not owned by NSF: the Post Office and the Fire Station.

The flagship facility at the Sacramento Peak Observatory is the Richard B. Dunn Solar Telescope (DST), currently managed by the National Solar Observatory (NSO). Construction of DST was completed in 1969. DST is a high-spatial resolution optical solar telescope that allows solar astronomers worldwide to obtain information about the Sun. The structure consists of a 136-foot (42-meter) tower, which extends into the ground approximately 220 feet (67 meters). The telescope optics and instrumentation are suspended from the top of the tower by a mercury float bearing. In addition to DST, the Evans Solar Facility (opened in 1952; currently not in active use), the Hilltop Dome (opened in 1963), the Grain Bin Telescope (1950; currently not in active use), and the ISOON Patrol Dome are located at the Sacramento Peak Observatory (Figure 1.1-2). Approximately 20 individuals are currently employed at the Sacramento Peak Observatory. The Sacramento Peak Observatory hosts approximately 15,000 visitors per year, primarily at the Visitor Center.

The 4-meter Daniel K. Inouye Solar Telescope (DKIST) is currently under construction on Haleakalá in Maui, Hawai'i, and is planned to replace the function of DST for NSO. NSO anticipates ending operations at DST in 2017 and projects an overlap period of 2 years to transfer operations and staff from DST to DKIST.

During NSF's efforts to identify potential interested parties, New Mexico State University (NMSU) expressed interest in the continued use of the Sacramento Peak Observatory for solar research and Science, Technology, Engineering, and Math (STEM) education. In September 2016, NSF announced the award of $1.2 million to NMSU to support efforts to transition the operation of the research facility from the NSO to a university-based consortium led by NMSU.

The NSF award will support science and operations of DST for a 2-year period (September 2016 to August 2018), bridging the gap between the departure of the NSO and the intended development of the NMSU-led Sunspot Solar Observatory Consortium as the primary solar telescope operator beyond 2018. NMSU already operates several telescopes at the adjacent Apache Point Observatory in Sunspot. During this transition, the proposers will begin an innovative science program of long-term, synoptic observations of solar magnetic fields while preparing the facility for consortium operations (NSF, 2016).

1.2 Purpose and Need

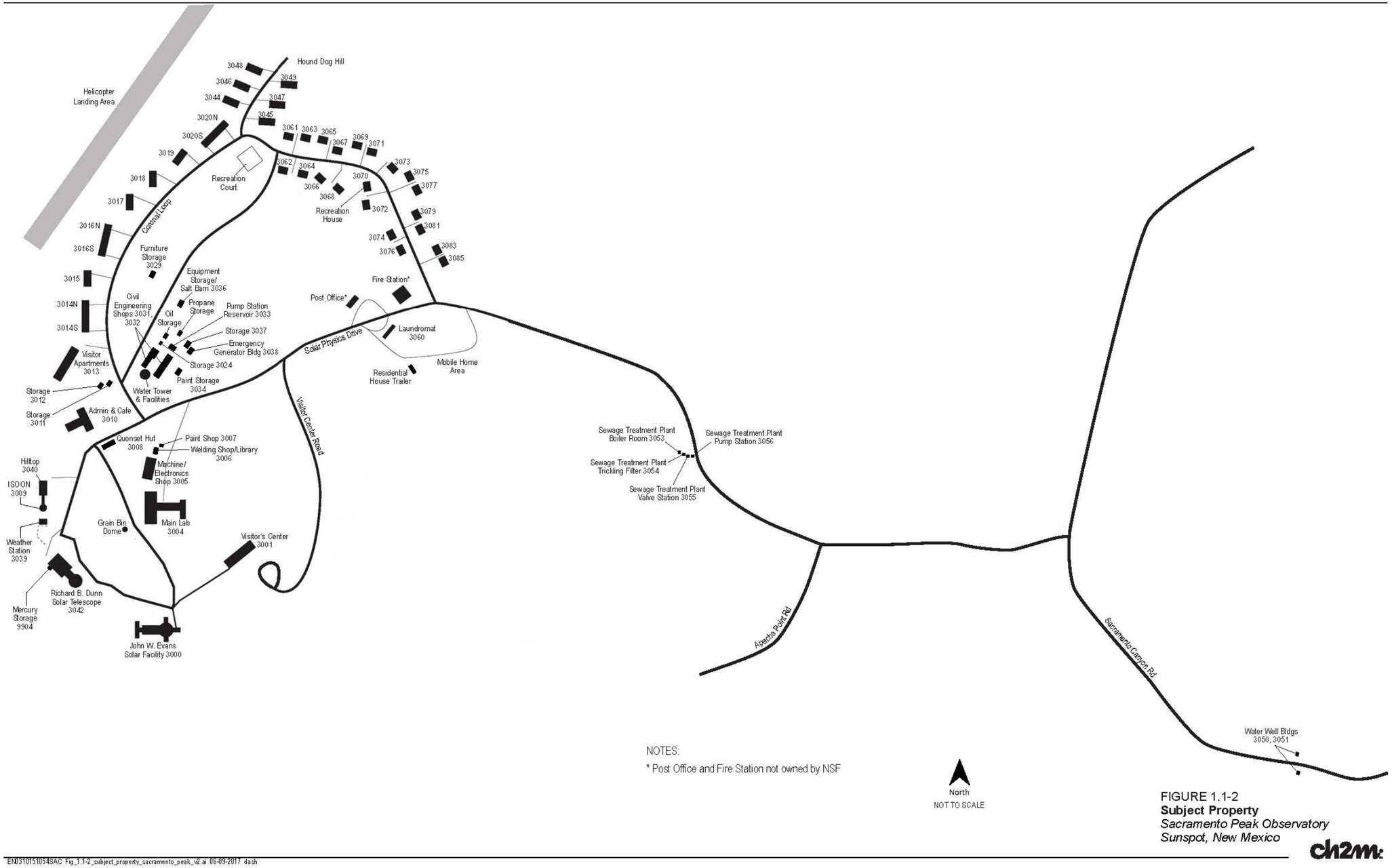
The Division of Astronomical Sciences (AST) of NSF is the federal steward for ground-based astronomy in the United States, funding research by providing awards to individual investigators and small research groups and through cooperative agreements for operation of large telescope facilities. These national and international telescope facilities provide world-leading, one-of-a-kind observational capabilities on a

competitive basis to thousands of astronomers per year. These facilities also enable scientific advances by making archived data products available to researchers. Along with funding telescope facilities and research awards, AST supports the development of advanced technologies and instrumentation and manages the allocation and assignment of specific frequencies in the radio spectrum for scientific use by the entire NSF community.

NSF needs to maintain a balanced research portfolio with the largest science return for the taxpayer dollar. AST is the federal steward for ground-based astronomy in the United States. Its mission is to support forefront research in ground-based astronomy, help ensure the scientific excellence of the United States astronomical community, provide access to world-class research facilities through merit review, support the development of new instrumentation and next-generation facilities, and encourage a broad understanding of the astronomical sciences by a diverse population of scientists, policy makers, educators, and the public at large. AST supports research in all areas of astronomy and astrophysics as well as related multidisciplinary studies. Because of the scale of modern astronomical research, AST engages in numerous interagency and international collaborations. Areas of emphasis and the priorities of specific programs are guided by recommendations of the scientific community, which have been developed and transmitted by National Research Council (NRC; now National Academies) decadal surveys, other National Academies committees, as well as federal advisory committees, such as the Astronomy and Astrophysics Advisory Committee (AAAC) and the Advisory Committee for the Directorate for Mathematical and Physical Sciences (MPSAC).The need for NSF to reduce its participation in the Sacramento Peak Observatory has been established through a number of reviews and surveys conducted by the science community.

In 2006, the AST Senior Review (SR) Committee, a subcommittee of the MPSAC, delivered a report to NSF. This committee of external scientists was charged with examining the AST investment portfolio and finding $30 million in annual savings, primarily from the facilities portion of the AST budget, while following the priorities and recommendations of community reports. The SR made the following recommendations (Section 6.3.4 and Recommendation 7):

> …the Dunn Solar Telescope and its user support should likewise begin ramping down prior to the ATST construction phase, to allow the NSO staff maximum concentration on the all-essential ATST effort (which might include, for example, use of the Dunn to test components of the ATST AO [Adaptive Optics] system)…The National Solar Observatory should organize an orderly withdrawal of personnel and resources, including the Synoptic Optical Long-term Investigations of the Sun telescope, from Kitt Peak/Tucson and Sacramento Peak and start to close down operations at these sites as soon as the Advanced Technology Solar Telescope funding begins.



NOTES:

* Post Office and Fire Station not owned by NSF

North
NOT TO SCALE

FIGURE 1.1-2
Subject Property
Sacramento Peak Observatory
Sunspot, New Mexico

ch2m:

EN\310151054SAC Fig_1.1-2_subject_property_sacramento_peak_v2.ai 06-09-2017 dash

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In 2010, the NRC conducted its sixth decadal survey in astronomy and astrophysics. In its report, *New Worlds, New Horizons in Astronomy and Astrophysics* (NRC, 2010), the NRC committee recommended that:

> NSF-Astronomy should complete its next senior review before the mid-decade independent review that is recommended in this report, so as to determine which, if any, facilities NSF-AST should cease to support in order to release funds for (1) the construction and ongoing operation of new telescopes and instruments and (2) the science analysis needed to capitalize on the results from existing and future facilities.

In response to this recommendation, the NSF Directorate for Mathematical and Physical Sciences (MPS), which includes AST, commissioned a subcommittee of the MPS Advisory Committee to assess the AST portfolio of facilities. This subcommittee, composed solely of external members of the scientific community, was charged with recommending a balanced portfolio to maximize the science recommended by National Academies' surveys of the field that are carried out every decade, under constrained budget scenarios. The resulting Portfolio Review Committee (PRC) Report was released in August 2012 and included recommendations about all of the major AST telescope facilities (NSF, 2012).

The PRC Report recommended divestment of a number of telescopes from the federal portfolio and maintenance of a balance of small, medium, and large programs that would best address the leading-edge scientific questions prioritized by National Academies' decadal surveys. With respect to Sacramento Peak Observatory, the PRC Report made the following recommendation (Recommendation 9.11):

> AST and NSO should plan for the continued use of the Dunn Solar Telescope (DST) as a world-class scientific observatory, supporting the solar physics community, to within 2 years of ATST [now the Daniel K. Inouye Solar Telescope, DKIST] first light, as well as utilize it as a test bed for development of critical ATST instrumentation.

The continued importance of the NSF response to the PRC Report was highlighted by the annual report of the congressionally chartered Astronomy and Astrophysics Advisory Committee in March 2016, which recommended that "[s]trong efforts by NSF for facility divestment should continue as fast as is possible." More recently, in August 2016, the National Academies mid-decadal report, *New Worlds, New Horizons: A Midterm Assessment*, provided their Recommendation 3-1: "The National Science Foundation (NSF) should proceed with divestment from ground-based facilities which have a lower scientific impact, implementing the recommendations of the NSF Portfolio Review, that is essential to sustaining the scientific vitality of the U.S. ground-based astronomy program as new facilities come into operation." (National Academies, 2016)

At present, the Sacramento Peak Observatory serves the solar physics community as the only high-resolution solar facility with extensive spectroscopic capabilities open for community access in the United

States and as a development test bed for the high-order AO capability needed for DKIST. However, in a funding-constrained environment, NSF needs to maintain a balanced research portfolio with the largest science return for the taxpayer dollar. Therefore, the purpose of this Proposed Action is to allow NSF to substantially reduce its contribution to the funding of Sacramento Peak Observatory; the need of the Proposed Action is to retain the balanced program recommended by the PRC. Last year (Fiscal Year 2016), the annual NSF contribution to support the operation of the Sacramento Peak Observatory was $2.2 million, a reduction from previous funding of $3.9 million (Fiscal Year 2012), which consisted of $3.1 million from NSF and $0.8 million from other sources. The reductions since Fiscal Year 2012 did not result in substantial changes to the operation of the Sacramento Peak Observatory, whereas significant additional reductions could result in such changes. Hence, the Proposed Action Alternatives are designed to address the purpose and need of substantially reducing the NSF contribution from its current level to retain a balanced program overall for ground-based astronomy.

1.3 Federal Authorities

This section identifies the federal authorities most relevant to this NEPA analysis.

1.3.1 National Environmental Policy Act

In 1969, Congress enacted NEPA to provide for the consideration of environmental issues in federal agency planning and decision-making. CEQ issued *Regulations for Implementing Procedural Provisions of the National Environmental Policy Act* (40 C.F.R. Parts 1500–1508) to establish the process for federal agency implementation of NEPA. NEPA requires preparation of an Environmental Impact Statement (EIS) for major federal actions that may significantly affect the quality of the human and natural environment. The EIS must disclose to decision makers and the public significant direct, indirect, and cumulative environmental impacts of the considered alternatives to inform decision makers and the public.

1.3.2 National Historic Preservation Act

Section 106 of NHPA (Section 106) requires federal agencies to consider the effects of their proposed undertakings on nationally significant historical properties and to provide the ACHP with a reasonable opportunity to comment on those undertakings. The New Mexico State Historic Preservation Officer (SHPO) serves a critical role in NSF's implementation of its responsibilities under Section 106, and works with NSF to determine whether there are historic properties within the Area of Potential Effects (APE) that are listed or eligible for listing in the National Register of Historic Places (NRHP). If there are such historic properties, NSF will work with the SHPO and consulting parties to determine whether there are adverse effects to those properties and, if so, will consult regarding ways to avoid, minimize, and/or mitigate those adverse effects.

1.3.3 Endangered Species Act

ESA and subsequent amendments thereto provide for the protection and conservation of threatened and endangered species (listed species) of animals and plants and associated habitat. ESA prohibits federal

agencies from funding, authorizing, or implementing actions likely to jeopardize the existence of listed species through direct taking or through the destruction or adverse modification of critical habitat designated for these species under ESA. Section 7 of ESA requires consultation with the U.S. Fish and Wildlife Service (USFWS) when any listed species under its jurisdiction may be affected by a proposed action.

1.4 Agency Notification and Collaboration

NSF began the process of communicating with federal and state regulatory agencies and elected officials, community groups, and relevant commercial interests in July 2016. On July 22, 2016, the USFS requested to be a cooperating agency for this NEPA process. A list of agencies and stakeholders with which NSF communicated may be found in Table 1.4-1. Details regarding regulatory agency and stakeholder coordination throughout the NEPA process are provided in Section 5.0, *Notification, Public Involvement, and Consulted Parties*.

TABLE 1.4-1
Agency and Stakeholder Communication

Federal	ACHP U.S. Army Corps of Engineers (USACE) USFWS USFS U.S. Department of Agriculture/Natural Resources Conservation Service U.S. Senate, State of New Mexico U.S. House of Representatives, State of New Mexico
State of New Mexico	Office of Governor of New Mexico New Mexico State Senate New Mexico House of Representatives New Mexico Environment Department New Mexico State Historic Preservation Officer New Mexico Department of Game and Fish (NMDGF) New Mexico Surface Water Quality Bureau New Mexico State Forestry Division NMSU
Otero County	Otero County Commission Otero Soil and Water Conservation District
City of Cloudcroft	Cloudcroft Chamber of Commerce (COC)
City of Alamogordo	Mayor of Alamogordo Alamogordo City Commission Alamogordo Chamber of Commerce
Other Public-Private Stakeholder Organizations	Apache Point Observatory American Astronomical Society, Solar Physics Division

1.5 Public Disclosure and Involvement

NSF notified, contacted, and/or consulted with agencies, organizations, and individuals during the development of this DEIS. Details of public disclosure and involvement, including pre-assessment notification letters to agencies, social media announcements, website updates, scientific digests and blogs, newspaper public notices, and a public scoping meeting (conducted on July 21, 2016, in Alamogordo, New Mexico), are provided in Section 5.0, *Notification, Public Involvement, and Consulted Parties*. The public was encouraged to comment during the comment period associated with the scoping process. NSF gave consideration to public comments when developing the scope of the analyses in this DEIS.

Additional public disclosure and involvement throughout this NEPA process will be conducted using similar methods. Comments received on this DEIS will be considered in preparing the FEIS and ROD.

1.6 Arrangement and Content of the DEIS

This DEIS is arranged as follows:

1. Executive Summary
2. Section 1.0: Purpose and Need
3. Section 2.0: Description of Proposed Action and Alternatives
4. Section 3.0: Affected Environment
5. Section 4.0: Environmental Consequences
6. Section 5.0: Notification, Public Involvement, and Consulted Parties
7. Section 6.0: List of Preparers
8. Section 7.0: References
9. Section 8.0: Acronyms and Abbreviations
10. Section 9.0: Index

The analysis considers the following resource areas, as these resources would have the potential for environmental impacts under one or more of the Alternatives:

- Biological Resources: Potential impacts to vegetation, wildlife, wetlands, threatened and endangered species, and migratory birds
- Cultural Resources: Potential impacts to NRHP-eligible structures
- Visual Resources: Potential impacts to visual resources and the visual character and quality of the area
- Geologic and Soil Resources: Potential impacts to soil and geologic features
- Groundwater: Potential impacts to groundwater quality

- Hazardous Materials: Potential impacts resulting from hazardous material contamination and the generation of hazardous materials
- Solid Waste: Potential impacts from the generation of solid waste
- Health and Safety: Potential impacts to public health, occupational health, and the protection of children
- Noise: Potential impacts from demolition and traffic noise
- Socioeconomics: Potential impacts from temporary demolition jobs and the loss of existing jobs
- Traffic and Transportation: Potential impacts from demolition traffic

An environmental justice analysis was also conducted to determine whether there are disproportionate impacts to low-income populations anticipated.

The following resource areas are not considered in detail, because there is no potential for noticeable or measurable impacts to these resources:

- Air Quality: The Proposed Action could involve short-term emissions associated with demolition. However, the Sacramento Peak Observatory is located in an area that is in full attainment for all National Ambient Air Quality Standards (NAAQS) criteria pollutants (U.S. Environmental Protection Agency [EPA], 2017). Therefore, Clean Air Act conformity analysis is not required and there is no potential for the Proposed Action to cause a violation in Clean Air Act NAAQS. Additionally, best management practices (BMPs) for construction activities would further reduce emissions from the demolition associated with any of the Alternatives. These include using ultra-low sulfur diesel fuel, using clean-burning on- and off-road diesel engines, restricting vehicle idling times to less than 10 minutes where possible, properly maintaining mechanical equipment, and implementing feasible fugitive dust control measures. Any air quality impacts would be negligible on a regional basis.
- Climate Change: It is anticipated that there will be no change in current greenhouse gas (GHG) emissions or a long-term reduction in GHG emissions from proposed changes to operations. Short-term GHG emissions from demolition activities would not appreciably affect climate change. Note that there would be a long-term decrease in GHG emissions under Alternative 4, as well as under Alternative 3 during the mothball period.
- Land Use: Because of the relatively small area and remote location, the change in land use among the Alternatives would not be noticeable with the exception of Alternative 4 (Demolition and Site Restoration). Land use controls under the USFS special use permit or land use agreement would restrict development of the site under Alternative 4. No impacts to adjacent land uses would occur.

- Rangeland Management: NSF does not conduct rangeland management activities. The land surrounding the Sacramento Peak Observatory is part of an active range allotment used for ranching activities, including grazing. The Proposed Action would not affect any ongoing rangeland management in the Lincoln National Forest. No impacts to rangeland management would occur.
- Surface Waters: There is no potential for direct or indirect impacts to surface waters under any of the Alternatives.
- Utilities: No new utility infrastructure would be required and utility usage would either stay the same or be reduced under any of the Alternatives.

SECTION 2.0

Description of Proposed Action and Alternatives

2.1 Introduction

NSF has defined options for the future operation of the Sacramento Peak Observatory, given the purpose to decrease or eliminate NSF funding of the Sacramento Peak Observatory. NSF sought input regarding viable concepts of operations from the public and scientific community through a community meeting held at the Sacramento Peak Observatory on May 27, 2015 (announced in the April 1, 2015, newsletter of the Solar Physics Division of the American Astronomical Society [*Solar News*, 2015]) and via Town Hall presentations and discussions with the Solar Physics Division in 2015 and 2016. Alternatives were developed based on these meetings and discussions, as well as further conversations with NSO and university personnel, and were included in the NOI published in the *Federal Register* on July 5, 2016.

The scoping process was completed on August 5, 2016. Details of this process are provided in Section 5.0, *Notification, Public Involvement, and Consulted Parties*. Input received during scoping was used to further evaluate the preliminary Alternatives presented in the NOI (Appendix 5A) and focus on the issues to be evaluated.

2.2 Alternatives Eliminated from Further Consideration

One preliminary Alternative was eliminated from further consideration. Safe-abandonment[2] of the Sacramento Peak Observatory facilities, which would suspend operations and reduce or eliminate maintenance costs, had originally been included as one of the preliminary Alternatives to be considered. This preliminary Alternative was discussed with USFS, and NSF agreed that safe-abandonment would not be a desirable alternative for either party because safe-abandoning the structures would leave abandoned buildings within the Lincoln National Forest, which is inconsistent with the USFS mission. Therefore, this preliminary Alternative was not carried forward for further consideration.

2.3 Alternatives Considered

This section describes the Alternatives considered in this DEIS. The basis for these Alternatives reflects consideration of the public comments received during the public scoping period and input received from the scientific community. Activities under each of the Alternatives would be consistent with the Lincoln National Forest Land and Resources Management Plan (USFS, 1986).

[2] Safe-abandon: To remove a building or facility from service without demolition of the structure. This includes removing furnishings, disconnecting utilities, and isolating the structure from public access by fencing or other means to reduce fall and tripping hazards and preclude vandalism. The structure is also made secure from environmental damage due to wind, rain, humidity, and temperature extremes. Pest and insect damage must also be taken into account and biodegradable items must be removed to the maximum extent practicable.

2.3.1 Alternative 1: Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding

Alternative 1 would involve the transition of site operations of the Sacramento Peak Observatory to interested parties for continued solar astronomy research. NSF would reduce funding of the Sacramento Peak Observatory and the interested parties would be responsible for future maintenance and any future upgrades. Alternative 1 would involve the least change to the current facility and the majority of the telescopes and related research and support facilities would be kept and maintained. This Alternative includes mothballing[3] the John Evans Facility, Grain Bin Telescope, and two Storage facilities and demolishing the Residential House Trailer and Relocatable Housing, including the Recreation House (21 units), depending on the needs of the interested party. Table 2.3-1 provides a list of the facilities that would remain in operation, or would be mothballed or demolished, for this and the other Alternatives considered. Existing utilities would be maintained. The demolition and mothballing activities described below are meant to describe the most inclusive and conservative (in terms of environmental impacts) scenario, but none of these activities, or a subset of these activities, may ultimately be chosen based on the needs of the interested parties, should this Alternative be selected.

The anticipated activities to implement Alternative 1 include the following:

- Finalize interested parties' operational agreements and maintenance plans.
- Ready designated buildings and structures to be mothballed and turn off nonessential utilities.
- Conduct hazardous materials assessment for asbestos-containing materials (ACMs), lead-based paint (LBP), and other conditions of concern for structures to be demolished. Remediate as necessary.
- Demolish and remove the Residential House Trailer and Relocatable Housing (including the Recreation House) to approximately 4 feet (1.2 meters) below existing ground surface grade.
- Re-landscape disturbed areas consistent with the other maintained grounds, as necessary.
- Implement BMPs for each resource area as described in Section 4.0, *Environmental Consequences*.

To the extent possible, previously disturbed areas would be used for staging areas for demolition and, as facilities are demolished, the newly cleared area would be used for additional staging if needed and feasible.

Operations and maintenance (O&M) activities for Alternative 1 would be comparable to current operations. Under Alternative 1, some onsite staff could potentially be retained by interested parties.

[3] Mothball: Remove a facility or structure from daily use while maintaining the general condition for a defined period. Equipment and structures are kept in working order but are not used.

Under Alternative 1, NSF would retain the title to the facilities, but operations would be conducted by the interested parties.

Implementation of Alternative 1 would be anticipated to take approximately 24 weeks to complete. Note that, due to funding constraints, activities under this Alternative may have to occur as multiple discrete events over a longer period of time instead of a single continuous 24-week period.

2.3.2 Alternative 2: Transition to Partial Operations by Interested Parties with Reduced NSF Funding

Alternative 2 would involve the transition of partial operations of the Sacramento Peak Observatory to interested parties. Operations would continue to focus on scientific research and STEM education. NSF would reduce funding of the Sacramento Peak Observatory and the additional interested parties would be responsible for future maintenance and any future upgrades. Facilities not needed to meet the anticipated operational goals of the interested parties would be mothballed or demolished. Table 2.3-1 provides a detailed list of the facilities that would remain in operation, or would be mothballed or demolished. Existing utilities would be maintained. The demolition and mothballing activities described below are meant to describe the most inclusive and conservative (in terms of environmental impacts) scenario, but none of these activities, or a subset of these activities, may ultimately be chosen based on the needs of the interested parties, should this Alternative be selected.

The anticipated activities to implement Alternative 2 include the following:

- Finalize interested parties' operational agreements and maintenance plans.
- Ready buildings and structures to be mothballed and turn off nonessential utilities.
- Conduct hazardous materials assessment for ACM, LBP, and other conditions of concern for structures to be demolished. Remediate as necessary.
- Demolish and remove the Residential House Trailer and Relocatable Housing (including the Recreation House) to approximately 4 feet (1.2 meters) below existing ground surface grade.
- Re-landscape disturbed areas consistent with the other maintained grounds, as necessary.
- Implement BMPs for each resource area as described in Section 4.0, *Environmental Consequences*.

To the extent possible, previously disturbed areas would be used for staging areas for demolition and, as facilities are demolished, the newly cleared area would be used for additional staging if needed and feasible.

O&M activities for Alternative 2 would be less than Alternative 1 but would generally be comparable to current operations with regard to the types of activities carried out (i.e., scientific research). Under Alternative 2, some onsite staff could potentially be retained by interested parties.

Under Alternative 2, NSF would retain the title to the facilities, but operations would be conducted by the interested parties.

Implementation of Alternative 2 would be expected to last approximately 24 weeks. Note that, due to funding constraints, activities under this Alternative may have to occur as multiple discrete events over a longer period of time instead of a single continuous 24-week period.

2.3.3 Alternative 3: Mothballing of Facilities

Alternative 3 would involve mothballing facilities for the purpose of maintaining operational readiness in the event a new operator is identified. This includes mothballing all buildings, with the exception of the Residential House Trailer and Relocatable Housing (including the Recreation House), which would be demolished under this Alternative. Mothballing activities involve removing a facility or structure from daily use while maintaining the general condition of equipment and structures. The intent is to preserve the equipment and structures such that operations could be restarted at some future date without requiring significant repairs. At this time, it is not known what type of operations would be implemented after the mothball period ends, but it is assumed that operations would be similar to the scientific research and educational activities currently occurring at the Sacramento Peak Observatory, with no major change in land use. Mothballing is practical to reduce costs when operating a facility is more expensive than not using the facility. Mothballing would not occur indefinitely, as it is inconsistent with NSF's mission and science priorities to maintain mothballed buildings in perpetuity. If no viable options are identified for operations to be transferred to a new operator, NSF would consider other methods of disposition in coordination with USFS and would complete any additional required environmental analysis at that time, if necessary. Table 2.3-1 provides a detailed list of the facilities that would remain in operation, or would be mothballed or demolished. To avoid the costs of mothballing and maintenance for those facilities that would likely not be needed for future operations, this Alternative includes demolition of the Residential House Trailer and Relocatable Housing, including the Recreation House (21 units).

NSF would coordinate with USFS to develop a maintenance and security plan to protect the facilities from deterioration, vandalism, and other damage. The plan NSF would implement may include measures such as closing the road at the entrance to the facility, regular security patrols, and/or other measures to ensure safety and security of the site. If the road is gated, the closure would block access only to the buildings at the Sacramento Peak Observatory and no USFS roads would be impeded. Common mothballing measures, such as providing proper ventilation, keeping roofs and gutters cleaned of debris, and performing ground maintenance and pest control, would be implemented. All items not needed for periodic maintenance would be removed from the site. Equipment, tools, machinery, furniture, and ancillary items that are no longer needed for operations and that have salvage value would be disposed of in accordance with federal law. Select utilities (see Table 2.3-1) would be retained for use by USFS or

other nearby entities, if desired, and maintenance activities for these utilities would be performed by others.

The anticipated activities to implement the demolition components of Alternative 3 include the following:

- Prepare buildings and structures to be mothballed and turn off nonessential utilities.
- Establish site security and conduct periodic facilities maintenance of mothballed buildings and structures.
- Conduct hazardous materials assessment for ACM, LBP, and other conditions of concern for structures to be demolished. Remediate as necessary.
- Demolish and remove the Residential House Trailer and Relocatable Housing (including the Recreation House) to approximately 4 feet (1.2 meters) below existing ground surface grade.
- Re-landscape disturbed areas consistent with the other maintained grounds, as necessary.
- Implement BMPs for each resource area as described in Section 4.0, *Environmental Consequences*.

To the extent possible, previously disturbed areas would be used for staging areas for demolition and, as facilities are demolished, the newly cleared area would be used for additional staging if needed and feasible.

Operational activities for Alternative 3 would be suspended during the period of time that the facilities are mothballed. It is anticipated that technical staff responsible for operating the facilities would not be retained. Under Alternative 3, some onsite staff responsible for facility maintenance could potentially be retained during the mothball period to keep equipment from deteriorating.

Under Alternative 3, NSF would retain the title to all facilities during the mothball period.

Implementation of Alternative 3 would be expected to last approximately 33 weeks. Note that, due to funding constraints, activities under this Alternative may have to occur as multiple discrete events over a longer period of time instead of a single continuous 33-week period.

2.3.4 Alternative 4: Demolition and Site Restoration

Alternative 4 would involve the removal of all structures to approximately 4 feet (1.2 meters) below existing ground surface grade to enable the restoration of the ground surface topography without limiting future surface operations or activities. All above-grade structures would be removed and demolished, with below-grade structures and foundations stabilized, filled, and abandoned in place. Safe demolition of the aboveground portion of the DST would be accomplished using explosives (in the form of shaped charges; single detonation event) and conventional demolition equipment, and would be conducted in accordance with a Blast Management Plan developed in coordination with USFS to identify and control safety risks associated with blasting. Excavated areas will be reclaimed using fill materials that are free of known

contaminants. Fill materials may contain concrete, masonry, and pavement from onsite or fill material from offsite. If USFS identifies a need to retain any of the buildings, NSF would transfer the title and all future maintenance responsibilities for those buildings to USFS, subject to negotiation.

Select utilities maybe kept and retained for use by USFS or nearby entities, if necessary (see Table 2.3-1) and maintenance activities for these utilities would be performed by others. Limited site restoration, including removal of debris, re-grading, and replanting, would be necessary. Existing utilities not to be used by USFS or other nearby entities would be air gapped and capped at the property line and abandoned in place. Equipment, furniture, supplies, and building materials would be disposed of offsite or recycled for beneficial reuse.

The anticipated activities to implement Alternative 4 include the following:

- Turn off and cap utilities not to be used by USFS or other nearby entities at the property line or source.
- Conduct hazardous materials assessment for ACM, LBP, and other conditions of concern for structures to be demolished. Remediate as necessary.
- Develop a Mercury Management Plan in coordination with USFS and implement the plan to address the handling, removal, transportation, storage, and disposal/recycling of mercury used in DST.
- Develop and implement a Blast Management Plan to identify and control safety and environmental risks associated with blasting.
- Demolition and remove structures to approximately 4 feet (1.2 meters) below existing ground surface grade.
- Conduct site restoration work: re-grade affected areas to desired elevations and contours; use available concrete rubble as necessary; bring in fill as needed to establish grade.
- Segregate waste, load, and transport to appropriate offsite landfills and recycling.
- Develop and implement a Vegetation Restoration Management Plan consistent with the Lincoln National Forest Land and Resources Management Plan to delineate boundaries for restoration, identify measures to stabilize soils and reestablish vegetation onsite, designate plant species to be used, and establish a monitoring plan that includes target goals and evaluation metrics. The plan would be developed in coordination with USFS.
- Install soil and vegetation consistent with the Vegetation Restoration Management Plan: place soil where needed to support the growth of desired vegetation; seed and transplant native species; install temporary erosion control (biodegradable fiber mats) where needed; maintain (appropriate watering as needed and weed control) until desired vegetation is established.

- Implement BMPs for each resource area as described in Section 4.0, *Environmental Consequences*.

Operations at the Sacramento Peak Observatory would be discontinued. It is anticipated that staff positions would no longer be needed.

To the extent possible, previously disturbed areas would be used for staging areas for demolition and, as facilities are demolished, the newly cleared area would be used for additional staging if needed and feasible.

Upon completion of all activities under this Alternative, NSF would be fully divested of any interest in the site.

Implementation of Alternative 4 would be expected to last approximately 43 weeks. Note that, due to funding constraints, activities under this Alternative may have to occur as multiple discrete events over a longer period of time instead of a single continuous 43-week period. In addition, vegetation restoration activities may be implemented over a longer period of time if required by the Vegetation Restoration Management Plan.

2.4 No Action Alternative

Under the No Action Alternative, NSF would continue to fund the Sacramento Peak Observatory at current levels. None of the Proposed Action alternatives would be implemented. However, this Alternative does not meet the intended purpose or need for the Proposed Action. This Alternative will be used as a baseline against which anticipated environmental impacts of the Alternatives in this DEIS are evaluated.

TABLE 2.3-1
Summary of Facilities per Alternative

Facility Name	Facilities for Each Alternative			
	Alternative 1 Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding	**Alternative 2 Transition to Partial Operations by Interested Parties with Reduced NSF Funding**	**Alternative 3 Mothballing of Facilities**	**Alternative 4 Demolition and Site Restoration**
Telescopes				
#3000 – John Evans Facility	Mothball	Mothball	Mothball	Demolition
#3002 – Grain Bin Telescope	Mothball	Mothball	Mothball	Demolition
#3040 – Hilltop Dome	Keep and Maintain	Mothball	Mothball	Demolition
#3042 – Vacuum Tower (Dunn Solar) Telescope	Keep and Maintain	Keep and Maintain	Mothball	Demolition
#3009 – ISOON Building (Patrol Dome)	Keep and Maintain	Mothball	Mothball	Demolition
#3001 – Visitor Center	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Operations Support				
#3004 – Main Lab	Keep and Maintain	Mothball	Mothball	Demolition
#3008, 3011, 3012, 3029 – Storage (Quonset Hut)	Keep and Maintain	Mothball	Mothball	Demolition
#3024 – Storage	Mothball	Mothball	Mothball	Demolition
#3031 & #3032 – CE Shops	Keep and Maintain	Keep and Maintain	Mothball	Demolition
#3036 – Equipment Storage / Salt Barn	Keep and Maintain	Keep and Maintain	Mothball	Demolition
#3037 – Storage	Mothball	Mothball	Mothball	Demolition
#3039 – Weather Station	Keep and Maintain	Keep and Maintain	Mothball	Demolition
#3005 – Machine / Electronics Shop	Keep and Maintain	Mothball	Mothball	Demolition
#3006 – Welding Shop / Library	Keep and Maintain	Mothball	Mothball	Demolition

TABLE 2.3-1
Summary of Facilities per Alternative

Facility Name	Facilities for Each Alternative			
	Alternative 1 Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding	**Alternative 2 Transition to Partial Operations by Interested Parties with Reduced NSF Funding**	**Alternative 3 Mothballing of Facilities**	**Alternative 4 Demolition and Site Restoration**
#3010 – Community Center	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Oil Storage	Keep and Maintain	Keep and Maintain	Mothball	Demolition
#9904 – Mercury Storage	Keep and Maintain	Keep and Maintain	Mothball	Demolition
#3034 – Paint Storage	Keep and Maintain	Keep and Maintain	Mothball	Demolition
#3007 – Paint Shop	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Onsite Residential Support				
#3060 – Laundromat	Keep and Maintain	Keep and Maintain	Mothball	Demolition
#3013 – VOQ (Visitor Officers Quarters)	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Redwood Family Housing Duplex Units (3 total)	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Redwood Family Housing Units (10 total)	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Relocatable Family Housing, including the Recreation House (#3070) (21 Total)	Demolition	Demolition	Demolition	Demolition
Recreation Court	Keep and Maintain	Mothball	Mothball	Demolition
Residential House Trailer	Demolition	Demolition	Demolition	Demolition
Site Utilities				
#3038 – Emergency Generator Building and Fuel Storage	Keep and Maintain	Keep and Maintain	Mothball	Demolition
#9909 Power System – Substation and Buried Electrical Lines	Keep and Maintain	Keep and Maintain	Retain	Retain
Buried Sewer, Water, and Gas Lines, and Storm Drain System	Keep and Maintain	Keep and Maintain	Retain	Retain

TABLE 2.3-1
Summary of Facilities per Alternative

Facility Name	Facilities for Each Alternative			
	Alternative 1 Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding	**Alternative 2 Transition to Partial Operations by Interested Parties with Reduced NSF Funding**	**Alternative 3 Mothballing of Facilities**	**Alternative 4 Demolition and Site Restoration**
Water Tower and Buried Water Tanks	Keep and Maintain	Keep and Maintain	Retain	Retain
#3050, 3051 – Water Wells and Water Well Buildings	Keep and Maintain	Keep and Maintain	Retain	Retain
#3033 – Pump Station Reservoir	Keep and Maintain	Keep and Maintain	Retain	Retain
#3053, 3054, 3055, 3056 – Sewage Treatment Plant	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Propane Storage	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Fencing / Rock Walls	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Roads and Sidewalks	Keep and Maintain	Keep and Maintain	Retain	Retain

Note: Under Alternatives 1 and 2, the demolition and mothballing activities describe the most inclusive and conservative (in terms of environmental impacts) scenario, but none of these activities, or a subset of these activities, may ultimately be chosen based on the needs of the interested parties, should the Alternatives be selected.

SECTION 3.0

Affected Environment

This section provides an overview of the existing physical, biological, economic, and social conditions at the Sacramento Peak Observatory. In compliance with NEPA, this description of the affected environment focuses on those resources and conditions potentially impacted by the Proposed Action.

This section is organized by resource area and describes the existing environment at the site. The region of influence (ROI) is also described for each resource. The ROI is defined as the area in which environmental impacts resulting from the Proposed Action could occur.

3.1 Biological Resources

This section describes the biological resources found at the Sacramento Peak Observatory, which include plants and wildlife; wetlands and waterbodies; state and federal threatened, endangered, proposed, and candidate species; USFS, Southwestern Region, Regional Forester (RF) Sensitive Species; Lincoln National Forest management indicator species (MIS), and migratory birds. The ROI for the biological resources analysis encompasses the areas within and immediately adjacent to the Sacramento Peak Observatory, although a broader view was taken as necessary. For example, regional populations were considered for impacts to species stability.

3.1.1 General Setting

The Sacramento Peak Observatory is located within the Rio Grande Rift physiographic province in southern New Mexico. The Rio Grande Rift generally extends from the north to the south of the state as a result of the Colorado Plateau pulling away from the High Plains. To the north, the Rio Grande Rift is narrow and consists of a series of westward stepping basins flanked by rugged mountains. To the south, the Rio Grande Rift broadens below Socorro and then merges with the basin and range province in southwestern New Mexico, where the Sacramento Peak Observatory is located (New Mexico Bureau of Geology and Mineral Resources, 2014). The Sacramento Peak Observatory is located within the Lincoln National Forest on the western ridgeline of the Sacramento Mountains. Elevations within the Lincoln National Forest range from approximately 4,000 feet to approximately 11,500 feet. These elevations include five different life zones, ranging from the Chihuahuan Desert life zone at the lower elevations to the sub-alpine forest life zone at the highest elevations. The Sacramento Peak Observatory is located between the coniferous forest zone and subalpine forest zone at approximately 9,200 feet. The diversity of vegetation systems provides habitat for numerous plants and animals, some of which are rare or have limited distributions (USFS, 2016a).

Biotic communities within the Lincoln National Forest and surrounding Sacramento Mountains are distributed in response to elevation and moisture gradients. The lower foothills are covered with desert

scrub-grassland species and have been largely altered by livestock grazing. Typically above 5,500 to 5,800 feet in elevation, pinyon-juniper (*Pinus edulis*/*Juniperus monosperma* or *Juniperus deppeana*) woodland and dense oak (gambel oak [*Quercus gambelii*] or wavyleaf oak [*Quercus undulata*]) scrub cover canyon walls and ridges. Above 6,800 feet, ponderosa pine (*Pinus ponderosa*) forms open stands that are often mixed with pinyon-juniper on drier slopes or Douglas-fir (*Pseudotsuga menziesii*) on more mesic slopes (USFS, 1998).

The upper elevations of the Sacramento Mountains (above 7,200 feet), where the Sacramento Peak Observatory is situated, are covered with mixed conifer forests, dominated by white fir (*Abies concolor*) or Douglas-fir, mixed with ponderosa pine, southwestern white pine (*Pinus strobiformis*), quaking aspen (*Populus tremuloides*), and small areas of blue spruce (*Picea pungens*) and Engelmann spruce (*Picea engelmannii*). Perennial waterbodies and riparian vegetation are sparse within the Sacramento Mountains. Tree species, including cottonwood (*Populus angustifolia*), willow (*Salix* sp.), and Arizona walnut (*Juglans major*), occur in low-elevation canyons, while shallow canyons at higher elevations are typically dominated by grass and forb species. Forest structure within this region is commonly shaped by insect outbreaks and fire (USFS, 1998).

3.1.2 Vegetation

Habitat on the Sacramento Peak Observatory are classified by USFS as wet mixed conifer with aspen and montane/subalpine grassland. At the Sacramento Peak Observatory, the tree species within the facility boundaries consist primarily of a mix of ponderosa pine, Douglas-fir, and blue spruce. The majority of the site is regularly maintained and exhibits little-to-no understory growth with a variety of mowed grass and forb species. Common herbaceous species identified around facility buildings, roadsides, and walking paths include various grass species (*Festuca* spp.), beefsteak plant (*Perilla frutescens*), common mullein (*Verbascum thapsus*), goldenrods (*Solidago* spp.), gumweed (*Grindelia arizonica*), and the noxious weed musk thistle (*Carduus nutans*). A small amount of understory and shrub growth exists adjacent to facility components and roadsides and includes limber pine (*Pinus flexilis*), gambel oak, and New Mexico locust (*Robinia neomexicana*) (Jenkins and Reaves, 2016). A large number of conifer tree species within the facility have experienced recent insect infiltration and subsequent storm damage, requiring ongoing removal and maintenance (Smaga, 2016).

3.1.3 Wildlife

3.1.3.1 Common Wildlife

Wildlife within the Lincoln National Forest includes an abundance of mule deer (*Odocoileus hemionus*), with population numbers fluctuating depending on the weather conditions. Elk (*Cervus canadensis*), black bear (*Ursus americanus*), white-tailed deer (*Odocoileus virginianus*), and turkey (*Meleagris gallopavo*) are also common fauna to the Lincoln National Forest, and all are regularly hunted (USFS, 1998). Cattle also graze the areas adjacent to the facility boundaries.

3.1.3.2 Lincoln National Forest Management Indicator Species

The Lincoln National Forest Land and Resource Management Plan (USFS, 1986) identifies nine MIS based on the presence of key vegetation community types within the Lincoln National Forest. These include the following:

- Meadowlark (*Sturnella neglecta* or *S. magna*) in the presence of grama galleta grassland (open weedy grasslands); vegetation community type does not occur within the Sacramento Peak Observatory site – species presence unlikely
- Rufous-crowned sparrow (*Aimophila ruficeps*) in desert shrub (brushy mountain slopes); vegetation community type does not occur within the Sacramento Peak Observatory site – species presence unlikely
- Juniper titmouse (*Baeolophuys ridgwayi*) in woodland areas (trees with natural cavities); vegetation community type does not occur within the Sacramento Peak Observatory site – species presence unlikely
- Pygmy nuthatch (*Sitta pygmaea*) in ponderosa pine forest (snags and large trees); vegetation community type occurs within areas adjacent to the Sacramento Peak Observatory site – potential species presence
- Hairy woodpecker (*Picoides villosus*) in aspen forests (aspen snags and mature aspen); Aspen occurs within and near the Sacramento Peak Observatory site – potential species presence
- Mule deer (*Odocoileus hemionus*) in woodlands (scrubby cover, browse species present, closed landscape); vegetation community type occurs near the Sacramento Peak Observatory site but onsite conditions are unfavorable due to lack of brushy understory – species presence unlikely except as transient
- Elk and Mexican vole (*Microtus mexicanus*) in mixed conifer forest (conifer forest, mountain meadows, areas with little or no grazing); vegetation community type occurs within areas adjacent to the Sacramento Peak Observatory site – potential species presence
- Red squirrel (*Tamiasciurus hudsonicus*) in Engelmann spruce forest (mixed conifer forest with interlocking crowns and trees of cone-bearing age); vegetation community type does not occur within the Sacramento Peak Observatory site – species presence unlikely

The three potentially occurring MIS (pygmy nuthatch, hairy woodpecker, and elk) are analyzed for potential impacts in Section 4.0, *Environmental Consequences*.

3.1.4 Wetlands

No wetlands are known to occur within the Sacramento Peak Observatory boundaries. No permanent surface water features, including perennial or intermittent stream channels, have been identified within

the site. A small swale is located within the facility and runs parallel to Sunspot Highway, crossing under Visitor Center Road. This swale is fully vegetated, lacks a defined bed and bank, and exhibits no discernible surface connection to downstream waters. This swale may in rare or extreme cases of stormwater flow conduct runoff offsite where runoff could enter tributaries of the Sacramento River (Jenkins and Reaves, 2016; DeLorenzo, 1995).

3.1.5 Federally and State-Listed Threatened, Endangered, Proposed, and Candidate Species

This section addresses species listed as threatened or endangered under the ESA, species proposed for listing or candidate species for listing under the ESA, and species listed as threatened or endangered by the State of New Mexico. Collectively, these species will be referred to as protected species in subsequent discussions.

A USFWS Information for Planning and Conservation (IPaC) report was generated for the Municipality of Sunspot, New Mexico (USFWS, 2017a). IPaC is a project planning tool that provides identification and distribution of important biological resources such as federally listed species and designated critical habitat for those species that may be affected by a proposed project.

The IPaC report identified federally listed species with the potential to occur in the Municipality of Sunspot, including four bird, two mammal, and five plant species (Table 3.1-1). The USFS maintains a list of federally listed species found within the Lincoln National Forest; these include the same species identified in the USFWS IPaC report plus the addition of two plant and one fish species. Based on the habitat requirements of those species identified by the USFWS and USFS, one bird, one mammal, and one plant species have the potential to occur in the vicinity of the Sacramento Peak Observatory as indicated in Table 3.1-1. NMDGF identified four additional bird, two additional mammal, one reptile, and one amphibian state-listed species with the potential to occur in the general area surrounding the Municipality of Sunspot (NMDGF, 2016; Table 3.1-1). Based on the habitat requirements of those species, the one amphibian is the only species that has the potential to occur in the vicinity of the Sacramento Peak Observatory as indicated in Table 3.1-1.

TABLE 3.1-1
Federally and State-Listed Threatened, Endangered, Proposed, and Candidate Species Known to Occur in the Vicinity of Sunspot, New Mexico

Common Name	Species Name	Status	Habitat	Potential to Occur at the Sacramento Peak Observatory
Birds				
Least Tern	*Sterna antillarum*	FE, SE	Sparsely vegetated riverine sandbars, dike field sandbar islands, sand and gravel pits, and lake and reservoir shorelines (USFWS, 1990a).	No

TABLE 3.1-1
Federally and State-Listed Threatened, Endangered, Proposed, and Candidate Species Known to Occur in the Vicinity of Sunspot, New Mexico

Common Name	Species Name	Status	Habitat	Potential to Occur at the Sacramento Peak Observatory
Mexican Spotted Owl	*Strix occidentalis lucida*	FT	Ponderosa pine-gambel oak, mixed-conifer, and riparian forests. Nesting and roosting habitat typically occurs in well-structured forests with high canopy cover, large trees, and other late seral characteristics (USFWS, 1995).	Yes
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	Exp, NE, SE	Yucca-covered sand ridges in coastal prairies, riparian woodlands in open grasslands, and in desert grasslands with scattered mesquite and yucca (USFWS, 1990b).	No
Yellow-Billed Cuckoo	*Coccyzus americanus*	FT	Wooded habitat with dense cover and nearby water features, including woodlands with low, scrubby, vegetation, abandoned farmland, and dense thickets along streams and marshes (USFWS, 2017b).	No
Peregrine Falcon	*Falco peregrinus*	ST	Utilize habitats containing cliffs and almost always nest near water and open habitats for foraging. Non-breeding Peregrine Falcons may also occur in open areas without cliffs and artificial habitats such as towers, bridges, and buildings (USFWS, 2016).	No
Elegant Trogon	*Trogon elegans*	SE	Primary habitat is tropical deciduous forest, but also occurs in lowland and montane moist forest, lowland dry and most shrubland, and plantations (Cornell Lab of Ornithology [Cornell], 2016a).	No
Gould's Wild Turkey	*Meleagris gallopavo mexicana*	SE	Bottomland hardwood forests to upland woods and pine forests. Areas must be interspersed with pastures, grasslands, or agricultural land and other openings that can provide feeding, dusting, and brooding habitat (USFS, 1992a).	No
Gray Vireo	*Vireo vicinior*	ST	Desert scrub, mixed juniper, or pinyon pine and oak scrub associations, and chaparral, in hot, arid mountains and high plains scrubland (Cornell, 2016b).	No
Mountain Plover	*Charadrius montanus*	PT	Species prefers open ground with little or no cover for roosting and breeding which include alkaline flats. Habitat also includes shortgrass prairie and open mountain terraces (USFWS, 2017c).	No
Mammals				
New Mexico Meadow Jumping Mouse	*Zapus hudsonius luteus*	FE, SE	Riparian wetlands along streams that include dense, riparian herbaceous vegetation primarily composed of hydrophytic sedges and forbs (USFWS, 2014).	No

TABLE 3.1-1
Federally and State-Listed Threatened, Endangered, Proposed, and Candidate Species Known to Occur in the Vicinity of Sunspot, New Mexico

Common Name	Species Name	Status	Habitat	Potential to Occur at the Sacramento Peak Observatory
Peñasco Least Chipmunk	*Tamias minimus atristriatus*	FC, SE	Non-forested habitats dominated by shrubs, rocks, or dense herbaceous vegetation, or forested habitats dominated by trees that do not have limbs close to the ground (quaking aspen, ponderosa pine) (USFWS, 2011).	Yes
Arizona Shrew	*Sorex arizonae*	SE	Rocky, narrow-walled canyons with riparian corridors associated with mature evergreen oak-pine forest. Dense leaf litter and forest debris, such as downed logs, provide cover for foraging shrews (AGFD, 2016a).	No
Arizona Montane Vole	*Microtus montanus arizonensis*	SE	Damp to wet grassy areas at high (alpine-like) elevations. Often found in marshy areas or near streams at elevations 6,900 to 9,500 feet, mostly above 7,500 feet (AGFD, 2016b).	No
Plants				
Kuenzler Hedgehog Cactus	*Echinocereus fendleri* var. *kuenzleri*	FE	Lower fringes of pinyon-juniper woodland with dominant overstory of *Juniperus monosperma* at lower elevations (5,800 feet) and *Juniperus deppeana* and *Pinus edulis* at higher elevations (6,400 feet) (USFWS, 1985).	No
Lee's Pincushion Cactus	*Escobaria sneedii* var. *leei* (formerly *Coryphantha sneedii* var. *leei*)	FT	Species grows in semi-desert grassland and is restricted to north-facing ledges of the Tansil Limestone Formation. Populations occur at elevations of 3,900 to 4,900 feet surrounded by sparse vegetation and low shrubs (USFWS, 1986).	No
Sneed's Pincushion Cactus	*Escobaria sneedii* var. *sneedii (formerly Coryphantha sneedii* var. *sneedii*)	FE	Species grows in semi-desert grassland and is restricted to cracks on vertical cliffs or ledges of limestone. Populations occur at elevations of 3,900 to 7,700 feet (USFWS, 1986).	No
Sacramento Mountains Thistle	*Cirsium vinaceum*	FT	Requires saturated soils at springs, seeps, and streams with soils containing calcium carbonate (USFWS, 1993).	Potential occurrence on property but not in proposed work areas
Sacramento Prickly Poppy	*Argemone pleiacantha* ssp. *pinnatisecta*	FE	Rocky canyons ranging in elevation from 4,200 feet to 7,120 feet. Typically found on natural and man-disturbed sites with significant water supply, including dry stream beds, stream banks, pipeline rights-of-way, and roadsides (USFWS, 1994).	No
Todsen's Pennyroyal	*Hedeoma todsenii*	FE	Occurs where pinyon pine and one seed juniper (*Juniperus monosperma*) are the dominant species at elevations ranging from 6,200 feet to 7,400 feet. Typically found on steep, north-facing slopes with a surface layer of gravelly cobble and	No

TABLE 3.1-1
Federally and State-Listed Threatened, Endangered, Proposed, and Candidate Species Known to Occur in the Vicinity of Sunspot, New Mexico

Common Name	Species Name	Status	Habitat	Potential to Occur at the Sacramento Peak Observatory
			thin layer of conifer litter (USFWS, 2001).	
Wright's Marsh Thistle	*Cirsium wrightii*	FC	Strictly a wetland species that occupies alkaline spring seeps at low to moderate elevations. Inhabits the Chihuahuan Desert floristic region and can occur at moderate elevations in pinyon-juniper woodlands (USFWS, 2008).	No
Fish				
Rio Grande Chub	*Gila pandora*	FC	Distribution includes the Upper Rio Grande and Pecos River systems in Colorado and New Mexico. Species prefers flowing pools of headwater streams and small rivers (USFS, 2005).	No
Reptiles				
Rock Rattlesnake	*Crotalus lepidus*	ST	Rocky mountainous areas, including talus slopes, gorges, rimrock, limestone outcrops, and rocky streambeds, often in arid or semi-arid areas vegetated with pine-oak, oak-juniper, pinyon pine, ponderosa pine, or agave (IUCN, 2016).	No
Amphibians				
Sacramento Mountain Salamander	*Aneides hardii*	ST	Douglas-fir, Engelmann spruce, and white fir forests. Typically found on north- and east-facing slopes; often found in canyons in rotting logs, rock crevices, or under forest litter (NatureServe, 2016).	Yes

Notes:

FE – Federally Endangered; FT – Federally Threatened; FC – Federal Candidate; Exp, NE – Federal Experimental, Non-Essential; PT – Proposed Threatened; SE – State Endangered; ST – State Threatened

Species identified as potentially occurring on the Sacramento Peak Observatory but that lack suitable habitat within the Sacramento Peak Observatory are not further discussed. State-listed species that are also listed as Southwestern Region RF Sensitive Species, but not federally listed, are described in Section 3.1.6, *U.S. Forest Service Sensitive Species*. Federally threatened or endangered species that may occur at the Sacramento Peak Observatory are discussed in greater detail below. NSF consulted with USFWS under Section 7 of the ESA for federally listed and candidate species with the potential to occur on the Sacramento Peak Observatory. USFWS agreed with the findings of NSF's Biological Assessment (BA) and concluded consultation under Section 7 in a letter dated July 25, 2017. Copies of correspondence are provided in Appendix 3A; a copy of the BA is provided in Appendix 3B. NSF would reinitiate Section 7 consultation with USFWS if (1) new information reveals the action may affect listed species or critical habitat in a manner, or to an extent, not previously considered, (2) the action is subsequently modified in

a manner that causes an effect to the listed species or critical habitat not previously considered, or (3) a new species is listed or critical habitat designated that may be affected by the action.

The Mexican spotted owl (federally threatened), Sacramento Mountains thistle (federally threatened), and the Peñasco least chipmunk (a candidate species for listing under the ESA) are discussed below. The state-threatened Sacramento Mountain Salamander is discussed with other Southwestern Region RF Sensitive Species in Section 3.1.6, *U.S. Forest Service Sensitive Species*.

Mexican Spotted Owl (*Strix occidentalis lucida*)

The Mexican spotted owl is a federally threatened species known to occur within ponderosa pine-gambel oak, mixed-conifer, and riparian forests. Nesting and roosting habitat typically occurs in well-structured forests with high canopy cover, large trees, and other late seral characteristics. Steep, narrow rocky canyons formed by parallel cliffs with numerous caves and ledges also provide suitable habitat for this species. Designated critical habitat for this species has been identified within large portions of the Lincoln National Forest, encompassing the Sacramento Peak Observatory, and the Sacramento Peak Observatory site is designated as restricted (recovery) habitat. The primary threats to habitat and population of this species have transitioned more recently from timber harvest to increasing risk of stand-replacing wildland fire (USFWS, 1995). Preliminary prey base data collected within the Lincoln National Forest suggest that the owl uses three main food sources: wood rats, deer mice, and voles. Canopy cover and herbaceous ground story materials are important prey habitat conditions (DeLorenzo, 1995).

Primary constituent elements (PCEs), which are specific elements of physical or biological features that provide for a species' life-history processes, are essential to the conservation of the species. PCEs related to the maintenance of adequate prey species (USFWS, 2004, 2012) associated with Mexican spotted owl occupancy include high volumes of fallen trees and other woody debris; wide range of tree and plant species, including hardwoods; and adequate levels of residual plant cover to maintain fruits and seeds and allow plant regeneration. Current conditions at the Sacramento Peak Observatory do not provide any of the defined PCEs related to maintaining a prey base because of the lack of woody debris; the limited species diversity across all strata, including tree species; and the absence of residual plant cover as a result of maintained landscaping.

Forest meadow habitat is not identified as a PCE or as a contributing element to PCEs, but this habitat can support voles (USFWS, 2004), which are one of the main food sources for Mexican spotted owls. There are no forest meadows within the proposed work areas. The grassed areas around buildings that may be demolished are maintained at a low height through regular mowing and provide very poor habitat for voles, which prefer taller grasses (USFWS, 2012). Grasslands along the road on the eastern portion of the property may support voles, but these areas are heavily grazed by cattle, which is not conducive to

providing good habitat for voles (USFWS, 2004) and tends to reduce the abundance of small mammals (for example, see Rosenstock, 1996).

Because of the existing level of human activity from both tourists and operational staff, managed vegetation, and the extensive cattle activity such as grazing immediately surrounding the site, the overall foraging and roosting habitat for the Mexican spotted owl is considered to be of low quality.

Protected Activity Centers (PACs) for the Mexican spotted owl have been identified in areas surrounding the Sacramento Peak Observatory. PACs are areas that encompass a minimum of 600 acres surrounding known Mexican spotted owl nests or roost sites (USFWS, 1995). One PAC is located 0.7-mile southeast of the Sacramento Peak Observatory and is bisected by Sacramento Canyon Road (identified in January 1987). Eight additional PACs have been identified in the area surrounding the Sacramento Peak Observatory, ranging in distance from 0.9-mile to 2.6 miles (identified between January 1987 and October 2003). The Sacramento Peak Observatory does not occur within an identified PAC for the Mexican spotted owl (USFWS, 2012). The prey habitat conditions are somewhat limited at the facility as a result of regular maintenance surrounding buildings and roadsides. Areas with mixed conifer or Ponderosa pine with an oak tree component are present at the Sacramento Peak Observatory and are considered suitable or capable habitat for nesting and roosting. However, no evidence of activity or individuals of Mexican spotted owl were observed during a reconnaissance-level field survey[4] (Jenkins and Reaves, 2016). The Mexican spotted owl is addressed in greater detail in the BA prepared as part of NSF's Section 7 consultation efforts (NSF, 2017; see Appendix 3B).

Sacramento Mountains Thistle (*Cirsium vinaceum*)

The Sacramento Mountains thistle is a federally threatened species restricted to the Sacramento Mountains of south-central New Mexico. Populations occur mostly in the Lincoln National Forest in mixed conifer/mountain meadow associations. The species occurs in wetlands or saturated soils areas associated with springs, streams, and seeps (USFWS, 1987, 1993). No wetlands or saturated soil conditions exist within or adjacent to proposed work sites under any of the Alternatives. The nearest potentially suitable habitat is along the road at the eastern end of the Sacramento Peak Observatory, where a drainage parallels the road on its northern side. This area is actively grazed by cattle with open access to the drainage. Cattle grazing and associated trampling is considered a major threat to the Sacramento Mountains thistle (USFWS, 2010), and the level of cattle grazing along the road leading east from the Sacramento Peak Observatory makes it unlikely that the Sacramento Mountains thistle would occur in this area. The Sacramento Mountains thistle is not known to occur on the Sacramento Peak

[4] Reconnaissance-level survey conducted by two experienced biologists and consisted of investigation of developed and undeveloped areas of the Observatory to collect observations on habitats, vegetation, and wildlife. This survey did not follow any species-specific protocols.

Observatory, but according to the USFS, its occurrence has been documented within approximately 0.5-mile of the Sacramento Peak Observatory. The Sacramento Mountains thistle is addressed in greater detail in the BA prepared as part of NSF's Section 7 consultation efforts (NSF, 2017).

No critical habitat has been designated for the Sacramento Mountains thistle.

Peñasco Least Chipmunk (*Tamias minimus atristriatus)*

The Peñasco least chipmunk is a federal candidate species found only in the Sacramento and White Mountains, contiguous mountain ranges in southern New Mexico. This species tends to occupy non-forested habitats such as those dominated by shrubs, rocks, or dense herbaceous vegetation, or forested habitats dominated by trees that do not have limbs close to the ground (quaking aspen, ponderosa pine). The seeds of shrubs and forbs are their main food source, though they also feed on arthropods, leaves, fruits, flowers, and fungi (USFWS, 2011). Given the regularly maintained nature of the Sacramento Peak Observatory, which includes trees without limbs close to the ground and surrounding habitat of dense herbaceous vegetation outside the facility boundaries, there is potential for this species to occur within the area. Because the Peñasco least chipmunk has not been listed as threatened or endangered under the ESA, no critical habitat has been designated for the Peñasco least chipmunk.

The Peñasco least chipmunk is addressed in greater detail in the BA prepared as part of NSF's Section 7 consultation efforts (NSF, 2017).

Federally and State-Listed Threatened and Endangered Species Excluded from Detailed Analysis

Through NSF's coordination with USFS, 12 federally listed species with the potential to occur in the general area were excluded from detailed analysis and are not discussed in this EIS because of the lack of presence in the geographical area, unsuitable habitat conditions, and/or lack a "high probability of occurrence" in the Sacramento Ranger District. Lee's pincushion cactus (*Escobaria sneedii* var. *leei* (formerly *Coryphantha sneedii* var. *leei*) and Sneed's pincushion cactus (*Escobaria sneedii* var. *sneedii* (formerly *Coryphantha sneedii* var. *sneedii*) may occur elsewhere in the Lincoln National Forest but are not known to occur in or near the Sacramento Ranger District, which includes the Sacramento Peak Observatory, and will not be affected by the Proposed Action (Table 3.1-1; USFS, 2016b). Todsen's pennyroyal (*Hedeoma todsenii*), Kuenzler's hedgehog cactus (*Echinocereus fendleri* var. *kuenzleri*), Sacramento prickly poppy (*Argemone pleiacantha* spp. *pinnatisecta*), Wright's marsh thistle (*Cirsium wrightii*), New Mexico meadow jumping mouse (*Zapus hudsonicus luteus*), and Rio Grande chub (*Gila Pandora*) may occur in the Sacramento Ranger District but these species are not known to occur in, or have habitat in, the project area and will not be affected by the Proposed Action. The least tern (*Sterna antillarum*), Northern Aplomado falcon (*Falco femoralis septentrionalis*), yellow-billed cuckoo (*Coccyzus americanus*), and mountain plover (*Charadrius montanus*) are not known to occur within the

Lincoln National Forest or Sacramento Ranger District. For the reasons stated above, these 12 species are not included in detailed analysis in this document.

3.1.6 U.S. Forest Service Sensitive Species

This section addresses species that have been identified by USFS as having the potential to occur within the Lincoln National Forest. This discussion does not include any sensitive species previously addressed: species listed as threatened or endangered under the ESA or species proposed for listing or candidate species for listing under the ESA. The Southwestern RF maintains a list of RF Sensitive Species for the Lincoln National Forest. Southwestern Region RF Sensitive Species that occur on the Sacramento Ranger District, excluding those species previously discussed in Section 3.1.5, *Federally and State-Listed Threatened, Endangered, Proposed, and Candidate Species*, are listed in Table 3.1-2.

TABLE 3.1-2
U.S. Forest Service, Southwestern Region, Regional Forester Sensitive Species that Occur on the Sacramento Ranger District

Common Name	Species Name	Status	Habitat	Potential to Occur at the Sacramento Peak Observatory
Birds				
Northern Goshawk	*Accipiter gentilis*	NL	Mature or old-growth conifer, mixed hardwood-conifer, birch, or aspen forest for nesting. Species can also found in younger forests intermingled with mature trees with high canopies for nesting. Sites near forest openings or edges for foraging (Reynolds *et al.*, 1992).	Yes
Bald Eagle	*Haliaeetus leucocephalus*	Bald and Golden Eagle Protection Act	Winter resident, roosts in large trees that offer protection from weather that typically are near water. Intolerant of human activity and never observed at the Observatory (USFWS, 2007).	No
Insects				
Sacramento Mountains Checkerspot Butterfly	*Euphydryas anicia cloudcrofti*	NL	Species inhabits meadows within the upper montane and subalpine mixed-conifer forest at elevations between 7,800 and 9,000 feet in the vicinity of the Village of Cloudcroft, Otero County, New Mexico. The adult butterfly is often found in association with the larval food plants, New Mexico penstemon (*Penstemon neomexicanus*) and valerian (*Valeriana edulis Nutt.*) (USFWS, 2005).	Yes
Mammals				
Pale Townsend's Big-Eared Bat	*Corynorhinus townsendii pallescens*	NL	Species is primarily associated with mesic habitats characterized by coniferous and deciduous forests and riparian habitat, although it also occurs in xeric areas. The species also occurs in man-made structures and tunnels, mines, and the basal hollows of old-growth redwood trees within western U.S. coastal areas (Desert Renewable Energy Conservation Plan [DRECP], 2012).	Yes
Spotted Bat	*Euderma maculatum*	NL	This species occurs in various habitats from desert to montane coniferous stands, including open ponderosa pine, pinyon-juniper woodland, canyon bottoms, riparian and river corridors, meadows, open pasture, and hayfields. Active foraging may be mostly in open terrain, including forest clearings, meadows, and open wetlands, sometimes	Yes

TABLE 3.1-2
U.S. Forest Service, Southwestern Region, Regional Forester Sensitive Species that Occur on the Sacramento Ranger District

Common Name	Species Name	Status	Habitat	Potential to Occur at the Sacramento Peak Observatory
			in open areas near buildings (NatureServe, 2017a).	
Western Red Bat	*Lasiurus blossevillii*	NL	In Arizona and New Mexico, these bats have been captured in riparian habitats dominated by cottonwoods, oaks, sycamores, and walnuts (rarely found in desert habitats), including riparian restoration sites along the lower Colorado River (NatureServe, 2017b).	No
New Mexico Shrew	*Sorex neomexicanus*	NL	Habitat includes mesic conifer-aspen forest in sheltered canyons, meadows, and in leaf litter in canyons of coniferous forests, often along streams (NatureServe, 2017c).	No
Snails				
Rio Grande Snaggletooth	*Gastrocopta riograndensis*	NL	Species is found in thin soil accumulations on small ledges of xeric south-facing limestone cliffs in the Sacramento Mountains of New Mexico (NatureServe, 2017d).	No
Ruidoso Snaggletooth	*Gastrocopta ruidosensis*	NL	Found on bare soil, under stones, and in thin accumulations of grass thatch and juniper litter on mid-elevation carbonate cliffs and xeric limestone grasslands along the eastern slopes of the Sangre de Cristo and Sacramento Mountains in eastern New Mexico (NatureServe, 2017e).	No

Note: NL – Not Listed

The American peregrine falcon, gray vireo, rock rattlesnake, and Rio Grande chub are Southwestern Region RF Sensitive Species determined to have no potential to occur in the project area in Section 3.1.5, *Federally and State-Listed Threatened, Endangered, Proposed, and Candidate Species*, and are not further discussed. The Sacramento Mountain salamander, discussed in Section 3.1.5, was identified as potentially occurring in the project area and is discussed in the following sections along with other Southwestern Region RF Sensitive Species with potential to occur in the project area. These include the northern goshawk (*Accipiter gentilis*), the Sacramento Mountains checkerspot butterfly (*Euphydryas anicia cloudcrofti*), the Pale Townsend's big-eared bat (*Corynorhinus townsendii pallescens*), and the spotted bat (*Euderma maculatum*). These five species are described below.

Sacramento Mountain Salamander (*Aneides hardii*)

The Sacramento Mountain salamander is a state-threatened species that also is a Southwestern Region RF Sensitive Species. The Sacramento Mountain salamander occurs in the Sacramento Mountains, in Otero and Lincoln counties. It is generally associated with Douglas-fir and spruce at elevations from 7,850 to 11,700 feet, where it is found under large woody debris or rocks. Dominant overstory includes Douglas-fir and white fir with lesser amounts of Engelmann spruce and southwestern white pine (NMDGF, 2016). Based on the typical forested vegetation found at the Sacramento Peak Observatory, which includes

Douglas-fir, white fir, and some white pine, there is potential for this species to occur within the area. Surveys for this species were conducted within the Sacramento Peak Observatory and surrounding Lincoln National Forest area between 1987 and 2006. No Sacramento Mountain salamanders have been identified within the Sacramento Peak Observatory; however, potential habitat occurs within portions of the facility. Proximal areas where the salamander has been identified include the valley immediately south of the Sacramento Peak Observatory, approximately 500 feet from the nearest facility building (USFS, 2016b).

Northern Goshawk (*Accipiter gentilis*)

The northern goshawk is an identified Southwestern Region RF Sensitive Species by USFS for the Lincoln National Forest. This species prefers mature or old-growth conifer, mixed hardwood-conifer, birch, or aspen forest for nesting and can also be found in younger forests intermingled with mature trees with high canopies for nesting. Sites near forest openings or edges for foraging also appear to be a preference for the northern goshawk. Food habits vary depending on season and region, but typically consist of small rodents, squirrels, large songbirds, and small to medium-sized game birds (Cornell Lab of Ornithology, 2018). Post-fledging family areas (PFAs) have been identified in areas surrounding the Sacramento Peak Observatory. PFAs are areas that typically include a variety of forest types and conditions and correspond to a northern goshawk pair. PFAs are important for fledglings and will be used by a goshawk pair from the time the young leave the nest until they are no longer dependent on the adults for food (USFS, 1992b). Three PFAs have been identified by the USFS within proximity to the Sacramento Peak Observatory and include one area of approximately 640 acres occurring immediately to the southeast between Apache Point Road and Sacramento Canyon Road (identified in January 1989). Two additional PFAs occur approximately 1.7 miles east and 2.4 miles northeast from the Sacramento Peak Observatory and are approximately 685 acres (identified in January 1989) and 640 acres (identified in January 1987), respectively (USFS, 2016b). Occurrences of this species within the Sacramento Peak Observatory are possible because of the proximity of potential habitat of mixed hardwood-conifer within the surrounding areas of the Lincoln National Forest and past identification of PFAs.

Sacramento Mountains Checkerspot Butterfly (*Euphydryas anicia cloudcrofti*)

The Sacramento Mountains checkerspot butterfly is a high-elevation, mountain meadow butterfly endemic to the Sacramento Mountains. This species inhabits meadows within the upper montane and subalpine mixed-conifer forest at elevations between 7,800 and 9,000 feet in the vicinity of the Village of Cloudcroft, Otero County, New Mexico. The adult butterfly is often found in association with the larval food plants New Mexico penstemon (*Penstemon neomexicanus*) and valerian (*Valeriana edulis*). Adult nectar sources include species such as orange sneezeweed (*Helenium hoopesii*). This species is considered to be highly selective of egg-laying sites and larval food sources which primarily include New Mexico penstemon, a narrowly endemic perennial forb that grows in south-central New Mexico (USFWS, 2005). Small pockets of forest openings and areas surrounding the Sacramento Peak Observatory exhibit similar

montane meadow characteristics and would exhibit potential egg-laying and larval habitat for this species; therefore, there is potential for this species to occur within the project area.

Pale Townsend's Big-Eared Bat (*Corynorhinus townsendii pallescens)*

The pale Townsend's big-eared bat ranges throughout the western U.S., occurring in a continuous distribution in all of the western states and east into western South Dakota, northwestern Nebraska, southwestern Kansas, western Oklahoma, and western Texas. This species of bat is primarily associated with mesic habitats characterized by coniferous and deciduous forests and riparian habitat. The species also occurs in man-made structures and tunnels, mines, and the basal hollows of old-growth redwood trees in coastal California. Unlike cave-roosting bat species, pale Townsend's big-eared bat only roosts in the open, often hanging from walls and ceilings. During summer, females roost in the warm parts of caves and buildings in clusters (DRECP, 2012). The existing mixed conifer forest habitat surrounding and within portions of the Sacramento Peak Observatory may provide low- to moderate-quality habitat for this species, and some of the less frequently used structures at the facility may provide potential summer roost habitat. There is low to moderate potential for this species to occur within and adjacent to the Sacramento Peak Observatory facility.

Spotted Bat (*Euderma maculatum*)

Range for the spotted bat encompasses western North America from southern British Columbia south to California, Arizona, and western and central New Mexico to central Mexico. This species occurs in various habitats from desert to montane coniferous stands, including open ponderosa pine, pinyon-juniper woodland, canyon bottoms, riparian and river corridors, meadows, open pasture, and hayfields. Foraging habitat may occur within open terrain, including forest clearings, meadows, open wetlands, and sometimes in open areas near buildings. Maternity roosts are generally in cracks and crevices in cliffs, sometimes in caves or in buildings near cliffs (NatureServe, 2017a). The existing open nature of the vegetation structure at the Sacramento Peak Observatory may provide some foraging habitat for this species; however, it is unlikely that the spotted bat would use the facility or the immediately surrounding area for maternity roosting due to lack of cracks and crevices in cliffs, or buildings located near cliffs. Incidental summer roosting in buildings or structures that are infrequently used is possible.

Regional Forester Sensitive Species Excluded from Detailed Analysis

Through NSF's coordination with USFS, five Southwestern Region RF Sensitive Species with the potential to occur within the Sacramento Ranger District were excluded from detailed analysis and are not discussed in this DEIS because of the lack of presence in the geographical area, unsuitable habitat conditions, and/or lack of a "high probability of occurrence." Bald eagle (*Haliaeetus leucocephalus*), western red bat (*Lasiurus blossevillii*), New Mexico shrew (*Sorex neomexicanus*), Rio Grande snaggletooth (*Gastrocopta riograndensis*), and Ruidoso snaggletooth (*Gastrocopta ruidosensis*) occur

within the Lincoln National Forest Sacramento Ranger District, but there is no suitable habitat in the project area and these five species would not be affected by the Proposed Action.

Neotropical Migratory Birds

The Lincoln National Forest region provides habitat for neotropical migratory birds (NTMBs) that are protected under the MBTA. Further, the Neotropical Migratory Bird Conservation Act (NMBCA) was enacted to provide funding to addresses migratory bird population needs on a larger continental scale and conserves bird species that typically winter south of the U.S. border and summer in North America (USFWS, 2017d). The USFS has identified 310 NTMB species that are likely to occur within the Lincoln National Forest. Of these, 31 species have been identified as high-priority and have the potential to occur within the Sacramento Ranger District. Species previously discussed that are state- or federally threatened or endangered or Southwestern Region RF Sensitive Species are not further discussed in this section. Table 3.1-3 examines the potential for these species to occur within the Sacramento Peak Observatory facility based on existing vegetation types and potential habitat.

TABLE 3.1-3
Lincoln National Forest High-Priority Neotropical Migratory Birds (Sacramento Ranger District)

Common Name	Species Name	Habitat[a]	Potential to Occur on the Sacramento Peak Observatory
Desert Shrub			
Bank Swallow	*Riparia*	Arroyos and dry washes with banks	No
Black-Chinned Sparrow	*Spizella atrogularis evura*	Brush fields	No
Black-Tailed Gnatcatcher	*Polioptila melanura*	Low elevation washes	No
Crissal Thrasher	*Toxostoma dorsale crissale*	Proximity to dry washes	No
Lark Bunting	*Calamospiza melanocorys*	Low desert areas	No
McCown's Longspur	*Calcarius mccownii*	Desert grasslands and short grass areas	No
Prairie Falcon	*Falco mexicanus*	Desert grasslands	No
Summer Tanager	*Piranga rubra*	Riparian areas below 5,500 feet	No
Varied Bunting	*Passerina versicolor*	Thorn brush in canyons and at low elevations	No
Scaled Quail	*Callipepla squamata pallida*	Desert grasslands, canyon brush, and pinyon-juniper forest	No
Black-Chinned Hummingbird	*Archilochus alexandri*	Arroyos, dry washes, medium riparian areas within pinyon-juniper forest	No
Loggerhead Shrike	*Lanius ludovicianus*	Desert grasslands up to 7,000 feet	No
Pinyon-juniper Forest			
Black-Throated Gray Warbler	*Dendroica nigrescens*	Mature pinyon-juniper forest with dense canopy and dominated by pinyon	No

TABLE 3.1-3
Lincoln National Forest High-Priority Neotropical Migratory Birds (Sacramento Ranger District)

Common Name	Species Name	Habitat[a]	Potential to Occur on the Sacramento Peak Observatory
Green-Tailed Towhee	*Pipilo chlorurus*	Brush fields	No
Montezuma Quail	*Cyrtonyx montezumae mearnsii*	Pinyon-juniper and ponderosa pine forest	Unlikely and only as incidental due to elevation
Gray Flycatcher	*Empidonax wrightii*	Pinyon-juniper with some ponderosa pine and shrub oak	No
Virginia's Warbler	*Vermivora virginiae*	Ponderosa pine/pinyon high elevation	Yes
Plumbeous Vireo	*Vireo plumbeus*	Brush mixed woods	No
Band-Tailed Pigeon	*Columba fasciata*	Pinyon-juniper, ponderosa pine, and mixed conifer forest	Yes
Pinyon Jay	*Gymnorhinus cyanocephalus*	Pinyon-juniper forest	No
Ponderosa Pine Forest			
Dusky Flycatcher	*Empidonax oberholseri*	Ponderosa pine and mixed conifer forest	Yes
Flammulated Owl	*Otus flammeolus*	Ponderosa pine and mixed conifer forest	Yes
Grace's Warbler	*Dendroica graciae*	Ponderosa pine forest	Yes
Olive-Sided Flycatcher	*Contopus cooperi*	Mixed conifer and high elevation pine forest	Yes
Red-Faced Warbler	*Cardellina rubrifrons*	Ponderosa pine and mixed conifer forest with oak understory	Yes
Williamson's Sapsucker	*Sphyrapicus thyroideus nataliae*	Ponderosa pine and mixed conifer forest	Yes
Red-Naped Sapsucker	*Sphyrapicus nuchalis*	Aspen forest and high elevation riparian areas	Yes, but not within proposed work areas
Broad-Tailed Hummingbird	*Selasphorus platycercus*	Wet meadows within pine habitat	Yes, but not within proposed work areas
Painted Redstart	*Myioborus pictus*	High- to mid-elevation riparian and semi-riparian areas	No
Mixed Conifer			
Golden-Crowned Kinglet	*Regulus satrapa*	High-elevation mixed conifer forest	Yes
Macgillivray's Warbler	*Oporornis tolmiei*	High-elevation riparian areas with brush fields	Yes, but not within proposed work areas

[a] Habitat information and Lincoln National Forest NTMB species list provided by USFS (2016a).

NTMB species typically associated with low-elevation desert shrub and dry wash vegetation communities are not likely to occur at the facility. The areas surrounding the Sacramento Peak Observatory contain a mixed conifer forest interspersed with grazed open meadow. Plants common to this forest type include ponderosa pine, Douglas-fir, white fir, and quaking aspen at higher elevations. At the Sacramento Peak Observatory, the tree species within the proposed work areas consist primarily of a mix of ponderosa pine, Douglas-fir, and blue spruce. The majority of the site is regularly maintained and exhibits little-to-no understory growth with a variety of mowed grass and forb species. Vegetation types within the proposed work areas provide suitable habitat for nine NTMB species, including Virginia's warbler (*Vermivora virginiae*), band-tailed pigeon (*Columba fasciata fasciata*), dusky flycatcher (*Empidonax oberholseri*), flammulated owl (*Otus flammeolus*), Grace's warbler (*Dendroica graciae graciae*), olive-sided flycatcher (*Contopus cooperi*), red-faced warbler (*Cardellina rubrifrons*), Williamson's sapsucker (*Sphyrapicus thyroideus nataliae*), and golden-crowned kinglet (*Regulus satrapa*). Additionally, nearby habitat on the Sacramento Peak Observatory is suitable for the red-naped sapsucker (*Sphyrapicus nuchalis*), broad-tailed hummingbird (*Selasphorus platycercus platycercus*), and Macgillivray's warbler (*Oporornis tolmiei*). Because of the proximity of the habitat, these birds may occur as incidentals within or adjacent to proposed work areas.

3.1.7 Migratory Birds

The Sacramento Mountains region provides habitat for migratory birds. A USFWS IPaC resource report was generated for Otero County, New Mexico, and identified 23 migratory bird species that could be affected by the Proposed Action (USFWS, 2017e). Two of these migratory species are the bald eagle and the golden eagle, which are afforded additional federal protections under the Bald and Golden Eagle Protection Act (16 U.S.C. §§668-668d). The 23 species are identified below and those that would not occur at the Sacramento Peak Observatory are noted.

- Bald eagle (*Haliaeetus leucocephalus*) – wintering resident, no suitable habitat and would not occur
- Black-chinned sparrow (*Spizella atrogularis*) – breeding season resident, no suitable habitat and would not occur
- Brewer's sparrow (*Spizella breweri*) – wintering resident, no suitable habitat and would not occur
- Burrowing owl (*Athene cunicularia*) – breeding resident, no suitable habitat and would not occur
- Cassin's sparrow (*Aimophila cassinii*) – breeding resident, no suitable habitat and would not occur
- Chestnut-collard longspur (*Calcarius ornatus*) – breeding resident
- Flammulated owl (*Otus flammeolus*) – breeding resident
- Golden eagle (*Aquila chrysaetos*) – year-round resident
- Grace's warbler (*Dendroica graciae*) – breeding resident, no suitable habitat and would not occur
- Gray vireo (*Vireo vicinior*) – breeding resident

- Lewis's woodpecker (*Melanerpes lewis*) – wintering resident, no suitable habitat and would not occur
- Loggerhead shrike (*Lanius ludovicianus*) – year-round resident, no suitable habitat and would not occur
- McCown's longspur (*Calcarius mccownii*) – wintering resident
- Peregrine falcon (*Falco peregrinus*) – year-round resident, no suitable habitat and would not occur
- Pinyon jay (*Gymnorhinus cyanocephalus*) – year-round resident, no suitable habitat and would not occur
- Rufous-crowned sparrow (*Aimophila ruficeps*) – year-round resident, no suitable habitat and would not occur
- Short-eared owl (*Asio flammeus*) – wintering resident, no suitable habitat and would not occur
- Snowy plover (*Charadrius alexandrines)* – breeding resident, no suitable habitat and would not occur
- Sonoran yellow warbler (*Dendroica petechia* ssp. *sonorana*) – migrating resident
- Swainson's hawk (*Buteo swainsoni*) – breeding resident
- Virginia's warbler (*Vermivora virginiae*) – breeding resident
- Western grebe (*Aechmophorus occidentalis*) – breeding resident
- Williamson's sapsucker (*Sphyrapicus thyroideus*) – wintering resident

3.2 Cultural Resources

Cultural resources include historic architectural properties (including buildings, structures, and objects), prehistoric and historic archaeological sites, historic districts, designed landscapes, and traditional cultural properties (TCPs). Three sub-resources (architectural properties, archaeological sites, and TCPs) are further defined at the end of this section.

The primary federal authorities that apply to cultural resources are NEPA and Section 106 of the NHPA (54 U.S.C. §306108). Cultural resources are specifically included under one of the mandates of NEPA: to "preserve important historic, cultural, and natural aspects of our national heritage…." (42 U.S.C. §4331). The implementing regulation for NHPA is the Protection of Historic Properties (36 C.F.R. Part 800), which defines historic properties as any prehistoric or historic district, site, building, structure, or object that is included in, or eligible for inclusion in, the NRHP (36 C.F.R. §800.16). As stated in 36 C.F.R. §800.8(a)(1), the NHPA encourages federal agencies to coordinate compliance with NEPA to maximize the timely and efficient execution of both statutes and to allow the federal agency, in this case NSF, to use its procedures for public involvement under NEPA to fulfill the public involvement requirements for Section 106 (36 C.F.R. §800.2(d)(3)). Note that this is not equivalent to using NEPA to comply with Section 106 "in lieu of" the standard Section 106 process as described in 36 C.F.R. §800.8(c).

3.2.1 Area of Potential Effects

The ROI for cultural resources is also referred to as the APE. The APE for the Alternatives is defined as Sacramento Peak Observatory's overall property limits, which includes the main Observatory area; the Sewage Treatment Plant and associated water wells, as well as the section of Sunspot Highway that connects this area to the main Observatory; and the remains of the helicopter landing area northwest of the Observatory. The Observatory's overall property limits are defined in the land use agreement executed between NSF and USFS in 1980 as the Compound Area. SHPO proposed that the Compound Area (overall property limits) should be used as the APE on March 1, 2017, and May 18, 2017, and NSF agreed. The APE encompasses all buildings and structures associated with the Sacramento Peak Observatory that were 45 years old or older at the time of the cultural resources survey in January 2015. The standard NRHP age threshold is 50 years; however, using 45 years as the cutoff allows a 5-year buffer for the execution of any Alternative. The total acreage of the APE is approximately 250 acres, with approximately 83 acres developed and the remaining acreage undeveloped. The cultural resources survey was conducted in those areas where buildings or roads associated with the Sacramento Peak Observatory are present. The APE is located within U.S. Geological Survey (USGS) Topographic Quadrangle Map Sacramento Peak (2013) (Figure 3.2-1).

NHPA Section 106 Process

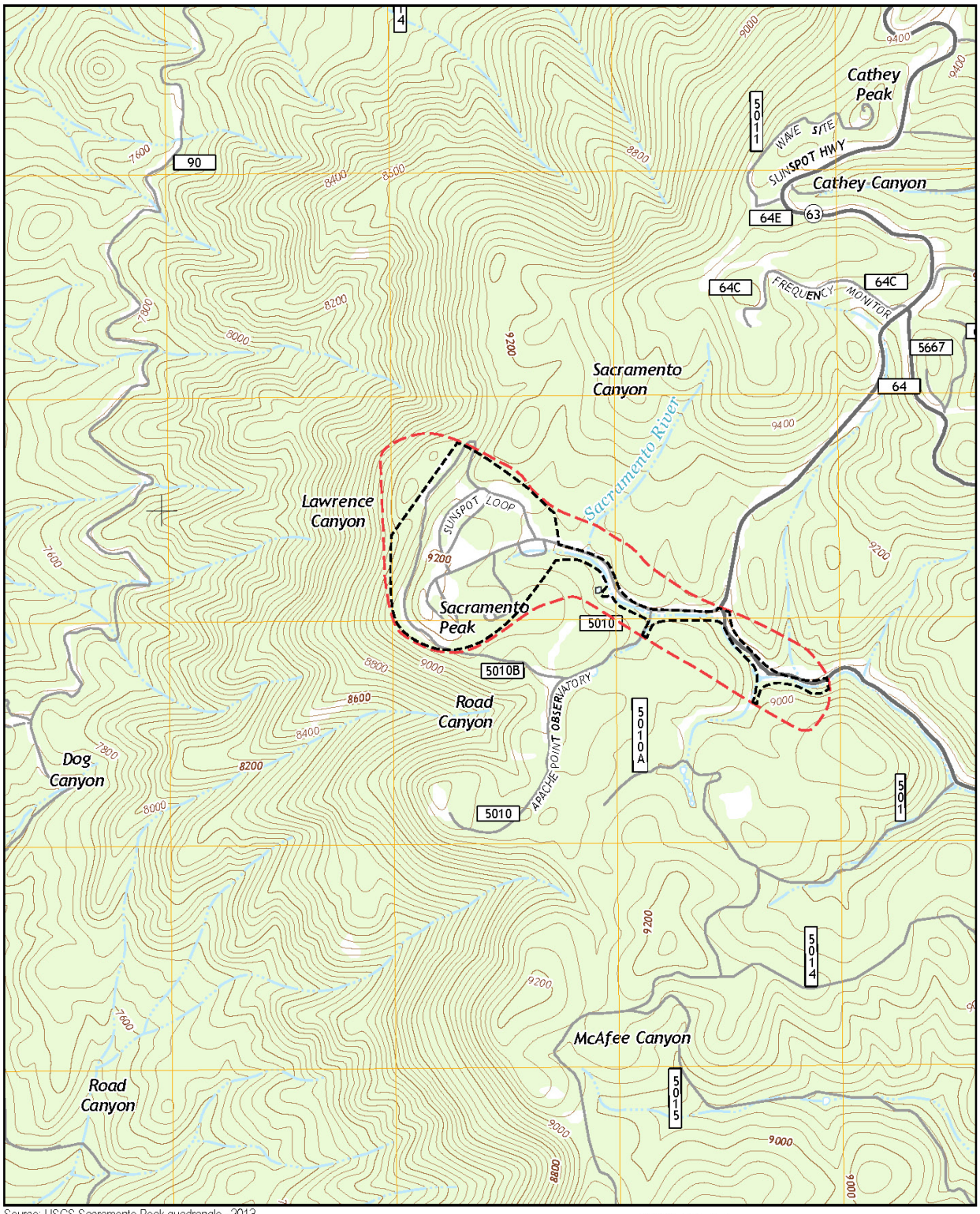
The Proposed Action is considered a federal undertaking and thus requires compliance with Section 106. The Proposed Action is limited to the four Alternatives described in Section 2.3 of this EIS. Section 106 is a procedural statutory provision and the regulations in 36 C.F.R. Part 800 provide the step-by-step approach for satisfying the Section 106 process. The steps include initiating consultation; identifying historic properties; assessing effects, including application of the criteria of adverse effect; and resolving adverse effects to historic properties, if necessary. Historic properties are evaluated and effects are identified in consultation with the SHPO. Consulting parties may also provide input into the process.

NSF, as the lead federal agency under Section 106 for this proposed undertaking, is consulting with the New Mexico SHPO and other Consulting Parties and has notified the ACHP of the undertaking. A list of Consulting Parties is included in Section 5.0, *Notification, Public Involvement, and Consulted Parties*. The Mescalero-Apache Tribe, Hopi Tribe, Pueblo of Zuni, Kiowa Tribe, and Fort McDowell Yavapai Nation were also notified of the undertaking and the public scoping meeting.

Table 5.1-2 in Section 5.1.1, *Section 106 Consultation Process*, lists the milestones of the Section 106 consultation process for this undertaking. Copies of correspondence are provided in Appendix 3A.

Sub-resource 1 – Architectural Resources

Historic architectural resources consist of buildings, structures, objects, or other manmade items resulting from human activities that occurred after European settlement.



Source: USGS Sacramento Peak quadrangle - 2013

North

0 1,000 2,000

Approximate scale in feet

LEGEND

Sacramento Peak Observatory Historic District Boundary

Area of Potential Effects (APE)

Figure_3.2-1_APE_v3 06-20-17 dash

FIGURE 3.2-1
Area of Potential Effects (APE)
Sacramento Peak Observatory
Sunspot, New Mexico

The federal historic properties database known as the National Register Information System was reviewed to identify existing historic properties within the APE. The search showed that there are no structures or buildings located within the Sacramento Peak Observatory that are listed in the NRHP. In addition, none of the buildings or structures at the Sacramento Peak Observatory had been previously evaluated for listing in the NRHP. An environmental assessment conducted in 1995 noted that "the Sacramento Peak Solar Observatory is an historic scientific compound begun in 1947, however, the buildings have not been evaluated for historical significance" (Cartwright, 1995).

A Secretary of the Interior-qualified architectural historian conducted an intensive architectural survey at the Sacramento Peak Observatory on January 26 and 27, 2015. The survey was used to engage staff in informal interviews and to conduct archival research, including review of historic photographs and narratives, newspaper articles, construction records, former surveys, environmental documentation, and architectural drawings.

Historic architectural resources within the APE were evaluated for potential eligibility for listing in the NRHP, both individually and as a potential historic district. The evaluation included all facilities that were more than 45 years old at the time of the survey. A total of 65 built environment resources that had been constructed in or before 1970 were identified as extant within the APE, including 5 telescope structures, 35 residential buildings, 17 administrative buildings, and 8 buildings and structures associated with site infrastructure.

Sub-resource 2 – Archaeological Resources

Prehistoric and historic archaeological resources are items or sites resulting from human activities that predate and postdate written records, respectively.

Previous environmental reviews and archaeological surveys have been conducted at the Sacramento Peak Observatory. During the 1990s, a series of surveys were conducted in preparation for the construction of the Visitor Center (1992 and 1995) and before planned construction of some roads and buildings at the Sacramento Peak Observatory (1994 to 1995). An intensive archaeological survey was conducted at the Sacramento Peak Observatory in 1994. The associated report indicated that no prehistoric or historic archaeological sites were identified (Shields, 1995).

The Sacramento Peak Observatory was previously surveyed for archaeological resources and no sites were identified. No additional archaeological survey work was conducted as part of the NEPA or Section 106 process for this undertaking. During a conference call on February 15, 2017, and confirmed in a follow-up summary letter from SHPO dated March 1, 2017, SHPO concurred that no further archaeological surveys would be required for this undertaking.

Sub-resource 3 – Traditional Cultural Properties

TCPs are sites, areas, and materials associated with cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining the continuing cultural identity of the community.

NSF initiated Section 106 consultation with five federally recognized tribes: Hopi Tribe, Pueblo of Zuni, Mescalero-Apache Tribe, Fort McDowell Yavapai Nation, and Kiowa Tribe. In addition to letters, NSF followed up with the tribes via telephone and email. The Hopi Tribe indicated "no historic properties significant to the Hopi Tribe affected." The Pueblo of Zuni had no concerns and asked to be added to the project contact list. No responses were received from the other three tribes, and no TCPs have been identified. Since no known TCPs are present, this sub-resource is not analyzed further.

3.2.2 Proposed Action Area

3.2.2.1 Architectural Resources

Historical Context

The Sacramento Peak Observatory is located in Sunspot, New Mexico, within the Lincoln National Forest in the Sacramento Mountains (Figure 1.1-1). After World War II, it became an important mission of the U.S. Air Force to establish a solar observatory. In 1947, the U.S. Air Force issued a contract to the High Altitude Observatory in Climax, Colorado, and to Harvard University to conduct a survey, identify an appropriate site for a new solar observatory, and establish which instruments would be installed (Bushnell, 1962). Sacramento Peak was identified as "especially promising for a solar research site" (Bushnell, 1962). A memorandum of agreement was established between the U.S. Air Force and USFS in 1950. The Observatory was subsequently transferred to NSF in 1976. NSF and USFS executed a land use agreement, signed in 1980, to formalize this transfer and the continued use of the land for the Sacramento Peak Observatory.

The flagship facility at the Sacramento Peak Observatory is DST, currently managed by NSO. DST is a high-spatial resolution optical solar telescope that was completed in 1969. Since that time, solar astronomers from around the world have used the facility to obtain information about the Sun. The structure consists of a 136-foot (42-meter) tower, which extends into the ground approximately 220 feet (67 meters). The telescope optics and instrumentation are suspended from the top of the tower by a mercury float bearing. In addition to DST, the Evans Solar Facility (1952 currently not in active use), the Hilltop Dome (1963; currently not in active use), the Grain Bin Telescope (1950; currently not in active use), and the ISOON Patrol Dome (1960–1963; currently not in active use) are located at the Sacramento Peak Observatory.

The Sacramento Peak Observatory was conceived of as an "integrated" solar research facility that combined observational, instrumentation, and theoretical activities on a larger scale than at any comparable solar observatory. The observational activities were complemented by onsite analysis and data-reduction activities. The instrumentation work focused on the design, development, and fabrication of optical devices used on the telescopes. The theoretical studies of solar structure and characteristics supported the observational work (Bushnell, 1962). Its location had a number of advantages for the establishment of a solar observatory: an elevation of 9,253 feet that was high enough to achieve reduced atmospheric dust level conditions, but low enough to be accessible to researchers; a moderate amount of rainfall; a high percentage of sunshine; and a thick forested setting to help block movement and interference from rising air currents (Liebowitz, 2002).

The first telescope within a dome or structure was a 6-inch prominence telescope mounted on a 10-foot spar and placed within a silo that had been ordered from the Sears & Roebuck catalogue. A slit was cut in the roof of the silo for observation purposes. The dome, which came to be known as the Grain Bin Dome, was used to conducted regular imaging patrols of the Sun in search of solar flares. Currently, the structure is not in active use, although it remains a historical attraction for visitors and the residents of Sunspot (NSO, 2015).

In 1951–1952, the mechanics and optics for a new 16-inch coronagraph were assembled and mounted within a large 30-foot conical dome known as the Big Dome (Liebowitz, 2002). A laboratory wing extends from the domed structure to the east, and a small, shed-like slide-off building that moves on raised tracks extends from the south elevation. After its construction, the instrument within the Big Dome was "repeatedly modified, rearranged, and added to" (Bushnell, 1962). On August 18, 1987, the Big Dome was rededicated as the John W. Evans Solar Facility. Currently, the facility is not being used for scientific purposes.

The ISOON Building (Patrol Dome) is a 20-foot dome on concrete walls with sliding doors in the dome that open to allow for observations. The dome also rotates to allow the telescope to continuously follow the Sun and take repeated images of the sun throughout the day. In 1963, the Hilltop Dome was constructed just north of the ISOON Building. A concrete block, enclosed corridor was subsequently added to connect the Hilltop Dome building to the ISOON Building (*Mountain Times*, n.d.).

The architect/engineer Charles W. Jones started designs for a new Solar Vacuum Tower Telescope in 1963, although construction on the instrument, which was supervised by USACE, did not start until 1966. Over the next 4 years, construction continued on what would become known as the Richard B. Dunn Solar Telescope. The architectural firm of Roghlin and Baran, Associates worked on the project. DST extends 136 feet (42 meters) aboveground and 220 feet (67 meters) below ground. The vertical vacuum tube is enclosed within a concrete tower with 3-foot-thick walls. At the top of the tower is an entrance window and two mirrors that guide sunlight down the vacuum tube where it is reflected off of the primary

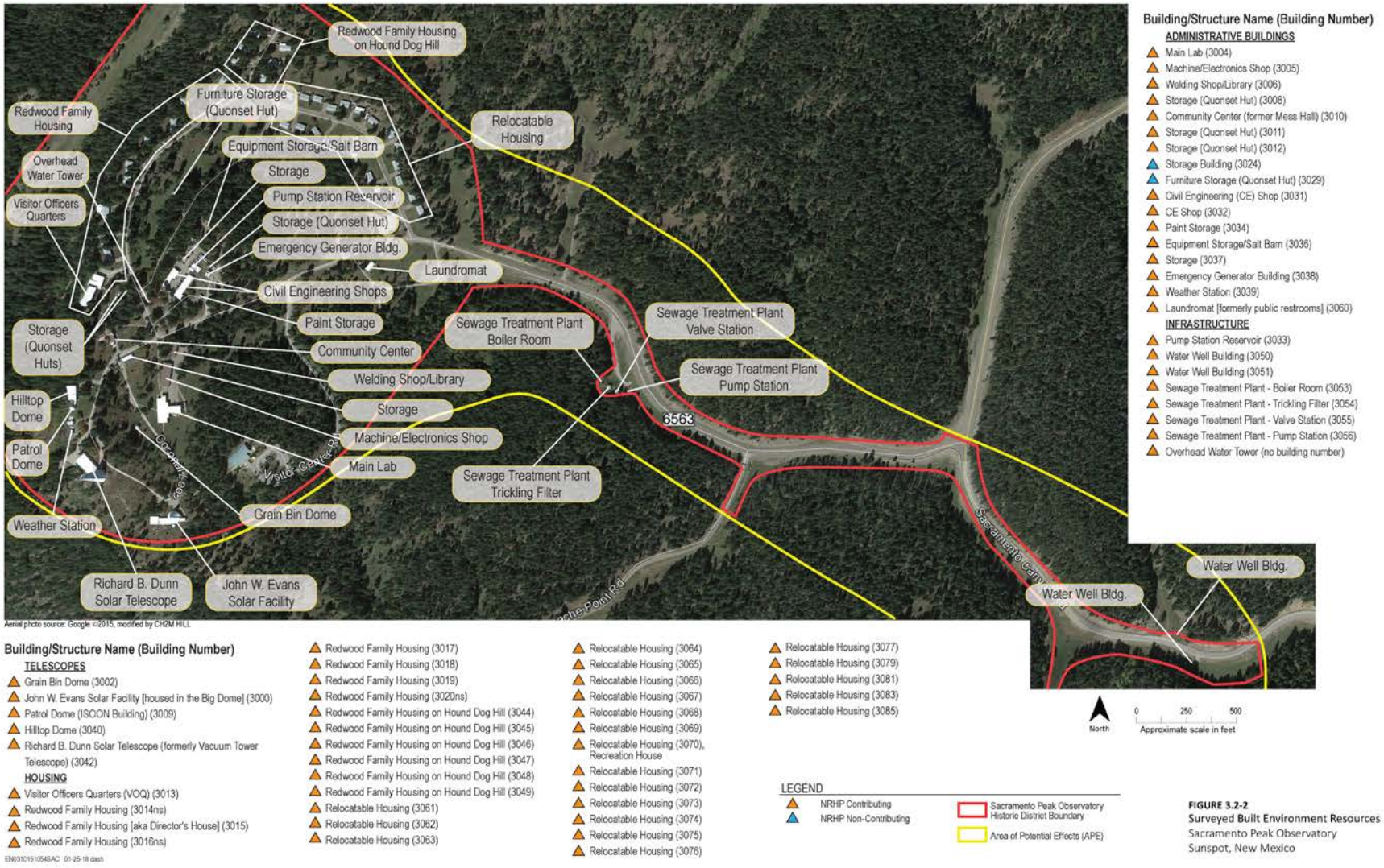
mirror at the bottom of the tower. The 64-inch primary mirror then "focuses the light and sends it back up to ground level, where it exits the vacuum tube and can be guided into the scientists' experiments on optical benches" (NSO, 2015). Construction of the vacuum tower significantly impacted future solar instruments: "So sharp were the images formed from this type of solar telescope, that almost every large solar telescope built since then has been based on the vacuum tower concept" (Plymate, 2001).

The Sacramento Peak Observatory was the first of several observatories established in New Mexico during the second half of the twentieth century, which led to the region emerging as a hub for astronomical research. In 1962, the U.S. Air Force established the Cloudcroft Electro-Optical Research Facility, more commonly referred to as Cloudcroft Observatory, which was located just 20 miles north of the Sacramento Peak Observatory. The Cloudcroft Observatory was situated in the Lincoln National Forest and was closed in 1982 (Henry and Sherlin, 1983). NMSU opened the Blue Mesa Observatory in 1967, located just northwest of Las Cruces, near Socorro, New Mexico. The Sacramento Peak Observatory was used by students, faculty, and visitors until 1991, when the Federal Aviation Administration acquired the property and demolished the observatory (NMSU, 2014a). The Apache Point Observatory, which is located less than a mile south of the Sacramento Peak Observatory, was established by the Astrophysical Research Consortium in 1985. NMSU's Astronomy Department currently operates the Apache Point Observatory for the Astrophysical Research Consortium. The Apache Point Observatory's location was chosen because "it has excellent seeing…and is close to support facilities, an airport and NMSU" (Peterson, n.d.). The Apache Point Observatory currently houses the 3.5-meter Telescope, the 2.5-meter Sloan Digital Sky Survey Telescope, the 0.5-meter Small Aperture Telescope, and NMSU's 1.0-meter Telescope (NMSU, 2014b). NMSU also has the Campus Observatory in Albuquerque, the Tombough Observatory in Las Cruces, and a 24-inch reflector on Tortugas Mountain just east of NMSU's campus (NMSU, 2014b). The Karl G. Jansky Very Large Array (VLA), which was constructed between 1972 and 1980, is located in Socorro, New Mexico, approximately 140 miles northwest of Sacramento Peak Observatory. The VLA consists of 27 radio telescopes that collect data as a unit, functioning as a much larger instrument. The Long Wavelength Array (LWA) is also located in Socorro. Completed circa 2011, the instrument is a multipurpose radio telescope that covers a collecting area with an approximately 400-kilometer diameter containing approximately 13,000 antennae (Ellingson *et al*., 2009). With these observatories in such close proximity, the Sacramento Peak Observatory holds a position within a regional network of significant astronomical research facilities.

Architectural Survey Results

The results of the intensive architectural survey were documented in a technical report, entitled *Cultural Resources Evaluation, National Solar Observatory (Sacramento Peak Observatory), Sunspot, New Mexico* (CH2M, 2015), and are summarized herein.

In 2015, NSF determined that the Sacramento Peak Observatory is eligible for listing in the NRHP as a historic district for representing an important time in science and military history and for its significant contribution to the advancement of solar astronomy (Criterion A). The Sacramento Peak Observatory is a collection of Cold War-era buildings and structures primarily constructed between 1950 and 1969 that reflects the early history of solar astronomy in the United States. The telescopes and associated facilities have influenced other, more modern solar telescopes and the observations have greatly expanded the understanding of the Sun. There are 63 built environment resources that are contributing elements to the Sacramento Peak Observatory historic district. Additionally, NSF determined that there are two contributing telescopes on the site that are also individually eligible for listing in the NRHP: the John Evans Facility and DST. Both are eligible under Criterion A for important associations with events that have made a significant contribution to the field of solar astronomy. DST is also eligible under Criterion C for design and engineering. Both telescopes have undergone minor additions and alterations. However, these changes have not diminished the overall integrity of the telescopes. Two buildings within the Observatory that are more than 45 years old were determined to not contribute to the historic district. Regarding the two telescopes, SHPO advised on January 18, 2017, that "determining individual significance of any features or structures is not the recommended approach to the determination of eligibility for this nationally significant property." SHPO concurred with NSF's determinations of eligibility on May 18, 2017, stating "HPD concurs that Sacramento Peak Observatory is eligible for inclusion in the National Register of Historic Places as a historic district with 63 contributing resources, including the two telescopes." Figure 3.2-2 and Table 3.2-2 list the properties at the Sacramento Peak Observatory that were identified as eligible for the NRHP. Information regarding contributing and non-contributing buildings to the NRHP-eligible historic district is provided in Appendix 3C. Buildings and structures that were not 45 years old at the time of the cultural resources survey and were not considered to have exceptional importance were not included in the historic district evaluation and are not listed in Appendix 3C. The Post Office located within the main Sacramento Peak Observatory area, which was more than 45 years old at the time of the survey, was not included in the cultural resources survey because it is not owned by NSF (the Fire Station within the Sacramento Peak Observatory is also not owned by NSF, but is less than 45 years old).



Building/Structure Name (Building Number)

ADMINISTRATIVE BUILDINGS
- Main Lab (3004)
- Machine/Electronics Shop (3005)
- Welding Shop/Library (3006)
- Storage (Quonset Hut) (3008)
- Community Center (former Mess Hall) (3010)
- Storage (Quonset Hut) (3011)
- Storage (Quonset Hut) (3012)
- Storage Building (3024)
- Furniture Storage (Quonset Hut) (3029)
- Civil Engineering (CE) Shop (3031)
- CE Shop (3032)
- Paint Storage (3034)
- Equipment Storage/Salt Barn (3036)
- Storage (3037)
- Emergency Generator Building (3038)
- Weather Station (3039)
- Laundromat [formerly public restrooms] (3060)

INFRASTRUCTURE
- Pump Station Reservoir (3033)
- Water Well Building (3050)
- Water Well Building (3051)
- Sewage Treatment Plant - Boiler Room (3053)
- Sewage Treatment Plant - Trickling Filter (3054)
- Sewage Treatment Plant - Valve Station (3055)
- Sewage Treatment Plant - Pump Station (3056)
- Overhead Water Tower (no building number)

Building/Structure Name (Building Number)

TELESCOPES
- Grain Bin Dome (3002)
- John W. Evans Solar Facility [housed in the Big Dome] (3000)
- Patrol Dome (ISOON Building) (3009)
- Hilltop Dome (3040)
- Richard B. Dunn Solar Telescope (formerly Vacuum Tower Telescope) (3042)

HOUSING
- Visitor Officers Quarters (VOQ) (3013)
- Redwood Family Housing (3014ns)
- Redwood Family Housing [aka Director's House] (3015)
- Redwood Family Housing (3016ns)
- Redwood Family Housing (3017)
- Redwood Family Housing (3018)
- Redwood Family Housing (3019)
- Redwood Family Housing (3020ns)
- Redwood Family Housing on Hound Dog Hill (3044)
- Redwood Family Housing on Hound Dog Hill (3045)
- Redwood Family Housing on Hound Dog Hill (3046)
- Redwood Family Housing on Hound Dog Hill (3047)
- Redwood Family Housing on Hound Dog Hill (3048)
- Redwood Family Housing on Hound Dog Hill (3049)
- Relocatable Housing (3061)
- Relocatable Housing (3062)
- Relocatable Housing (3063)
- Relocatable Housing (3064)
- Relocatable Housing (3065)
- Relocatable Housing (3066)
- Relocatable Housing (3067)
- Relocatable Housing (3068)
- Relocatable Housing (3069)
- Relocatable Housing (3070), Recreation House
- Relocatable Housing (3071)
- Relocatable Housing (3072)
- Relocatable Housing (3073)
- Relocatable Housing (3074)
- Relocatable Housing (3075)
- Relocatable Housing (3076)
- Relocatable Housing (3077)
- Relocatable Housing (3079)
- Relocatable Housing (3081)
- Relocatable Housing (3083)
- Relocatable Housing (3085)

LEGEND
- NRHP Contributing
- NRHP Non-Contributing
- Sacramento Peak Observatory Historic District Boundary
- Area of Potential Effects (APE)

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FIGURE 3.2-2
Surveyed Built Environment Resources
Sacramento Peak Observatory
Sunspot, New Mexico

TABLE 3.2-1
NRHP-Eligible Architectural Resources within the APE

Resource Name (Year Constructed)	Description/Significance	NRHP Eligibility Determination
Sacramento Peak Observatory Historic District (1950–1969)	Collection of solar telescopes, residential buildings, administrative buildings, and site infrastructure facilities associated with NSO and the Sacramento Peak Observatory.	Eligible (Historic District); 63 contributing elements (see Appendix 3C)
John Evans Facility [John W. Evans Solar Facility], Building 3000 (1952) (housed in the Big Dome)	Dome contains two coronagraphs, the largest in the United States, and a coelostat. Consists of a 30-foot dome on concrete walls.	Contributing resource to the Sacramento Peak Observatory Historic District
Vacuum Tower Telescope [Richard B. Dunn Solar Telescope], Building 3042 (1969)	A solar telescope composed of a vacuum tube centered within a concrete tower that extends 136 feet aboveground and 220 feet below the ground surface.	Contributing resource to the Sacramento Peak Observatory Historic District

3.2.2.2 Archaeological Resources

There are no identified archaeological resources at the Sacramento Peak Observatory that are eligible for or listed in the NRHP. Several historic archaeological resources are located within the Sacramento Peak Observatory Historic District, including the remains of the helicopter landing area and several building foundations. These were not evaluated for the NRHP as part of the cultural resources survey for the Proposed Action, but are considered elements of the historic district. There are no archaeological resources present at the Sacramento Peak Observatory that are considered historic properties under Section 106 of the NHPA.

3.3 Visual Resources

Visual resources include natural and/or built features that can be seen by the public and contribute to the public's appreciation and enjoyment of these features.

The CEQ regulations to implement NEPA (40 C.F.R. §1508.8) identify aesthetics (visual resources) as one of the elements of the human environment that must be considered in determining the effects of a project.

The ROI for visual resources corresponds to the developed areas of Sacramento Peak Observatory and its immediate vicinity from which the staff and visitors would potentially see changes to the site as a result of the Alternatives.

Visual resources can include solitary built and natural landmarks or entire landscapes. Impacts to visual resources are defined in terms of the extent to which the implementation of an action would change the aesthetic character and quality of the environment as seen by the public.

Visual character is defined by the relationships between the existing visible natural and built landscape features. These relationships are considered in terms of how objects in the viewed landscape relate to each

other in terms of visual dominance, scale, diversity, and continuity. Visual character is non-evaluative, in that it is simply a description of the viewed environment and does not assign value or degree of attractiveness to the viewed environment.

For this assessment, visual quality is considered to be either high, average, or low, defined as follows:

- High: Dramatic view with a pleasing composition (a mix of elements that seem to belong together)
- Average: Average view with average composition
- Low: Common view with common composition (a mix of elements that either do not belong together or contrast with the other elements in the surroundings)

Visual resources were identified through observations and a review of aerial photographs and maps.

3.3.1 Proposed Action Area

The Sacramento Peak Observatory is located within a predominantly undeveloped and forested area. The natural landscape dominates the visual character of the site, with tall trees creating a verdant backdrop to the Sacramento Peak Observatory. The elevation of the area provides for unobstructed views of the surrounding mountain scape while the steeply sloping and varied topography within the Observatory emphasizes the untamed natural setting. Within the natural setting, the DST stands as part of the backdrop of the Tularosa Basin and is the dominant visual feature of the Sacramento Peak Observatory's built environment visible from the valley below.

Most of the buildings and structures associated with the Sacramento Peak Observatory seem small in scale and have been placed as ancillary features within the mountainous terrain. The buildings and structures are generally arranged based on function; therefore, within the natural setting, there are developed areas that have a utilitarian or residential visual character. Although some of these areas contribute to the NRHP-eligible historic district, many of them also detract from the natural landscape.

The height and unique design of DST stands out within the Sacramento Peak Observatory as an aesthetically pleasing structure, while the surrounding support buildings within the site are generally common and utilitarian facilities that individually are not considered to have high visual or aesthetic quality. Collectively, the facilities are a distinct and well-preserved collection of Cold War-era structures located within a dramatic natural setting. Most of the built environment resources within the Observatory contribute to the NRHP-eligible Sacramento Peak Observatory Historic District. However, the historic district as a whole is not considered aesthetically significant, but rather is considered significant as a result of its function as a science facility and for its historical associations. Since the majority of buildings within the site are utilitarian structures that are not visually significant, Sacramento Peak Observatory's aesthetic character is defined largely by its natural setting and placement at the peak of a mountain. As a result of the dramatic natural environment, the site is considered to have high visual quality to the primary

viewers, which consist of the staff and visitors. Representative photographs depicting the existing visual character are included in the Environmental Baseline Study (EBS) prepared for the Sacramento Peak Observatory site (Appendix 3D).

As a result of its picturesque natural landscape, the Sacramento Peak Observatory as a whole is considered a sensitive visual resource.

3.4 Geology and Soils

This section describes the geologic and soil conditions at the Sacramento Peak Observatory. The ROI for geology and soils is the boundary of the Sacramento Peak Observatory and the immediately surrounding area.

3.4.1 Proposed Action Area

Geology

The Sacramento Peak Observatory is underlain by rocks of the Permian-age Rio Bonito Member of the San Andres Formation, which consists of medium- to thick-bedded dolomite and limestone. The Rio Bonito Member ranges in thickness from 400 to 600 feet and contains karst features, including large cavernous fractures and sinkholes (Newton *et al*., 2012). The Rio Bonito Member is underlain by the Permian-age Yeso Formation, which consists of mixed clastic and carbonate rocks with intervening evaporite layers, including gypsum, anhydrite, and halite. The Yeso Formation is highly variable in thickness but is greater than 1,650 feet thick in the area of Cloudcroft, New Mexico, which is located approximately 12 miles (20 kilometers) north of the Sacramento Peak Observatory. The nearest surface outcrop to the Yeso Formation is approximately 1,000 feet west of the Sacramento Peak Observatory.

The Rio Bonito Member and the Yeso Formation are relatively level, with a shallow dip down to the Pecos Slope to the east (Rawling, 2012). Many of the carbonate units in the Sacramento Mountains are deformed by joints. In the upper beds of the Yeso Formation, intraformational dissolution-collapse features and chaotic bedding dips are common in road exposures, and solution-enlarged fractures are common in bedrock that is exposed in stream channels in the area (Rawling, 2012).

The Sacramento River fault zone, which includes a series of west-side down, normal faults, is located approximately 1 mile to the east of the Sacramento Peak Observatory. Faults in this system are believed to be of Tertiary age (Rawling, 2012). The Alamogordo fault, located approximately 6.5 miles west of the Sacramento Peak Observatory, is a quaternary-age, major-range bounding fault that forms the western base of the Sacramento Mountains. The fault extends for more than 60 miles and is considered to be "potentially hazardous" (Machette *et al*., 2000).

According to the 2010–2011 Minerals Yearbook – New Mexico (advance release) (USGS, 2015), only non-fuel minerals, including gemstones, construction sand and gravel, and crushed stone are mined in

Otero County, New Mexico. Based on information provided in this publication and through site observations, no commercial mining activities have occurred or are occurring on the Sacramento Peak Observatory site. Since the underlying rocks are carbonates that do not typically host gemstones, and are not a source of construction sand and gravel, there is no potential for these types of mineral-bearing resources of economic value at the site. Also, gemstones comprise a very small percentage (< 0.01 percent) of the non-fuel mineral value in New Mexico for the latest years on record, 2009–2001 (USGS, 2015). Carbonate rocks such as limestone and dolomite can be mined and used for crushed stone. However, for economic reasons, quarries for these materials are typically established in areas with easier access and readily accessible heavy-haul transport. Carbonate rocks are extremely common in the site area and the site does not represent an irreplaceable source for these materials. Though there is potential for use of limestone and dolomite from the site for use as crushed stone, it is small enough to be discountable. In addition, since the mineral rights at the property have been withdrawn by USFS, no exploration or mining activities are allowed on this property without USFS approval.

Soils

Soil data from the U.S. Department of Agriculture Soil Conservation Service were not available for the subject property; however, according to the EDR report (Environmental Data Resources, Inc. [EDR], 2015), the property is underlain by a soil component called Argic Cryoborolls, which is a gravelly loam and is well-drained with moderately coarse textures. Argic Cryoborolls soils are characterized as gravelly loam from 0 to 9 inches, very cobbly to sandy clay loam from 9 to 19 inches, very gravelly to sandy clay loam from 19 to 24 inches, very gravelly coarse sand 24 to 40 inches, and extremely cobbly to loamy coarse sand from 40 inches to 60 inches. This soil component is not hydric. Depth to bedrock is greater than 60 inches (EDR, 2015).

Soils developed on the San Andres Formation and the upper 30 to 60 feet of the underlying Yeso Formation consist mostly of San Andres Formation parent material. These soils are generally less than 3 feet thick, with surface soil layers of silty loam incorporating 30 to 50 percent angular pebbles and cobbles of limestone, grading into fractured bedrock. Bedrock weathering appears to be predominantly mechanical. These soils are likely to have high infiltration rates and, if connected to shallow bedrock fracture networks, are expected to rapidly transmit infiltrated water to the groundwater system (Newton *et al*., 2012).

3.5 Groundwater

This section addresses the groundwater conditions at and around the Sacramento Peak Observatory. The ROI for groundwater is the Sacramento Peak Observatory and immediately adjacent aquifer recharge areas, including the headwaters of the Sacramento River that occur in the vicinity of the Sacramento Peak Observatory site.

3.5.1 General Setting

The major aquifers of southern New Mexico include alluvial aquifers that are formed in thin alluvial-fan and river-laid deposits and basin-fill aquifers formed by basin-fill aggregate in deep down-faulted basins. Although neither of these two major aquifer types underlies the Sacramento Peak Observatory, the nearest alluvial aquifers are the Salt Basin alluvial aquifer, located approximately 30 miles to the southeast, and the Pecos River Basin alluvial aquifer, located more than 80 miles to the east (Newton *et al*., 2012). The nearest basin-fill aquifer is the Tularosa Basin aquifer located at the western base of the Sacramento Mountains, beneath the town of Alamogordo and approximately 6 miles west of the Sacramento Peak Observatory. Consistent with the underlying rock types, aquifers underneath the Sacramento Peak Observatory consist of limestone, sandstone, and shale aquifers, which are local aquifers only (New Mexico Bureau of Geology and Mineral Resources, 2011).

Summer monsoon rains and winter snows are the sources of groundwater in the Sacramento Mountains, providing recharge to both the Tularosa and Salt Basin aquifers (New Mexico Bureau of Geology and Mineral Resources, 2011). The aquifer system in the Sacramento Mountains is developed primarily within the Yeso Formation, a heterogeneous unit comprising carbonates, clastics, and evaporites that provides a lateral conduit to these major aquifers (Land *et al*., 2012). The recharge area is closely correlated with surface exposure of the Yeso Formation, and the nearest surface exposure of the Yeso Formation to the Sacramento Peak Observatory site is approximately 1,000 feet to the west, at a much lower elevation. Based on the Water Table Map of the southern Sacramento Mountains (Land *et al*., 2012), the groundwater elevation in the Yeso Formation beneath the Sacramento Peak Observatory site ranges from 8,400 feet above mean sea level (amsl) on the west side of the site (depth of approximately 800 feet) to 8,600 feet amsl on the east side of the site (depth of approximately 460 feet). This correlates to a relatively steep hydraulic gradient to the west on the Sacramento Peak Observatory site. It is likely that very shallow groundwater still follows the local topography and flows to the east, except for the extreme west part of the Sacramento Peak Observatory site, before reaching a recharge point (surface exposure) for the underlying Yeso Formation. As described in Section 3.4.1, *Proposed Action Area*, soils developed on the San Andres Formation and the upper 30 to 60 feet of the underlying Yeso Formation are likely to have high infiltration rates and, if connected to shallow bedrock fracture networks, are expected to rapidly transmit infiltrated water to the groundwater system (Newton *et al*., 2012). The groundwater recharge zone is estimated to encompass approximately 131,000 acres (Newton *et al*., 2012).

According to the EBS prepared for the Sacramento Peak Observatory site (Appendix 3D), no groundwater wells are listed as being located within 1 mile of the site. One public water supply well and an additional water well were identified to the southeast and northeast of the site, respectively. The public water supply well is the source of drinking water for the Sacramento Peak Observatory. Measured groundwater elevation at this well is approximately 8,720 feet amsl or approximately 180 feet below

ground surface (bgs) (Land *et al*., 2012). The listed use of the second well is for livestock watering. No information about the depth to groundwater in this well was readily available.

3.5.2 Groundwater Quality

As part of a regional hydrogeologic study (Newton *et al*., 2012), geochemical data, including chemical and thermal parameters, were collected from wells and springs in the southern Sacramento Mountains. This dataset includes concentrations of naturally occurring constituents, such as calcium, iron, and magnesium. The public water supply well that is the source of drinking water for the Sacramento Peak Observatory was sampled in this study, as well as a spring that is located several hundred feet east of the Sacramento Peak Observatory site. None of the concentrations of these naturally occurring constituents exceeds any applicable or actionable concentrations. The data do show that specific conductance is lower in spring water than well water, which suggests that water discharging at springs has undergone slightly less water/mineral interaction than water collected from wells. Other observed trends from this study suggest that dissolution of limestone and dolomite is the primary process that controls the water chemistry in groundwater in the region.

Site-specific groundwater analytical data have not been collected at the Sacramento Peak Observatory site.

3.6 Hazardous Materials

This section discusses the hazardous materials and hazardous contamination that may be present at the Sacramento Peak Observatory. The ROI for hazardous materials and wastes analyses follows the requirements prescribed by ASTM International (ASTM) Standard Practice E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*, and 40 C.F.R. Part 312, "Innocent Landowners, Standards for Conducting All Appropriate Inquiries," and includes the area within the Sacramento Peak Observatory site boundary and the approximate minimum search distances for select federal and state standard source environmental databases ranging from the site to 1 mile (see Appendix 3D for figures and additional details). No other neighboring properties appear to have the potential to environmentally affect the Sacramento Peak Observatory site.

3.6.1 Existing Site Contamination

In 2013, a "Restoration and Rehabilitation Opinion of Probable Costs" was prepared for the Observatory by Souder, Miller and Associates (SMA, 2013). This study identified a number of hazardous materials and wastes known or suspected to be present on the Sacramento Peak Observatory. In addition, in 2016, an EBS was prepared for the Sacramento Peak Observatory site (CH2M, 2016). The hazardous materials section of the EBS was conducted in conformance with ASTM E1527-13.

The following recognized environmental conditions (RECs) were identified at the Sacramento Peak Observatory as part of the EBS. Known or suspected hazardous materials and wastes associated with the

RECs and other potential environmental concerns and identified in the Restoration and Rehabilitation Opinion of Probable Costs are listed below:

- All wastewater from the site facilities, including sinks from laboratories, discharges to the sanitary sewer system (except prior to the connection of the John Evans Facility to the sewer system). Facilities connected to the sewer system also include maintenance facilities and photograph process facilities. The Sewage Treatment Plant discharges the treated effluent to a 4-acre parcel of property via a series of perforated pipes at the ground surface. In Fiscal Year 2008, sampling of the treatment plant discharge detected exceedances of benzene, toluene, ethylbenzene, and xylenes and chlorinated solvents. Other than the one 2008 reported sampling event with volatile organic compound exceedances, only Total Haloacetic Acids (HAA5) exceedances were reported in the database search. No records of additional sampling, further studies, or cleanup activities were identified or available. In the Restoration and Rehabilitation Opinion of Probable Costs, Petroleum-Contaminated Soil (PCS) was identified in this area, and in the Fuel Storage area (SMA, 2013).
- Based on a 1979 environmental assessment prepared for Sacramento Peak Sanitary Sewer Improvements (Hegnier, 1979), photograph-processing chemicals were discharged to a chemical pond located behind the John Evans Facility. Chemicals and rinse water received no treatment and were allowed to flow into a constructed pond. The wastewater seeped through the dikes, according to the 1979 environmental assessment. No records of cleanup activities were identified or available; however, the pond was not visually evident during the onsite survey. In the Restoration and Rehabilitation Opinion of Probable Costs, Photo Chemical-Contaminated Soil was identified in the area of the main lab, in the area of the Hilltop Dome, and in the area of the John Evans Facility and DST (Vacuum Tower Telescope) (SMA, 2013).
- Based on a preliminary assessment at the property in July 1992, an oil disposal pit consisting of a subsurface gravel drainfield existed in the maintenance area. AURA Inc. maintenance personnel historically drained oil from two 2,477-cubic-inch emergency, diesel generators housed in Building 3038 into the pit through a 2-inch-diameter drain pipe. The AURA Inc. personnel estimated 240 gallons of oil entered into the pit before they capped the drain pipe and abandoned the pit. In the Restoration and Rehabilitation Opinion of Probable Costs, PCS was identified in this area (SMA, 2013).

No historical or controlled RECs were found on the site.

The following *de minimis* conditions were identified at the Sacramento Peak Observatory as part of the EBS:

- Staining on the concrete floor in the Oil Storage Building (no assigned building number)
- Stain on the CE Shop (Building 3031) floor appeared to be petroleum

The following are other conditions of the site that are not considered RECs but were found at the site:

- Six pole-mounted transformers located near the maintenance area were not labeled as to whether they contain polychlorinated biphenyls (PCBs). Additionally, three disconnected transformers are located near the new transformers at the maintenance area staged on the ground. No evidence of leaks, spills, or releases of dielectric fluid or stressed vegetation were observed near the transformers. Due to lack of labeling, PCBs are assumed to be present in all onsite transformers and fluorescent light ballasts. Accordingly, PCBs are assumed to be present in most onsite structures, and concentrated in the electrical distribution system, including the pole-mounted transformers.
- Asbestos was reported in Buildings 3000, 3004, 3010, 3013, 3040, 3042, 3060, T3055, and all of the housing (Redwood Family Housing Duplex Units, Redwood Family Housing Units, and Relocatable Family Housing). No asbestos abatement records were found. According to the Restoration and Rehabilitation Opinion of Probable Costs, non-friable ACM were assumed to be present in floor coverings and wallboard in most onsite structures, and friable ACM (pipe insulation) is assumed to be confined to the main lab (SMA, 2013).
- No LBP surveys were found. The majority of the buildings were built prior to 1978 and are likely to have LBP. According to the Restoration and Rehabilitation Opinion of Probable Costs, LBP is assumed to be present in all onsite structures, excluding utility-related buildings (SMA, 2013).
- DST contains approximately 8 to 10 metric tons of mercury in a bearing located 130 feet bgs, as well as unused mercury stored in the Mercury Storage Building.

A more detailed discussion of existing contamination is presented in Appendix 3D.

3.6.2 Use of Hazardous Materials

Hazardous materials typically used for building maintenance, landscaping, scientific instruments, and fuel for generators are used onsite. The majority of hazardous materials and petroleum products are stored in the Oil Storage Building (no building number assigned) or in aboveground storage tanks. Details regarding the aboveground storage tanks are provided in Appendix 3D. Additional mercury not currently used in DST is stored in the Mercury Storage Building. Lesser quantities of products are stored in lockers at buildings where they were intended to be used (CH2M, 2016).

3.7 Solid Waste

This section presents a description of the solid waste infrastructure at the Sacramento Peak Observatory. Solid waste at the Sacramento Peak Observatory comprises a broad range of materials, including garbage, refuse, sludge, demolition waste, nonhazardous industrial waste, municipal waste, and hazardous waste.

The ROI for solid waste includes the Sacramento Peak Observatory site and the facility in which the solid waste would be landfilled.

3.7.1 Proposed Action Area

The landfill that receives waste generated at the Sacramento Peak Observatory is the Otero-Greentree Regional Landfill. The landfill is owned by Otero and Lincoln counties and the City of Alamogordo is the Managing Agency for the landfill (City of Alamogordo, 2016). The Otero-Greentree Regional Landfill is a New Mexico-permitted solid waste facility (Permit No. SWM-109102) designed to dispose of residential, commercial, and construction waste and is permitted to accept asbestos. Additional information regarding the landfill is provided in Table 3.7-1.

TABLE 3.7-1
Landfill Facility Summary for the ROI

Facility Name	Location	Estimated Annual Waste Received	Remaining Capacity	Wastes Accepted	Distance from Sacramento Peak Observatory (Miles - One Direction)	Estimated Permit Closure Date
Otero-Greentree Regional Landfill	West side of Highway 54 south of Alamogordo, near Mile Marker (MM) 23, Otero County, New Mexico. (32º33'53.79"N; -106º01'45.03"W)	66,113.7 metric tons; plus an additional 7,515.76 metric tons of special waste (asbestos and petroleum-contaminated soil)	3,003,328 cubic yards; 18.9 years at current rate	Residential, commercial, and construction waste (including asbestos)	58	2036

Sources: McGinnis, 2017.

3.8 Health and Safety

This section discusses health and safety within the ROI, which includes a discussion on public safety, occupational health, and the protection of children.

Public Safety

Public safety is defined as the welfare and protection of the general public and includes individuals both on and off the Sacramento Peak Observatory site.

Occupational Health

Occupational health risks are defined as risks arising from physical, chemical, and other workplace hazards that interfere with establishing and maintaining a safe and healthy working environment. Hazards could include chemical agents; physical agents, such as loud noise or vibration; physical hazards, such as slip, trip, and fall hazards; electricity or dangerous machinery; and natural hazards, such as flooding, botanical hazards, or wildlife hazards. The ROI for occupational health is defined as the Sacramento Peak Observatory boundary. These risks are evaluated for their current impact on demolition personnel, staff, and visitors.

Protection of Children

An assessment of disproportionate risks to children was performed in compliance with Executive Order (E.O.) 13045. Child-centric resource locations, including schools, parks, churches, and daycare centers, were obtained by readily available online spatial data and government agency address lists, such as those for licensed daycare facilities (New Mexico Children, Youth and Families Department, 2016). The ROI for the protection of children is 0.5-mile around the Sacramento Peak Observatory boundary and 0.5-mile around the roadway network leading to the Sacramento Peak Observatory and along the potential route to the demolition materials landfill.

3.8.1 Proposed Action Area

3.8.1.1 Public Safety

The Sacramento Peak Observatory is located in a rural area and the facilities are not currently used to directly protect the public. However, NSF owns and is required to maintain an onsite water tank and the water lines leading to the tank and the tank valve used for firefighting purposes. The Sunspot Volunteer Fire Department operates the County-owned fire station located on the Observatory, and provides firefighting support to the surrounding area as needed. In addition, NSF is responsible for removal of snow on the Sacramento Peak Observatory.

3.8.1.2 Occupational Health

Physical hazards at the Sacramento Peak Observatory include hazards associated with a typical office environment and large-scale structures requiring maintenance, including slip, trip, and fall hazards. Natural hazards in the undeveloped portions of the site include slip, trip, and fall hazards on uneven and steep terrain, poisonous plants, stinging and biting insects, and potentially aggressive animals. The site is not located within a floodplain and any flooding risk would be localized in nature.

3.8.1.3 Protection of Children

The Sacramento Peak Observatory is located in a rural area surrounded by rugged terrain and is 1.1 miles (1.7 kilometers [km]) to the nearest housing area. The Sacramento Peak Observatory hosts approximately 15,000 annual visitors, many of whom are children. There are no child-centric resources within 0.5-mile of the Sacramento Peak Observatory; however, there are at least 11 within 0.5-mile of the roadway network leading to the Sacramento Peak Observatory and along the potential route to the demolition materials landfill (Figure 3.8-1).

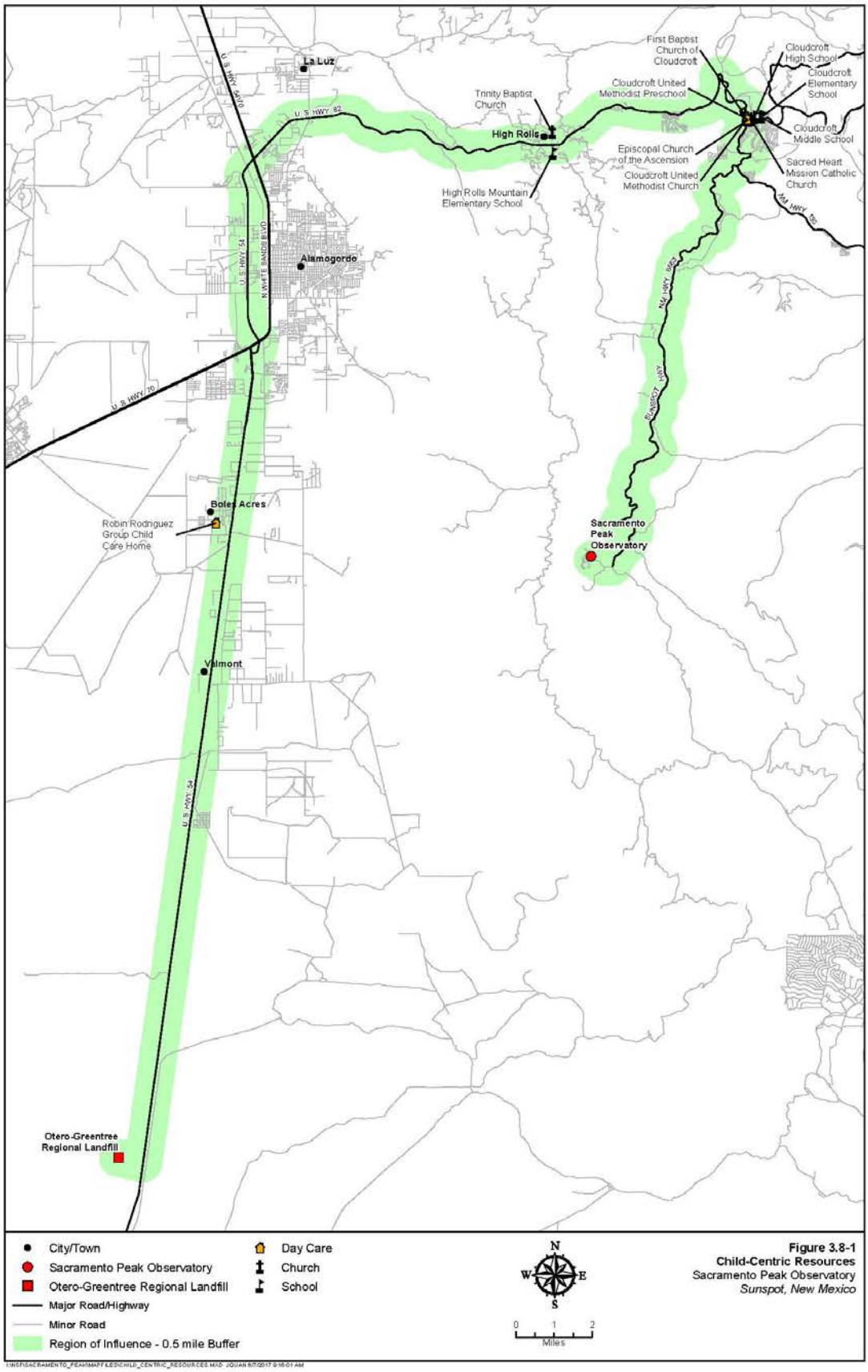

Figure 3.8-1
Child-Centric Resources
Sacramento Peak Observatory
Sunspot, New Mexico

3.9 Noise

This section focuses on the noise environment for human receptors. Potential effects of noise on wildlife are discussed in Section 3.1, *Biological Resources*. This section describes the noise environment at the Sacramento Peak Observatory. Noise is defined as unwanted or undesirable sound.

Noise intensity, or loudness, is determined by how sound pressure fluctuates. Because the range of sound pressure ratios vary greatly over many orders of magnitude, a base-10 logarithmic scale is used to express sound levels in dimensionless units of decibels (dB). Because sound travels in waves, varying frequencies are also associated with each sound event. The human ear does not respond equally to all frequencies. To obtain accurate measurements and descriptions of noise, as noise comprises many frequencies, the noise frequencies are filtered or weighted to most closely approximate the average frequency response of the human ear. This weighting is called the "A" scale on sound-level meters and is the scale that is used for traffic noise analyses. Decibel units described in this manner are referred to as A-weighted decibels (dBA). Table 3.9-1 provides a general comparison of dBA levels by noise source.

TABLE 3.9-1
Comparison of dBA Levels by Noise Source

Noise Source at Give Distance	A-Weighted Sound Level in Decibels (dBA)	Subjective Impression
Loud Music	110	Very loud
Jet Flyover at 1,000 feet	100	--
Gas lawnmower at 3 feet	90	--
Garbage disposal at 3 feet	80	--
Vacuum cleaner at 10 feet	70	Moderately loud
Heavy traffic at 300 feet	60	--
Quiet urban daytime	50	--
Quiet urban nighttime	40	Quiet
Library	30	--
Recording studio	10	Threshold of hearing

Source: Caltrans, 1998.

As sound intensity tends to fluctuate with time, a method is required to describe a noise source, such as a highway, in a steady-state condition. The descriptor most commonly used in environmental noise analysis is the equivalent steady state sound level (Leq). This value is representative of the same amount of acoustic energy that is contained in a time-varying sound measurement over a specified period. For highway traffic noise analyses, that time period is 1 hour, and the value reflects the hourly equivalent sound level (Leq[h]).

3.9.1 Proposed Action Area

The Sacramento Peak Observatory is located in a rural area surrounded by rugged terrain and dense vegetation and is not near sensitive human receptors. It is 1.1 miles (1.7 km) from the Sacramento Peak Observatory to the nearest housing area. The ROI for noise includes the site boundary, the potential route to the demolition materials landfill, and adjacent properties. Noise-sensitive locations in the ROI include the residential areas along the potential route to the demolition materials landfill (see Figure 3.11-1 of Section 3.11, *Traffic and Transportation*).

The land uses surrounding the Proposed Action are primarily open space and would typically experience a 40 dBA noise level. The existing noise environment in the ROI consists primarily of aircraft overflights and training activities associated with Holloman Air Force Base (AFB) and traffic noise from automobiles and medium and heavy trucks on the surrounding rural roads.

3.10 Socioeconomics

This section provides a description of the existing socioeconomic conditions for New Mexico, Otero County, City of Alamogordo, and the Village of Cloudcroft to provide a context for evaluating impacts associated with the Proposed Action. It addresses the following indicators: population and housing, employment, economy and income, education, and tourism. The population and economic contributions of Holloman AFB, located to the northwest of the site, are also described because of the substantial role it serves in the local economy. These socioeconomic resources are important because local governments, businesses, and individuals could be affected by changes in local employment, educational opportunities, and tourism associated with the Proposed Action. For the purpose of this evaluation, socioeconomic factors are defined as follows:

- **Population** is characterized by the magnitude and distribution of demographic change based on U.S. Census Bureau (USCB) data, population estimates, and population projections for Otero County, City of Alamogordo, and the Village of Cloudcroft. This ROI was selected because the current Sacramento Peak Observatory workforce resides almost entirely in Otero County and the majority of the demolition workforce will likely come from within Otero County. The most recent U.S. Census was completed in 2010; therefore, a second source, the 2010–2014 American Community Survey (ACS) 5-Year Population Estimates, are also described, as these data are more current. Whereas the USCB data cover the entire population, the ACS estimates rely upon sample data. The ACS estimates include 1-year, 3-year, and 5-year estimates, of which the 5-year estimates are presented, because as the USCB notes, it is the most accurate for very small geographic areas (USCB, 2016a). The 2014 ACS 5-year population estimates are based on monthly samples collected during the 60 months of the 5 most recent calendar years (USCB, 2014). The estimates are not calculated as a simple average of monthly or annual estimates; instead, the USCB generates the estimates by pooling the sample responses of what was observed for every month of the entire time period and applying measures to

account for changes in areas such as geography and margins of error to develop weighting of sample cases (USCB, 2016a).

- **Housing** is described as the quantity and availability of accessible permanent and temporary housing for the current workforce as well as the demolition workforce that could need to temporarily relocate. 2014 ACS housing data are provided for rental and owner-occupied options in Otero County, City of Alamogordo, and the Village of Cloudcroft. This ROI was selected because the current Sacramento Peak Observatory workforce resides almost entirely in Otero County and the majority rent their homes, while the rest own their residences. It is anticipated that the demolition workforce would either commute from their residences within Otero County or stay in temporary housing (rental units or hotels) in the City of Alamogordo or the Village of Cloudcroft depending on the duration of their involvement.
- **Economy, Employment, and Income** are described together because of the interrelatedness of this resource. Economy is defined by a general description of the existing local net output of Otero County and New Mexico. The description includes the growth, or lack thereof, of the gross domestic product for New Mexico and its change over time as well as the top industries that contribute to civilian employment. Employment, distribution of employment by industry sector, and income are described by the size of the labor force (defined as the civilian non-institutionalized population, ages 18 to 64 years), the unemployment rate, and median household income. Otero County was selected as the ROI because the majority of the current Sacramento Peak Observatory workforce reside in the County. Additionally, the anticipated demolition workforce would be expected to be sourced from within Otero County with direct (demolition materials), indirect (purchases made to other suppliers by the industries that directly support the demolition), and induced (money spent by demolition workers locally) expenditures occurring almost entirely within Otero County. However, New Mexico is also described because a majority of the 15,000 visitors to the Sacramento Peak Observatory come from outside Otero County.
- **Education** is characterized by the total public school enrollment figures by grade level for Otero County and New Mexico and by the educational opportunities offered at the Sacramento Peak Observatory.
- **Tourism** is characterized by the number of visitors and their expenditures in New Mexico for 2014 from the New Mexico Tourism Department (NMTD) and from visitor trends at the Sacramento Peak Visitor Center. Proximate tourism resources characterized include the White Sands National Monument (managed by the National Park Service [NPS]), the Lincoln National Forest (managed by the USFS), and the Mescalero Apache Tribe Reservation. This ROI was selected because a significant

percentage of the 15,000 annual visitors to the Sacramento Peak Observatory are vacationing in the area of Sunspot or the Village of Cloudcroft and are not residents of Otero County.

The Sacramento Peak Observatory is located in unincorporated Otero County in the Lincoln National Forest. The ROI for population, housing, employment, economy, and income is defined as Otero County. Because of its remote location in the central portion of Otero County, the Sacramento Peak Observatory is closest to the small communities of Sunspot and the Village of Cloudcroft. However, the majority of housing and public services are located 28.5 miles to the northwest in the City of Alamogordo, approximately 1 hour away by automobile. Therefore, it is assumed that most of those employed at the Sacramento Peak Observatory would tend to be located in this ROI. The ROI for education and tourism is Otero County to characterize the potential effects of a reduction or total loss in the number of students and visitors to Otero County from across the state for education and tourist activities. The baseline year for population and housing is 2014, which is the most recent year for which USCB ACS data are available for most of the socioeconomic indicators. Similarly, economic conditions are presented for 2015, which is the most recent year for which USCB data are available.

Otero County had an estimated population of 65,415 in 2014 (USCB, 2015a). It is bordered to the west by Doña Ana County (population 212,942), to the north by Lincoln County (population 20,162), to the northwest by Sierra County (population 11,774), to the east by Chaves County (population 65,850), and to the south by two counties in Texas: El Paso (population 823,862) and Hudspeth (population 3,344) (USCB, 2015a). Otero County is part of the Alamogordo micropolitan statistical area [7] and contains two census designated villages and 14 census-designated places (USCB, 2016b). The Sacramento Peak Observatory is located in a remote area of the Lincoln National Forest in the unincorporated community of Sunspot, New Mexico. The community of Sunspot is accounted for in the Village of Cloudcroft, with an estimated population of 577 in 2014 (USCB, 2015a). Development within 5 to 10 miles of the Sacramento Peak Observatory in the adjacent municipalities is also limited and primarily rural.

The primary access route to the Sacramento Peak Observatory is NM-6563 (Sunspot Highway), an estimated 30-minute drive (17.1-mile distance) to the Village of Cloudcroft and an estimated 1-hour drive (28.5 miles) to the City of Alamogordo to the northwest. Other access routes to the Sacramento Peak Observatory are limited as a result of the steep topography. Because of its remote location and limited access, it is assumed that the majority of those employed onsite live nearby in the Village of Cloudcroft and access the City of Alamogordo for local services, as needed. As a result, it is anticipated that the Village of Cloudcroft (unincorporated Otero County) and the City of Alamogordo will be most affected

[7] The USCB defines a micropolitan statistical area as an area that is centered on an urban area with a population at least 10,000 but less than 50,000 (USCB, 2016b).

by changes in employment and earnings; however, the potential direct and indirect economic impacts on Otero County will also be discussed because of concerns raised during the public scoping process.

3.10.1 Population and Housing

This section describes the 2014 population estimates for New Mexico, Otero County, City of Alamogordo, and the Village of Cloudcroft based on 2010 to 2014 ACS. It also discusses population trends over time and population projections for 2020. Information on racial and ethnic composition of the population is found in Section 4.11, *Environmental Justice*. This section also provides a description of housing characteristics in Otero County, City of Alamogordo, and the Village of Cloudcroft, including housing types, housing costs, and vacancy rates.

Population

Table 3.10-1 shows the population, median age, and age distribution of the Village of Cloudcroft, City of Alamogordo, Otero County, and New Mexico. The population of the Village of Cloudcroft was 577 in 2014, less than 1 percent of Otero County's total population (USCB, 2015a). This small population is indicative of the rural and sparsely developed nature of the area immediately outside the Sacramento Peak Observatory boundaries. One hour's drive from the Sacramento Peak Observatory, the City of Alamogordo had approximately 31,224 residents, representing 48 percent of the 65,415 residents of Otero County (USCB, 2015a). Holloman AFB is located approximately 3 miles west of the City of Alamogordo, and is the largest employer in the area (Holloman AFB, 2013). While the age distribution of the City of Alamogordo and Otero County are comparable to that of the state, Cloudcroft tends to be older. Approximately 30 percent of its population 65 years or older compared to 14 to 17 percent for the other geographies in Table 3.10-1. As a result, the median age of the population of the Village of Cloudcroft is 53 versus to median ages of 36 to 37 for the City of Alamogordo, Otero County, and New Mexico.

TABLE 3.10-1
Population, Median Age, and Age Distribution (estimated 2014)

	Village of Cloudcroft	City of Alamogordo	Otero County	New Mexico
Total Estimated Population	**577**	**31,224**	**65,415**	**2,080,085**
Distribution				
Under 5 years	2%	7%	8%	7%
5 to 19 years	10%	18%	20%	21%
20 to 64 years	59%	58%	57%	58%
65 years or older	30%	17%	15%	14%
Median Age (years)	**53**	**37**	**36**	**37**

Source: USCB, 2015a.

Population Trends

Table 3.10-2 shows recent population trends for the Village of Cloudcroft, City of Alamogordo, Otero County, and New Mexico from the USCB decennial census in 2000 and 2010, as well as ACS population estimates for 2014 (USCB, 2000, 2010a, 2015a). As noted in a *Joint Land Use Study (JLUS) of Fort Bliss, Holloman AFB and the White Sands Missile Range*, the population changes in the City of Alamogordo in particular may be attributed to increases or decreases in personnel at nearby military bases (Border Research, 2015). In the 2010 census, the population for Otero County is reported as 62,782, an increase of 0.8 percent or 484 people compared to the population reported for the 2000 census. This population increase is lower than that of the state-wide population increase of 10.7 percent between 2000 and 2010. As shown in Table 3.10-2, the Village of Cloudcroft's estimated 2014 population of 577 is a 14.4 percent decrease from 2010, and the 2010 population of 674 reflected a decline of 10 percent from the 2000 census. The City of Alamogordo estimated 2014 population of 31,224 is a 4.9 percent increase from 2010, and the 2010 population of 29,753 reflected a decline of 16.4 percent from the 2000 census. This population loss as well as a portion of the lack of growth overall in Otero County was associated with a loss of military personnel during a transfer of aircraft to other installations. The City of Alamogordo experienced a noticeable loss in military personnel and their families during this transition; however, the 54th Fighter Group, an F-16 training unit, arrived in March 2014 to use the vacant facilities at Holloman AFB (Border Research, 2015). Population estimates from the 2014 ACS indicate that this increasing population trend is continuing.

TABLE 3.10-2
Population Change from 2000, 2010, and Estimated 2014

	2000 Census	2010 Census	2000 to 2010 % Change	ACS Estimated 2014	2010 to 2014 % Change
Village of Cloudcroft	749	674	-10.0%	577	-14.4%
City of Alamogordo	35,582	29,753	-16.4%	31,224	4.9%
Otero County	62,298	62,782	0.8%	65,415	4.2%
New Mexico	1,819,046	2,013,122	10.7%	2,080,085	3.3%

Sources: USCB, 2000, 2010a, 2015a.

Population Projections

The population for New Mexico is expected to increase from 2,085,109 persons in 2015 to 2,827,692 persons in 2040 (New Mexico Department of Workforce Solutions [NMDWS], 2015; USCB, 2015b). This is an approximately 36 percent increase in population over the 25-year period. The projected population growth for Otero County is expected to be approximately 4 percent total over the next 25 years, growing from 64,362 to 66,841 by 2040 (NMDWS, 2015; USCB, 2015b).

Housing Information

Table 3.10-3 shows 2014 housing information for the Village of Cloudcroft, City of Alamogordo, Otero County, and New Mexico, including the estimated number of housing units by occupancy type (owner or renter) and vacancy status (USCB, 2015c). In 2014, there were a total of 1,124 housing units in the Village of Cloudcroft and 14,267 housing units in the City of Alamogordo, which, when combined, represented half of the 30,982 total units in Otero County. Of the 12,470 occupied units in the City of Alamogordo, 58 percent were owner-occupied and 42 percent renter-occupied. This ratio of housing type (owner versus renter) is lower than the New Mexico average in which 68 percent of housing is owner-occupied and 32 percent is renter-occupied. The Village of Cloudcroft is closer to the state average with 71 percent owner-occupied and 29 percent renter-occupied. Overall, existing housing vacancy rates for the City of Alamogordo, Otero County, and New Mexico are approximately 13, 23, and 16 percent, respectively, which reflects approximately 1,797 vacant units in the City and 7,075 vacant units in Otero County in 2014. While the housing vacancy rate in the Village of Cloudcroft was particularly high with 72 percent (814 units) vacant, this was primarily due to a large percentage of the housing stock used for seasonal, recreational, or occasional purposes. For example, 79 percent of the 814 vacant units (646 units) in the Village of Cloudcroft in 2014 were considered seasonal (USCB, 2015d). Seasonal units include those used for summer or winter sports or recreation, such as hunting cabins, quarters for workers such as seasonal service workers and loggers, as well as timesharing and other arrangements.

TABLE 3.10-3
Estimated Number of 2014 Housing Units Ownership and Occupancy

Housing Occupancy	Village of Cloudcroft	City of Alamogordo	Otero County	New Mexico
Total housing units	1,124	14,267	30,982	907,233
Occupied housing units	310	12,470	23,907	764,684
Owner-occupied	220	7,271	15,475	521,278
Renter-occupied	90	5,199	8,432	243,406
Vacant housing units	814	1,797	7,075	142,549
Percent of Total Housing Units	72.4 %	12.6 %	22.8 %	15.7 %
Vacancy rate for all housing types				
Owner-occupied vacancy rate (% of total owner-occupied units)	22.8	3.9 %	3.6 %	2.3 %
Renter-occupied vacancy rate (% of total renter-occupied units)	31.8	3.7 %	3.1 %	8.0 %
HOUSING COSTS				
Median Value of Owner-occupied Units (dollars)	168,200	112,100	101,400	159,300
Median Gross Rent of Occupied Units (dollars)	857	689	775	774

Source: USCB, 2015c.

Housing costs (median rent) in the City of Alamogordo ($689) are slightly less than the state-wide average ($774). However, housing costs (median rent) in Otero County ($775) are nearly equivalent to the state average while those in the Village of Cloudcroft are higher ($857). Housing values for owner-occupied homes in the Village of Cloudcroft are also higher with the median value of owner-occupied units being $168,200 in 2014. Housing values for owner-occupied homes have increased in the City of Alamogordo. The median annual value of owner-occupied units in the City of Alamogordo increased 8 percent, from $103,900 in 2010 to $112,100 in 2014 (USCB, 2015e, 2015f). During this same period, the median value of homes in New Mexico increased from $158,400 in 2010 to $159,300 in 2014, an increase of 0.6 percent. In contrast, the overall median value of homes in the United States declined by 7.2 percent, from $188,400 in 2010 to $175,700 in 2014 as did those in the Village of Cloudcroft (USCB, 2010b). The Village of Cloudcroft saw owner-occupied median housing values decline from $181,100 in 2010 to $168,200, a 7.1 percent decline.

Because of the undeveloped nature of the surrounding area, temporary housing opportunities (rentals) near the Sacramento Peak Observatory are very limited. Currently, 37 onsite housing units are available for visiting scientists. If lodging is unavailable in these buildings, visitors must arrange for accommodations in the limited number of local guesthouses or hotels, the nearest of which are in the Village of Cloudcroft. The Lodge Resort has the greatest capacity offering 59 rooms in addition to 8 rooms at the associated Pavilion Bed and Breakfast Inn. Smaller operations include the Dusty Boots Motel (16 rooms), Cloudcroft Hotel (18 rooms), Crofting Inn Bed and Breakfast (8 rooms), the Alta Vista Chalet Motel (7 rooms), the Summit Inn (10 rooms and 3 cabins), as well as a number of private cabin rentals and bed and breakfast facilities. Approximately 14 hotels are located in the City of Alamogordo, including the 185-room Holiday Inn Express, the 80-room Holiday Inn Express Hotel and Suites, the 73-room Fairfield Inn & Suites, the 71-room Hampton Inn, and the 40-room Days Inn (TripAdvisor, 2016). As noted previously, an additional temporary housing resource could be the 646 vacant seasonal units located in the Village of Cloudcroft (USCB, 2015g).

3.10.2 Economy, Employment, and Income

This section provides information on the local economy of Otero County and the City of Alamogordo, as well as industry sector, employment, and income data for these locations. To the extent this information is available, the economic contribution and employment provided by Holloman AFB are also discussed.

Economy of Otero County and the City of Alamogordo

As the City of Alamogordo is the county seat of Otero County and home to nearly half the residents of Otero County, it is the largest economic contributor. Historically, the region's economy was supported by the construction and maintenance of the El Paso and Northeastern Railroad. It was not until 1933 when President Hoover created the nearby White Sands National Monument that the economy shifted with a significant increase in tourism in the region after its April 1934 dedication and grand opening (Townsend,

1999). Construction of the present-day Holloman AFB began in 1942 and the base is presently the largest single employer within Otero County (Holloman AFB, 2013). Over a quarter of the civilian employment in Otero County and Alamogordo is in the "educational services, and health care and social assistance" industry, which is comparable to New Mexico yet higher than the 20 percent of civilians who work in this sector in Cloudcroft (USCB, 2015e). Approximately 20 percent of the civilian workers in the County, City, and Village are in the "public administration" industry and 12 percent are in the "arts, entertainment, and recreation, and accommodation and food services" industry in 2014. The "retail trade" sector played a greater role (12 percent) in the civilian employment of New Mexico, Otero, and Alamogordo than the 2 percent of civilian employment in the Village of Cloudcroft (USCB, 2015e). Other notable economic drivers specific to Otero County include Gerald Champion Regional Medical Center, New Mexico State University at Alamogordo, and PreCheck (Otero County Economic Development Council [OCEDC], 2016a).

Employment

As summarized in Table 3.10-4, employment in 2009 and 2014 is compared by sector for the Village of Cloudcroft, the City of Alamogordo, Otero County, and New Mexico based on the ACS to characterize the current workforce composition (USCB, 2010c, 2015d). Overall, the total civilian employment, age 16 years and older, declined by approximately 6 percent to employment of 253 in 2014 in the Village of Cloudcroft and 13 and 24 percent between 2009 and 2014 for Otero County and the City of Alamogordo, respectively. The 2014 civilian employed population, age 16 years and older, was estimated to be 875,947 in New Mexico, 22,243 in Otero County, and 11,691 in the City of Alamogordo (USCB, 2015e). It was estimated that there were a total of 5,471 Active Duty, Guard and Reserve, and federal Civilian Contractors employed at Holloman AFB in 2013, of which only the civilian contractors are included in Table 3.10-4 (Border Research, 2015). According to 2014 estimates, the civilian labor force for the City of Alamogordo was employed in the following sectors: management, business, science and the arts (27 percent), service (26 percent), sales and office occupations (26 percent), natural resources (15 percent), production, transportation, and material moving occupations (5 percent). Figure 3.10-1 shows that the civilian employment by sector in the City of Alamogordo and Otero County is generally similar to the employment by sector for New Mexico. Due to the small size of the labor force in the Village of Cloudcroft it is not included in Figure 3.10-1 and Appendix 3E. Natural resources, construction, and maintenance occupations in particular declined substantially (21 percent) from 2009 to 2014, particularly in the City of Alamogordo, where installation, maintenance, and repair fell 23 percent and construction and extraction occupations fell 24 percent (USCB, 2010c, 2015d). Appendix 3E provides more detailed civilian employment and median earnings for all the subsectors of the large sectors shown in Table 3.10-4. As demonstrated in Table 3.10-4, the "Production, transportation, and material moving" and "Service" both declined noticeably, greater than 100 percent, during this time period in the Village of Cloudcroft.

TABLE 3.10-4
Selected Civilian Employment and Median Earnings for 2009 and 2014 by Occupation for the Village of Cloudcroft, City of Alamogordo, Otero County and New Mexico [a]

	Village of Cloudcroft					City of Alamogordo					Otero County					New Mexico				
	2009 Estimated Employment	2014 Estimate	Employment by Sector (2014)	2009 – 2014 % Change	2014 Median Earnings (dollars) [a]	2009 Estimated Employment	2014 Estimate	Employment by Sector (2014)	2009 – 2014 % Change	2014 Median Earnings (dollars) [a]	2009 Estimated Employment	2014 Estimate	Employment by Sector (2014)	2009 – 2014 % Change	2014 Median Earnings (dollars) [a]	2009 Estimated Employment	2014 Estimate	Employment by Sector (2014)	2009 – 2014 % Change	2014 Median Earnings (dollars) [a]
Employed population 16 years and older	267	253		*-6%*	$26,172	15,347	11,691		-24%	25,857	25,560	22,243		-13%	25,975	877,146	875,947		0%	30,018
Management, business, science, and arts occupations	93	126	*50%*	*26%*	$48,214	4,103	3,143	*27%*	-23%	45,186	6,709	6,048	*27%*	-10%	44,171	295,963	311,860	*36%*	5%	48,300
Service occupations	94	43	*17%*	*-119%*	$11,131	3,122	3,082	*26%*	-1%	15,232	5,870	5,598	*25%*	-5%	15,165	164,644	180,054	*21%*	9%	16,074
Sales and office occupations	38	39	*15%*	*3%*	$31,375	4,528	3,043	*26%*	-33%	21,860	6,746	5,387	*24%*	-20%	21,991	215,435	203,765	*23%*	-5%	24,823
Natural resources, construction, and maintenance occupations	23	41	*16%*	*44%*	$12,875	2,274	1,805	*15%*	-21%	26,929	3,857	3,559	*16%*	-8%	27,303	115,075	99,875	*11%*	-13%	31,127
Production, transportation, and material moving occupations	19	4	2%	-375%	X	1,320	618	*5%*	-53%	29,318	2,378	1,651	*7%*	-31%	25,333	86,029	80,393	*9%*	-7%	27,345

Sources: USCB, 2010c, 2015d.

Notes: An '(X)' means that the estimate is not applicable or not available. Please see Appendix 3E for the full detail of this table for the City of Alamogordo, Otero County and New Mexico.

[a] In 2014 inflation-adjusted dollars, which are calculated using the average Consumer Price Index for a given calendar year and represent the change in “buying power” because of the increases in the prices of all goods and services purchased by consumers.

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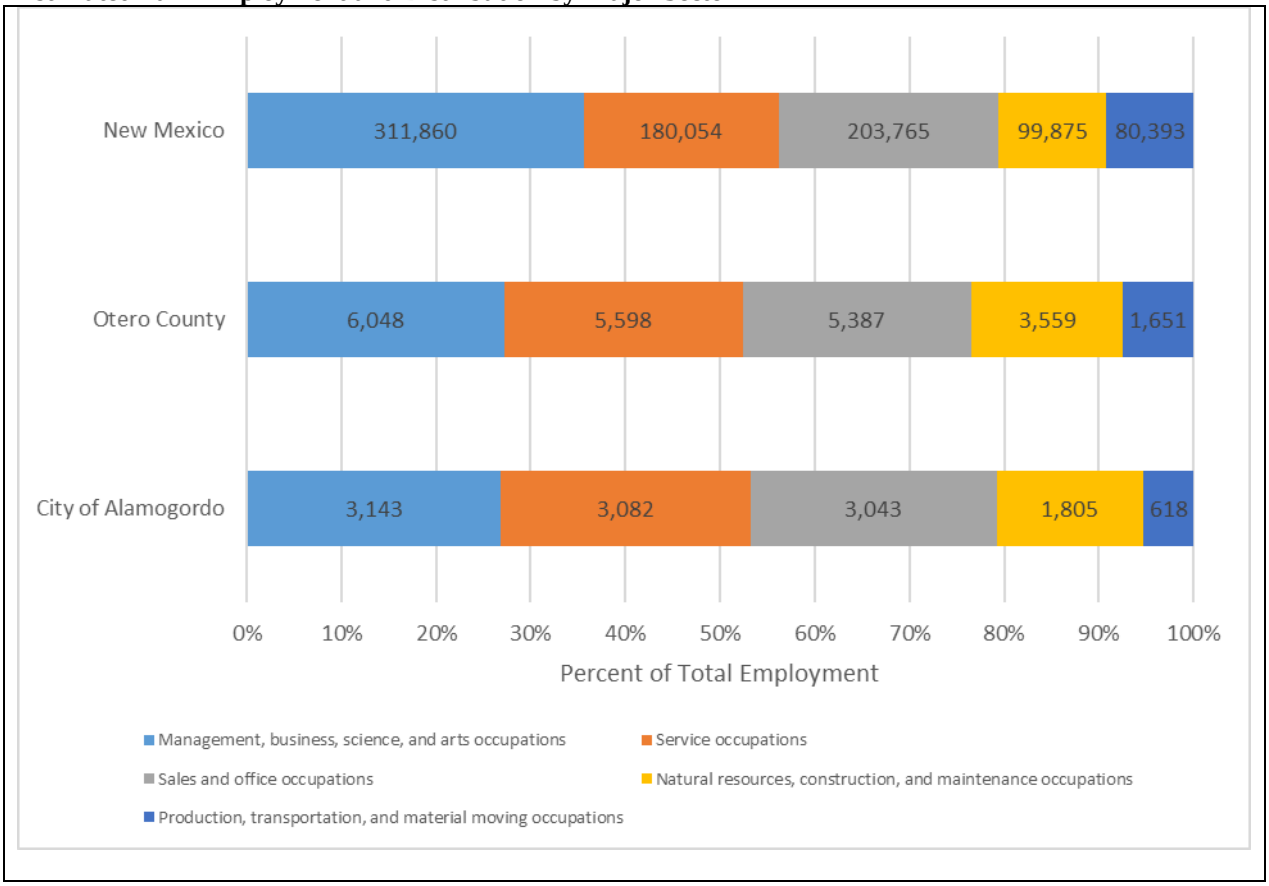
FIGURE 3.10-1
Estimated 2014 Employment and Distribution by Major Sector



Sources: USCB, 2010c, 2015d.

The existing labor, employment, and income information (estimated 2014) for the Village of Cloudcroft, the City of Alamogordo, Otero County, and New Mexico are summarized in Table 3.10-5. The unemployment rate (not seasonally adjusted) for New Mexico was 6.2 percent in June 2016, while the United States national unemployment rate was 4.9 percent (BLS, 2016a). The City of Alamogordo's unemployment rate in 2016 was estimated at 5.6 percent while there were approximately 14,118 persons, age 16 years and older, in the labor force in 2014 based on a 5-year average (BLS, 2016b; USCB, 2015f).

TABLE 3.10-5
Total Labor Force, Employment and Income Data (2014 Estimated)

	Village of Cloudcroft	City of Alamogordo	Otero County	New Mexico
2014 Total labor force, not seasonally adjusted	278	14,118	28,127	977,579
In Labor Force, Civilian	278	13,078	25,652	969,053
In Labor Force, Armed Forces	0	1,040	2,475	8,526
2016 Civilian Unemployment Rate	n/a	5.60%	6.3%	6.7%

TABLE 3.10-5
Total Labor Force, Employment and Income Data (2014 Estimated)

	Village of Cloudcroft	City of Alamogordo	Otero County	New Mexico
Median Household Income	$42,222	$43,460	$40,614	$44,968
Per Capita Income	$27,852	$22,768	$19,803	$23,948
Highest Paying Occupations in 2014				
	Management, $48,214	Architecture and engineering, $65,721	Legal, $61,875	Architecture and engineering, $76,406
	Education, training, and library, $47,750	Management, $56,319	Computer and mathematical, $60,833	Computer and mathematical, $62,790
	Computer and mathematical, $40,556	Law enforcement workers including supervisors, $49,688	Architecture and engineering, $59,306	Life, physical, and social science, $61,545
	Office and administrative support, $31,375	Community and social services occupations, $48,750	Management, $50,551	Health diagnosing and treating practitioners and other technical, $61,438
	Sales, $26,250	Health diagnosing and treating practitioners and other technical, $47,331	Life, physical, and social science, $47,546	Legal, $56,495

Sources: USCB, 2015e, 2015f; BLS, 2016a, 2016b.
Notes: BLS does not track unemployment for smaller communities such as the Village of Cloudcroft.

Income

As shown in Table 3.10-5, New Mexico's per capita income was $23,948, while the per capita income in Otero County was $19,803 (for the previous 12 months in 2014 dollars) and the City of Alamogordo per capita income was $22,768 (USCB, 2015f). Similarly, the New Mexico median household income (in 2014 dollars) was $44,968, while the City of Alamogordo median household income was $43,460 (USCB, 2015f). The median household income in the Village of Cloudcroft was comparable at $42,222 in 2014. Table 3.10-5 also shows the sectors with the highest paying jobs in these same geographies. Both the City of Alamogordo and New Mexico share the same highest paying sector, architecture and engineering, while Otero County's highest paying sector is in legal services. On the whole, median income for these top paying jobs is generally higher in New Mexico than in the City of Alamogordo (USCB, 2015e). Management positions were the highest-paying sector in Cloudcroft.

The estimated poverty status and age distribution of those below the poverty level in 2014 in New Mexico, Otero County, the City of Alamogordo, and the Village of Cloudcroft are summarized in Table 3.10-6. Overall, the percent of the population below the poverty level in the Village of Cloudcroft, 11 percent, is approximately half that of the other geographies. Approximately 21 percent of the

TABLE 3.10-6
Poverty Status: 5-year Rolling Average Adjusted for Inflation

Subject	Village of Cloudcroft			City of Alamogordo			Otero County			New Mexico		
	Total	Below Poverty Level	Percent Below Poverty Level	Total	Below Poverty Level	Percent Below Poverty Level	Total	Below Poverty Level	Percent Below Poverty Level	Total	Below Poverty Level	Percent Below Poverty Level
	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Population for whom poverty status is determined	577	65	11.3%	30,641	5,682	18.50%	62,663	13,761	22.0%	2,039,574	426,116	20.90%
Age												
Under 18 years	58	15	25.9%	6,956	1,999	28.7%	15,992	5,072	31.7%	504,947	148,427	29.4%
18 to 64 years	348	50	14.4%	18,565	3,279	17.7%	37,031	7,663	20.7%	1,244,509	242,392	19.5%
65 years and older	171	0	0%	5,120	404	7.9%	9,640	1,026	10.6%	290,118	35,297	12.2%

Source: USCB, 2015h.

population in New Mexico fall below the poverty level compared to 22 percent in Otero County and 19 percent in the City of Alamogordo. Approximately 29 percent of children (population under age 18 years) fall below the poverty level in both New Mexico and City of Alamogordo. In the City of Alamogordo, 18 percent of the working age population (ages 18 to 64 years) is at or below the poverty level compared to 20 percent for New Mexico. Additionally, 8 percent of the elderly population (age 65 years and older) in the City of Alamogordo lives at or below the poverty level compared to 12 percent in New Mexico (USCB, 2015h).

3.10.3 Education

This section briefly characterizes the current educational resources of New Mexico, Otero County, and the City of Alamogordo, as well as those programs specific to the Sacramento Peak Observatory.

School Enrollment in New Mexico

New Mexico is currently the thirty-sixth largest school system in the United States, with 877 public schools and a projected 2016–2017 enrollment of 338,220 students (NEA, 2015). Additionally, there are approximately 222 private schools in New Mexico (Private School Review, 2016a). The statewide high school graduation rate was 67 percent in 2014, while it was 76 percent in the Alamogordo school district (New Mexico Public Education Department [NMPED], 2016).

Table 3.10-7 summarizes public student enrollment trends for the Village of Cloudcroft, City of Alamogordo, Otero County, and New Mexico between the 2010 and 2014 school years. Student enrollment in the Village of Cloudcroft School System declined each year, most recently by 13 percent between the 2012–2013 and 2013–2014 school years, resulting in a total enrollment of 353 in 2013–2014 (NMPED, 2013). Table 3.10-7 also summarizes the grade level distribution for the 2013–2014 school year; approximately 10 to 11 percent of the students in the City of Alamogordo, Otero County, and New Mexico are in pre-kindergarten or kindergarten, 61 to 62 percent in Grades 1 to 8, and 27 to 29 percent in Grades 9 to 12 (U.S. Department of Education [USDE], 2015). However, the Village of Cloudcroft had a lower percentage, 11 percent, of pre-kindergarten or kindergarten, and a higher percentage, 35 percent, of high-school-age students. Table 3.10-7 also depicts the rising trend of student-teacher ratios within the state, county, and city. The City of Alamogordo maintains a higher student-teacher ratio throughout the years reported compared to Otero County and New Mexico. However, the student-teacher ratio in Cloudcroft's schools was much lower, 13.58, during the 2013–2014 school year. Table 3.10-7 also depicts the rising trend of student-teacher ratios within the State of New Mexico, Otero County, and the City of Alamogordo. The City of Alamogordo maintains a higher student-teacher ratio throughout the years reported when compared to Otero County and the State of New Mexico.

TABLE 3.10-7
Public School Enrollment Trends and Grade Distribution

Cloudcroft Municipal Schools	**2009–10**	**2010–11**	**2011–12**	**2012–13**	**2013–14**	**2013–14 Percent Distribution**
Pre-kindergarten and Kindergarten	25	28	36	23	13	4%
Grades 1–8	250	247	232	230	204	61%
Grades 9–12	161	138	138	123	115	35%
Total	436	413	406	376	332	
Percent Total Change		-5.6%	-1.7%	-8.0%	-13.3%	
Student-Teacher Ratio	10.80		11.6		13.58	
City of Alamogordo	**2009–10**	**2010–11**	**2011–12**	**2012–13**	**2013–14**	**2013–14 Percent Distribution**
Pre-kindergarten and Kindergarten	547	587	716	682	672	11%
Grades 1–8	3,702	3,816	3,809	3,793	3,778	62%
Grades 9–12	1,875	1,888	1,809	1,679	1,619	27%
Total	6,124	6,291	6,334	6,154	6,069	100%
Percent Total Change	n/a	2.7%	0.7%	-2.8%	-1.4%	
Student-Teacher Ratio	15.38		16.71		16.98	
Otero County	**2009–10**	**2010–11**	**2011–12**	**2012–13**	**2013–14**	**2013–14 Distribution**
Pre-kindergarten and Kindergarten	643	673	851	812	789	11%
Grades 1–8	4,515	4,642	4,604	4,579	4,572	62%
Grades 9–12	2,348	2,320	2,237	2,080	2,019	27%
Total	7,506	7,635	7,692	7,471	7,380	100%
Percent Total Change	n/a	1.7%	0.7%	-2.9%	-1.2%	
Student-Teacher Ratio	12.34		13.35		14.23	
New Mexico	**2009–10**	**2010–11**	**2011–12**	**2012–13**	**2013–14**	**2013–14 Distribution**
Pre-kindergarten and Kindergarten	26,226	26,688	34,606	35,174	35,233	10%
Grades 1–8	201,305	204,677	204,875	205,807	206,282	61%
Grades 9–12	98,011	98,777	97,744	97,242	97,704	29%
Total	325,542	330,142	337,225	338,223	339,219	100%
Percent Total Change	n/a	1.4%	2.1%	0.3%	0.3%	
Student-Teacher Ratio	13.72		14.12		15.75	

Source: NMPED, 2013.
Note: ‡ indicates that the data do not meet National Center for Education Statistics data quality standards.

Approximately 197,253 college students were enrolled in 29 public and private institutions of higher education in New Mexico in 2013–2014, which represents 67 percent of the college age population, ages 20 to 29 years (New Mexico Higher Education Department, 2016; USDE, 2015). The largest 4-year university is the University of New Mexico, with a total of 33,378 students (CollegeStats.org, 2016).

School Enrollment in Otero County

Otero County has a total of 23 public schools and 3 private schools with a projected 2016–2017 enrollment of 7,094 students and 308 students, respectively (Private School Review, 2016b). Two public

institutions providing training beyond the high school level are located in Otero County: the 2-year community college New Mexico State University at Alamogordo (enrollment of 5,354) and the Olympian University of Cosmetology (enrollment of 1,855) (CollegeStats.org, 2016).

Sacramento Peak Observatory-related STEM Opportunities

Approximately 15,000 individuals visit the Sacramento Peak Observatory each year, including workshops for approximately 30 participants per year on solar physics. Each year, internships and research assistantships are awarded to undergraduate and graduate students to pursue research opportunities at NSO locations, including the Sacramento Peak Observatory. Residential housing units and visitor apartments are located onsite at the Sacramento Peak Observatory for resident and visiting scientists.

3.10.4 Tourism

According to the NMTD, approximately 33.3 million visitors (both overnight and day trips) came to the state in 2014, resulting in a total estimated spending of $6,080 (U.S. millions) (NMTD, 2015). From 2010 to 2014, total visitor spending increased by 17 percent, improving the state's gross domestic product. Table 3.10-8 shows the number of visitors, their expenditures by the location of their stay in New Mexico, and their country of origin for 2010, 2012, and 2014.

TABLE 3.10-8
Number and Expenditures of Visitors in New Mexico: Fiscal Years

	2010	2012	2014	2014 % of Total
Number of Domestic Visitors (in millions)	29.8	32	32.7	
Overnight Visitors	*13.7*	*14.5*	*14.9*	*46%*
Day Visitors	*16.1*	*17.5*	*17.6*	*54%*
Visitors Spending (in millions of dollars)	5,207	5,727	6,080	

Source: NMTD, 2015.

Tourism in Otero County

Notable tourist activities in Otero County consist of visiting the Sacramento Peak Observatory, White Sands National Monument, and the Lincoln National Forest (Roadtrippers, 2016). The Sacramento Peak Observatory allows for self-guided tours of the facilities any day of the week, year round, for $3.00 for adults, $1.50 for seniors, $1.00 children, and $10.00 for a family. The Village of Cloudcroft is also a tourism destination offering shopping, dining, extensive recreation opportunities, as well as hosting unique events such as performances by the Cloudcroft Light Opera Company and a Fourth of July parade (Cloudcroft COC, 2017). Approximately 45 minutes due west of the Sacramento Peak Observatory is the White Sands National Monument. Entrance fees to the White Sands National Monument are $5 for adults and free for children ages 15 years and under (NPS, 2016). Special pre-registration is required to attend guided tours of Lake Lucero and other activities, such as the full moon hike, moonlight bike ride, and sunrise photography (NPS, 2016).

The Sacramento Peak Observatory is located in the Lincoln National Forest, which offers many opportunities for hiking, camping, horseback riding, and cross country skiing. Admission to the Lincoln National Forest is free, although permits are required for caving, gathering fire wood, and other special uses (USFS, 2016c).

3.11 Traffic and Transportation

This section addresses the traffic and transportation network surrounding the Sacramento Peak Observatory and the potential route to the demolition materials landfill. The ROI for traffic and transportation includes the roadway network leading to the Sacramento Peak Observatory and along the potential route to the demolition materials landfill (see Figure 3.11-1).

3.11.1 Proposed Action Area

The Sacramento Peak Observatory is located at the southern terminus of Sunspot Highway (New Mexico Highway 6563). On the Sacramento Peak Observatory site, Sunspot Highway is renamed Coronal Loop. Access to the other named road at the facility (Visitor Center Road) is provided via Coronal Loop. The proposed demolition materials landfill is the Otero-Greentree Regional Landfill, located at 4276 Highway 54 South, approximately 20 miles south of Alamogordo, New Mexico.

Routes to the north and south from the Sacramento Peak Observatory were assessed for suitability for use by large vehicles transporting heavy loads from the Sacramento Peak Observatory. Based on this assessment, a route to the south was determined to be unsuitable because of multiple tight turns and gravel-surfaced roads. Another route to the north and then along Karr Canyon Road was also assessed and determined to be unsuitable for similar reasons. The route selected as most suitable for use by large vehicles transporting heavy loads to the demolition materials landfill would extend to the north from the Sacramento Peak Observatory to Cloudcroft, then westward to Alamogordo, and then south along U.S. Highway 54 to the Otero-Greentree Regional Landfill. The route includes travel on approximately 15 miles of New Mexico Route 6563 toward Cloudcroft, travel along New Mexico Highway 130 for approximately 2 miles to U.S. Highway 82, travel to the west for 16 miles to U.S. Highway 54, and then travel for 26 miles along U.S. Highway 54 south to the Otero-Greentree Regional Landfill. All of these roads are two-way asphaltic-concrete roadways with a minimum width of 30 feet. Passing lanes are present in certain areas along U.S. Highway 82. After U.S. Highway 82 crosses U.S. Highway 70, it becomes U.S. Highway 54, which is a divided four-lane highway. A permanent traffic alert exists as of April 2017 on U.S. Highway 82 between Cloudcroft and Alamogordo, where the road descends 5,000 feet in 16 miles. Steep grades, numerous tight turns, and a tunnel with 17-foot clearance are present on this section of the potential route to the demolition materials landfill. According to the New Mexico Department of Transportation (NMDOT), trucks without retarder brakes and/or longer than 65 feet in length are prohibited on this section of U.S. Highway 82 (NMDOT, 2017a).

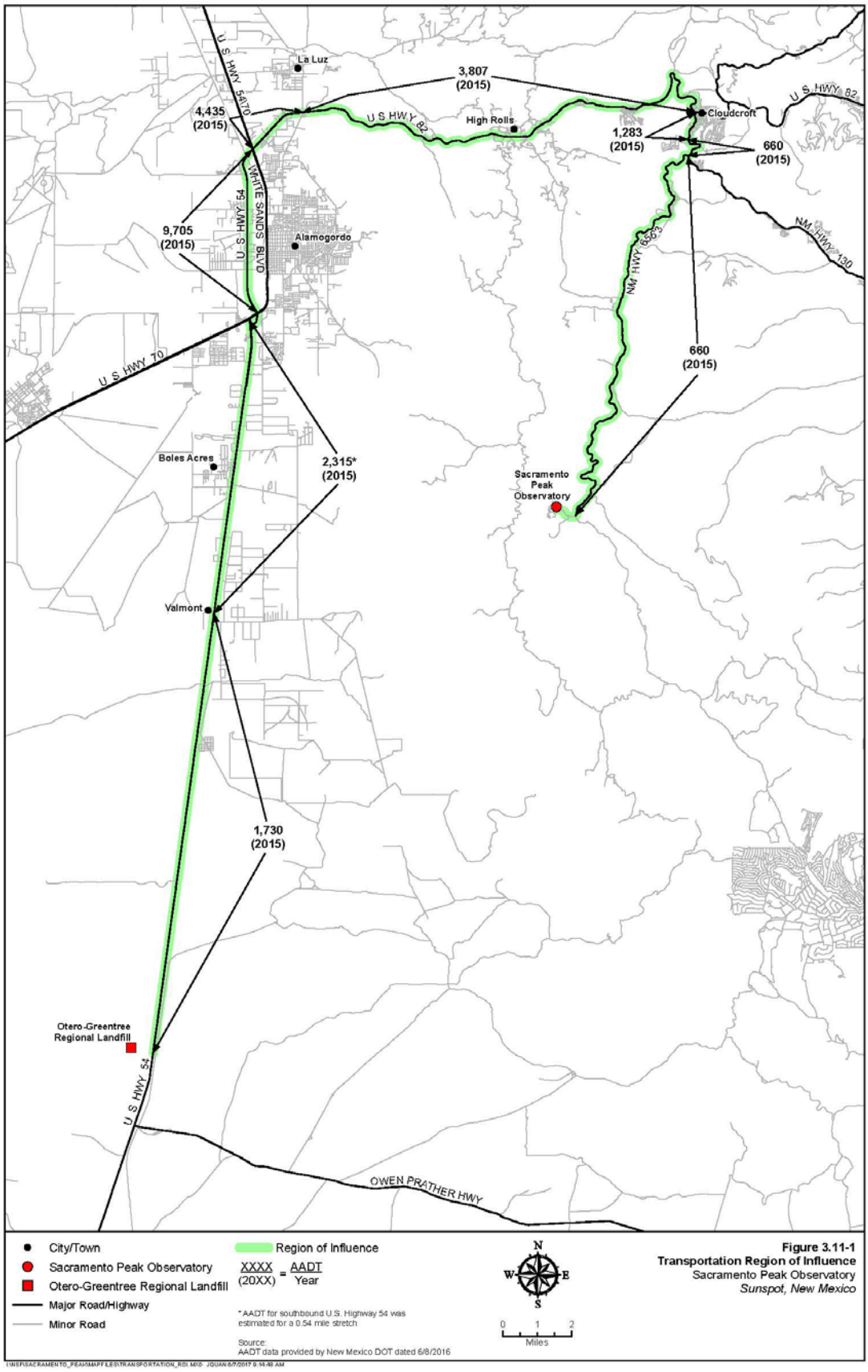


Figure 3.11-1
Transportation Region of Influence
Sacramento Peak Observatory
Sunspot, New Mexico

Annual average daily traffic on the roadway network within the ROI are depicted on Figure 3.11-1. The Sacramento Peak Observatory is staffed by approximately 20 people and averages 15,000 visitors yearly. Traffic data indicate that the roadways in the ROI have varying percentages of heavy commercial traffic. Heavy commercial traffic is defined as vehicles larger than a car, passenger truck, or motorcycle (NMDOT, 2016a, 2016b). The routes in the ROI have the following heavy commercial traffic percentages:

- New Mexico Route 6563 – 9 percent
- New Mexico Highway 130 – 12 to 24 percent
- U.S. Highway 82 to La Luz Road – 10 percent
- U.S. Highway 54 – 29 percent

SECTION 4.0

Environmental Consequences

This section provides an evaluation of the potential environmental impacts of the Proposed Action under the Alternatives:

- Alternative 1: Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding
- Alternative 2: Transition to Partial Operations by Interested Parties with Reduced NSF Funding
- Alternative 3: Mothballing of Facilities
- Alternative 4: Demolition and Site Restoration
- No Action Alternative: Continued NSF Investment for Science-focused Operations

The analysis herein identifies likely impacts on the environment within the ROI for each resource area. The analysis of resource impacts focuses on environmental issues in proportion to their potential impacts. Detailed consideration is given to those resources that have a potential for environmental impacts. Interpretation of impacts in terms of duration, intensity, and scale is provided where possible. Implementation of mitigation measures and BMPs that would reduce the duration, intensity, or scale of the impacts are identified within the resource evaluations. Impacts identified under the No Action Alternative are reflective of the baseline conditions of each resource discussed in Section 3.0, *Affected Environment*.

Section Organization

Sections 4.1 through 4.13 describe the methodology and factors used to evaluate impacts and to determine the significance of impacts consistent with the following:

1. CEQ 40 C.F.R. §§1500 to 1508, 1508.8, where "Effects" (synonymous with "Impacts" in this analysis) include:

    a) Direct effects, which are caused by the action and occur at the same time and place.

    b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably known. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

    c) Cumulative effects, which can result from individually minor, but collectively significant, actions taking place over time (past, present, and reasonably foreseeable future actions). Cumulative impacts are addressed in Section 4.13, *Cumulative Impacts*.

For Alternative 3, the impacts analysis is limited to the demolition and mothballing periods and does not include the resumption of operations because it is not known what type of operations would be

implemented when the mothball period ends. If the Sacramento Peak Observatory is transitioned to an interested party for full operations, impacts following resumption of operations would be comparable to the operations impacts discussed for Alternative 1. If the Sacramento Peak Observatory is transitioned to an interested party for partial operations, impacts following resumption of operations would be comparable to the operations impacts discussed for Alternative 2. If some other type of operations is implemented following the mothball period, NSF would initiate a separate NEPA review of the proposed operations prior to the end of the mothball period.

Impacts could include ecological (such as the impacts on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health. Impacts may also include those resulting from actions that may have both beneficial and adverse impacts, where, even if on balance, the agency believes that the impact would be beneficial.

Section 4.13, *Cumulative Impacts*, presents an evaluation of the cumulative impacts of the Proposed Action. Cumulative impacts result from adding the total impacts of past, present, and reasonably foreseeable future actions to impacts likely caused by the Proposed Action.

Section 4.14, *Irreversible and Irretrievable Commitment of Resources*, presents an evaluation of the Proposed Action impacts regarding irreversible or irretrievable commitment of resources, and unavoidable adverse impacts, as required by NEPA.

Section 4.15, *Short-Term Uses of the Environment and Maintenance and Enhancement of Long-Term Productivity*, presents an evaluation of the Proposed Action impacts regarding the relationship between local short-term uses of the environment and long-term productivity as required by NEPA.

Terminology

To determine whether an impact is major, CEQ requires the consideration of context and intensity of potential impacts (40 C.F.R. §1508.27). Context normally refers to the setting, whether local or regional, and intensity refers to the severity and duration of the impact. Each resource has its own impact intensity standards that are listed and explained in tables under each resource section. Impacts are described by the following levels of significance:

- Negligible
- Minor
- Moderate
- Major

There may be both adverse and beneficial impacts within a single resource category. Where there are both adverse and beneficial impacts, both are described. Impacts are also characterized as short-term or long-term in duration.

Specific language may be used in describing impacts under other laws or regulations (for instance, ESA or NHPA) that is different from the NEPA discussion of impacts. As appropriate under each resource, any specific language for noting compliance with other laws or regulations is identified.

4.1 Biological Resources

This section identifies potential direct and indirect biological impacts that may result from implementing the Alternatives at the Sacramento Peak Observatory, including the No Action Alternative. The ROI for the biological resources analysis encompasses the areas within and immediately adjacent to the Sacramento Peak Observatory, although a broader view was taken as necessary. For example, regional populations were considered for impacts to species stability, and noise attenuation defined the ROI for wildlife noise impacts.

Methodology

The methods used to determine whether the Alternatives would have impacts on biological resources are as follows:

- Evaluate existing conditions to identify which past actions within the ROI have resulted in either improved or diminished health or diversity of populations of biological resources to evaluate the potential impacts on biological resources for each Alternative.
- Evaluate each considered Alternative to determine its potential for impacts on biological resources due to loss of habitat, disruption of normal behavior (e.g., from noise or vibration), vehicular traffic, and the introduction of invasive species.
- Assess the compliance of each Alternative with applicable federal regulations that apply to preservation of biological resources.

Table 4.1-1 defines the thresholds used to determine the intensity of a direct and indirect impacts to the biological resources.

TABLE 4.1-1
Impact Thresholds for Biological Resources

Impact Intensity	Description
Negligible	Impact would be below or at the lower levels of detection.
Minor	The Alternative would result in a detectable change to biological resources or habitat; however, the impact would be small, localized, and of little consequence. Any disruption to wildlife would be short-term and species would be expected to return to normal activities after disturbance. No measurable reduction in species population stability would occur. Threatened or endangered species may be in the area but no effects on behavior, mortality, or habitat quality would occur. There would be no take of any threatened or endangered species or migratory birds. There may be some increase in the presence of weed species over a small area, but the increase would be easily controllable.

TABLE 4.1-1
Impact Thresholds for Biological Resources

Impact Intensity	Description
Moderate	The Alternative would result in a readily apparent change to biological resources or habitat over a relatively wide area. A permanent loss of non-critical vegetative cover or other habitat, may occur. However, no measurable reduction in species population stability would occur. Any effects on threatened and endangered species or migratory birds would be temporary and would not result in mortality or impacts to population size. The action may result in a non-mortal take to a federally listed species. There would be a noticeable increase in the presence of weed species.
Major	The Alternative would result in a substantial change to the character of the biological resource, affecting a large area or a species population, or would result in a violation of the ESA or the Migratory Bird Treaty Act (MBTA). A permanent loss in vegetative cover or other habitat, would occur, resulting in a measurable reduction in species population stability. Effects on threatened and endangered species or migratory birds would result in mortality to individuals. There would be a large increase in the presence of weed species.

Duration: Short-term – Occurs only during demolition activities or a brief recovery period.

Long-term – Continues after demolition activities and beyond a brief recovery period, or results from recurring activities.

4.1.1 Alternative 1 – Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding

4.1.1.1 Vegetation

4.1.1.1.1 Alternative 1 Implementation – Vegetation

Under Alternative 1, minor, adverse, and short-term direct impacts to site vegetation would occur from the creation of staging areas for materials and equipment, and from the demolition of certain facilities (Residential House Trailer and Relocatable Housing, which includes the Recreation House). To the extent possible, previously disturbed areas would be used for staging areas and, as facilities are demolished, the newly cleared area would be used for additional staging if needed and if it is possible. Landscaped vegetation around the demolished facilities and in any additional onsite staging areas would be lost during demolition. Heavy equipment would be used and their placement and operation could further disturb or damage vegetation onsite. Following removal of structures, the building locations and staging areas would be revegetated comparable to the adjacent landscaped areas. To avoid or minimize the potential for incidental impacts to vegetation, the following BMPs would be implemented during demolition:

- Worksites would be clearly marked and workers would be instructed to stay within marked workspace areas. No work would occur in undisturbed areas within the Sacramento Peak Observatory.
- Following demolition activities, disturbed areas would be re-landscaped consistent with other maintained areas on the Observatory.
- Any materials (soil, sod, or seed) must be certified weed-free; native species must be used for seeding and plantings and must be approved by the Lincoln National Forest Botanist.

- Equipment used during demolition activities would be cleaned prior to entering National Forest lands to remove any debris or dirt on the equipment and to eliminate the potential for spread of seed or other propagules of noxious or invasive weeds.
- Stormwater controls would be used to minimize scour and erosion outside the work area that could otherwise affect habitat quality.

Activities associated with mothballing would be confined to the building footprints; therefore, no impacts are expected as a result of mothballing.

4.1.1.1.2 Alternative 1 Operations – Vegetation

Operation of the Sacramento Peak Observatory would likely continue during demolition, although possibly at a temporarily decreased level. Any ongoing operations would not be expected to impact vegetation because these operations would not be distinguishable from the baseline conditions of current operations. After demolition is complete, a normal level of O&M at the Sacramento Peak Observatory would resume. O&M under an interested party would be similar with regard to impacts to vegetation as current operations. No change from baseline conditions would be expected and no adverse impacts to vegetation would be expected from normal O&M.

There would be potential for weed species to become established in areas disturbed during demolition activities. However, demolished areas would be re-landscaped after the demolition period, which would remove weed species that start to establish in disturbed areas. Landscaped areas would be maintained during operation, which would minimize the potential for the introduction or spread of weed species. Because disturbed areas would be landscaped and because weeds in landscaped areas would be managed during operation, negligible long-term beneficial impacts are expected from an overall reduction of weed species.

4.1.1.2 Wildlife

4.1.1.2.1 Alternative 1 Implementation – Wildlife

Minor adverse short-term direct impacts would occur to wildlife under Alternative 1. Impacts could result from loss of habitat or from displacement or other disturbance from noise and increased human activity. General wildlife impacts are discussed, followed by a discussion for each of the three MIS identified for the Sacramento Peak Observatory area (see Section 3.1.3, *Wildlife*) (USFS, 1986).

Activities under this Alternative implementation would occur as multiple discrete events over a longer period of time instead of a single continuous 24-week period. While demolition and mothballing under this Alternative would be expected to take approximately 24 weeks, it could require at least two separate work periods to complete, as the work restriction to avoid Mexican spotted owl and northern goshawk leaves only a 21-week period for demolition in a given season. Implementation of demolition of the 11 relocatable structures likely would be completed in a single 21-week period, with completion of

mothballing activities potentially extending into a second work period. The length of time for which there would be disturbed soils would be extended; however, appropriate BMPs and mitigation measures for vegetation, as described previously, would be implemented throughout the period of demolition to minimize the potential for adverse indirect impacts. The BMPs described for vegetation that would be implemented during demolition would reduce or eliminate the potential for indirect impacts to wildlife by reducing the potential for erosion and invasion by exotic species that could degrade habitat.

Small areas of landscaped grounds around buildings would be lost and replaced as described for vegetation. In addition, permanent direct impacts would occur for animals that use structures as habitat (e.g., roosting habitat for some bird species). These types of habitat would be reduced following demolition but use of these areas would be expected to be limited due to the general level of human disturbance. Wildlife species would be expected to use the remaining buildings/structures and landscaped grounds for these types of habitat or to relocate into natural habitat areas. Because of the availability of extensive habitat areas in the region and the small amount of habitat that would be lost, these adverse impacts are expected to be short-term and minor.

During the approximately 24-week demolition and mothball period, noise and vibration would cause minor short-term direct impacts to wildlife. Demolition-related noise would not be continuous and would be generated at different locations within the Sacramento Peak Observatory across the demolition work period. Wildlife could experience disruptions in their natural activities, including disruptions in communications, foraging, and avoiding danger. Demolition work would not be done during the period from March 1 through September 30 to avoid impacts to the Mexican spotted owl and northern goshawk. In addition, this restriction would prevent disruption of breeding and reproduction of common wildlife. Maximum sound levels of 80 to 90 dBA at 50 feet would be expected, based on the equipment expected to be used during demolition. These intermittent maximum sound levels would attenuate as sound travels from the work areas, due to the increase in distance, terrain, and generally closed forest vegetation surrounding the Sacramento Peak Observatory. While wildlife at the Sacramento Peak Observatory normally experience noise from motor vehicles and maintenance equipment, such as mowers and powered tools, the demolition noise would periodically be of a greater intensity and more localized to the work areas. As a result, wildlife in proximity to active work areas would likely respond to the increased noise levels during demolition. More mobile wildlife (e.g., birds) would be expected to exhibit avoidance behaviors and relocate to avoid noise. Demolition-related noise impacts would cease following completion of demolition and there would be no potential for indirect or cumulative impacts from the temporary construction-related noise. Adverse impacts to wildlife from demolition noise would be expected to be minor and short-term because demolition would be expected to be completed within a single 21-week period and because noise from mothballing activities would not be expected to cause disturbance to wildlife.

The level of human activity would be increased at active demolition sites compared to baseline conditions. This increased level of activity also may displace some wildlife that would not necessarily respond to increased noise levels. Species displaced by increased human activity are expected to use similar nearby available habitat. Human activity-related impacts would cease following completion of demolition. Because of the availability of extensive habitat areas in the surrounding region and the small areas where human activity would increase, adverse impacts to wildlife from demolition noise would be expected to be minor and short-term.

Activities associated with mothballing would be confined to the building footprints. This activity may result in loss of access to some structures used by wildlife for roosting. Any such impacts would be expected to be minor.

4.1.1.2.2 Alternative 1 Operations – Wildlife

Operation of the Sacramento Peak Observatory would likely continue during demolition, although possibly at a temporarily decreased level. Ongoing operations would not be expected to impact wildlife because these operations would not be distinguishable from the baseline conditions of current operations, which have been ongoing for more than 50 years. After demolition is complete, a normal level of O&M at the Sacramento Peak Observatory would resume. O&M under an interested party would be similar with regard to impacts to wildlife as current operations. No change from baseline conditions would be expected and no adverse impacts to wildlife would be expected from normal O&M.

4.1.1.3 Alternative 1 – Management Indicator Species Determination

Pygmy Nuthatch

Pygmy nuthatch occur in ponderosa pine forest (snags and large trees). Suitable habitat occurs within areas adjacent to the Sacramento Peak Observatory, but there are no snags on the Sacramento Peak Observatory as they would pose a safety risk. Implementation of Alternative 1 may result in minor, adverse, short-term direct impacts to the pygmy nuthatch from displacement due to noise and increased human activity during demolition activities but no mortality would be expected. Because the work would not occur between March 1 and September 30, reproductive behavior and nesting would not be affected. There would be no direct impacts to habitat used by the pygmy nuthatch and implementation of construction stormwater BMPs would prevent indirect impacts to this habitat from erosion and sedimentation. Because all impacts would be temporary and limited to the demolition period, no cumulative impacts to the pygmy nuthatch would be expected. Operation of the facility under Alternative 1 would not be distinguishable from current operations with regard to the pygmy nuthatch. Operations have been ongoing for more than 50 years, and any pygmy nuthatch in the Sacramento Peak Observatory area are acclimatized to this level of human activity. Continuation of operations would not be expected to affect the pygmy nuthatch relative to the current conditions.

There would be no direct, indirect, or cumulative impacts to habitat (ponderosa pine forest with snags and large trees) for the pygmy nuthatch as a result of implementation of Alternative 1. Because Alternative 1 would not affect habitat, there would be no change in the status and trend for habitat for the pygmy nuthatch. There would be no impact to population levels and no change in population status and trends for the species.

Hairy Woodpecker

Hairy woodpecker occur in aspen forests (aspen snags and mature aspen). Suitable habitat occurs in the eastern portion of the Sacramento Peak Observatory site, but not within proposed work areas. Aspen within proposed work areas are saplings and small-diameter trees that would not be used by the species. Implementation of Alternative 1 may result in minor, adverse, short-term direct impacts to the hairy woodpecker from displacement due to noise and increased human activity during demolition activities but no mortality would be expected. Because the work would not occur between March 1 and September 30, reproductive behavior and nesting would not be affected. There would be no direct impacts to habitat used by the hairy woodpecker and implementation of construction stormwater BMPs would prevent indirect impacts to this habitat from erosion and sedimentation. Because all impacts would be temporary and limited to the demolition period, no cumulative impacts to the hairy woodpecker would be expected. Operation of the facility under Alternative 1 would not be distinguishable from current operations with regard to the hairy woodpecker. Operations have been ongoing for more than 50 years, and any hairy woodpecker in the Sacramento Peak Observatory area are acclimatized to this level of human activity. Continuation of operations would not be expected to affect the hairy woodpecker relative to the current conditions.

There would be no direct, indirect, or cumulative impacts to habitat (mature aspen) for the hairy woodpecker as a result of implementation of Alternative 1. Because Alternative 1 would not affect habitat, there would be no change in the status and trend for habitat for the hairy woodpecker. here would be no impact to population levels and no change in population status and trends for the species.

Elk

Elk occur in mixed conifer forest, including mountain meadows. Typically elk occur in areas with little or no grazing. Suitable habitat for elk occurs within areas adjacent to the Sacramento Peak Observatory site and signs of elk use (scat and tracks) were observed during the September 2016 reconnaissance survey. Observations of elk sign were concentrated on the western end of the Sacramento Peak Observatory, near the unused grassed airstrip and outside proposed work areas. Cattle grazing is less extensive around the western end of the Sacramento Peak Observatory site than around other portions of the Sacramento Peak Observatory and this may contribute to greater elk use.

Implementation of Alternative 1 may result in minor, adverse, short-term direct impacts to elk from displacement due to noise and increased human activity during demolition activities but no mortality would be expected. Because the work would not occur during September, the initial breeding phase would not be affected. Further, elk breeding on the Sacramento Peak Observatory site is unlikely due to the level of human activity. For these reasons, reproductive behavior and population dynamics would not be affected. There would be no direct impacts to habitat used by elk and implementation of construction stormwater BMPs would prevent indirect impacts to this habitat from erosion and sedimentation. Because all impacts would be temporary and limited to the demolition period, no cumulative impacts to elk would be expected. Operation of the facility under Alternative 1 would not be distinguishable from current operations with regard to elk. Operations have been ongoing for more than 50 years, and any elk in the Sacramento Peak Observatory area are acclimatized to this level of human activity. Continuation of operations would not be expected to affect elk relative to the current conditions.

There would be no direct, indirect, or cumulative impacts to habitat for elk as a result of implementation of Alternative 1. here would be no change in the status and trend for habitat for elk. Because no impacts to breeding and population dynamics for elk would be expected, there would be no impact to population levels and no change in population status and trends for the species.

4.1.1.4 Federally and State-Listed Threatened, Endangered, Proposed, and Candidate Species

As described in Section 3.0, *Affected Environment*, state-listed species that are not federally listed, proposed, or candidate species are discussed under Southwestern Region RF Sensitive Species.

4.1.1.4.1 Alternative 1 Implementation – Federally Listed Threatened, Endangered, Proposed, and Candidate Species

The Peñasco least chipmunk, Sacramento Mountains thistle, and Mexican spotted owl have the potential to occur near the Sacramento Peak Observatory. Designated critical habitat for the Mexican spotted owl has also been identified for large portions of the Lincoln National Forest, encompassing the Sacramento Peak Observatory; the Observatory site is classified as restricted (recovery) habitat.

No individuals or roosting sites of the Mexican spotted owl were identified during reconnaissance-level field surveys of the Sacramento Peak Observatory facilities. There is a high level of human activity at the Sacramento Peak Observatory. In addition to daily activities of scientific and maintenance staff, some of whom reside onsite, the Sacramento Peak Observatory averages approximately 15,000 visitors per year, and these visitors walk the grounds to look at the Sacramento Peak Observatory facilities. There is frequent vehicle traffic including visitors and staff automobiles and O&M vehicles during daily operations. There is frequent recreational use of the lands surrounding the Sacramento Peak Observatory by picnickers, campers, hikers, and hunters (seasonally) and operation of vehicles associated with these recreational users. In addition to the high level of human activity, the lands surrounding the Sacramento

Peak Observatory are actively ranched and regularly disturbed by cattle grazing, which reduces the ability of these areas to support prey species. Due to the high level of human activity and the general level of understory and groundcover disturbance from grazing, it is unlikely that this species would nest or regularly forage in, or adjacent to, proposed work areas. If there are unidentified roosting or foraging sites of Mexican spotted owl within the Sacramento Peak Observatory, it is likely these sites would occur within the more forested area in the western portions of the facility, away from any proposed demolition activities under Alternative 1.

During the demolition period, noise and vibration would occur. Sound levels of 80 to 90 dBA at 50 feet would be expected based on the equipment used during demolition. These levels would not be continuous and would attenuate as sound travels from the work areas because of the increase in distance, terrain, and well-developed forest vegetation surrounding the Sacramento Peak Observatory. While infrequent noise-producing activities have relatively little long-term impact on Mexican spotted owls, the owls will react to noise disturbances by changing behavior and/or flushing from their perches, which may alter nesting and roosting activities. The distance to and frequency of a noise disturbance, habitat type, topography, and sound source may influence Mexican spotted owl responses. Noises close to nests are likely to be more disruptive than those far from nests and may affect prey delivery rates. Also with respect to distance and noise levels, the proportion of owls flushing was negatively related to distance (owls flushed more often to closer sounds) and positively related to noise level (owls flushed more often to louder sounds). Noise levels that consistently exceed 69 dBA within 165 feet (50 meters) of nesting sites are detrimental to Mexican spotted owls (USFWS, 2012). The distance from the proposed work areas to the edge of the closest PAC is approximately 3,700 feet. The sound from the loudest equipment operating would be reduced to below 69 dBA from natural attenuation at the edge of the PAC, absent any topography or vegetation effects that would further reduce the noise level.

The BMPs described in Section 4.1.1.1, *Vegetation*, would also benefit protected species by reducing or eliminating the potential for indirect adverse impacts as a result of habitat degradation from scour and erosion.

NSF, in coordination with USFS, will implement the following mitigation measures, which USFWS acknowledged during Section 7 consultation (letter dated July 25, 2017), prior to and during demolition activities:

- Implement seasonal restrictions to avoid demolition during period from March 1 through September 30 to avoid impacts to the Mexican spotted owl and other avian species.
- Idle restrictions on heavy equipment will be enforced to reduce noise during demolition.
- Develop a site-specific Stormwater Pollution Prevention Plan (SWPPP) in coordination with USFS. The SWPPP would specify stormwater control BMPs and proper maintenance of those BMPs to

control runoff from precipitation events and minimize the potential for offsite scour and sedimentation and would be implemented during demolition.

- No clearing of wooded/forested areas would occur.
- Perform proposed demolition work during daylight hours to avoid effects on nocturnal foraging by Mexican spotted owl.
- Re-landscape disturbed areas consistent with the other maintained grounds, as necessary.

With implementation of these measures, no impacts to the Mexican spotted owl would be expected from demolition activities.

The Peñasco least chipmunk, which also is a Southwestern Region RF sensitive species, has the potential to occur within dense herbaceous undergrowth and rock-dominated areas around buildings planned for demolition, or could enter an active work area during demolition activities. Demolition activities subsequent to a chipmunk entering a proposed work area could injure or kill individuals of these species. If the Peñasco least chipmunk becomes federally listed prior to implementation of the selected Alternative, Section 7 consultation would be re-initiated with USFWS. To minimize the potential for impacts, NSF would:

- Perform pre-demolition surveys using cameras or live traps to determine whether the chipmunk, or active burrows, are in, or adjacent to, work areas prior to the start of demolition work. If animals are found, they would be captured and relocated to approved relocation areas by qualified and permitted individuals.
- Animals collected at buildings proposed for demolition would be relocated to a previously identified habitat area outside of proposed activities. Relocation sites would be approved by USFWS, USFS, and NMDGF.
- Surveys, capture efforts, and relocation would be performed in accordance with appropriate USFWS, USFS, and NMDGF protocols and collection permits.

With implementation of these measures, short-term, adverse, and minor impacts to the Peñasco least chipmunk would be expected as a result of demolition activities.

The Sacramento Mountains thistle does not occur on the Sacramento Peak Observatory due to a lack of suitable habitat; therefore, there would be no direct impacts to this species. However, there is potential for indirect impacts resulting from stormwater runoff, which could cause erosion or sedimentation of offsite habitat. Standard construction stormwater BMPs as specified in the site-specific SWPPP that would be developed and implemented for the demolition activities under Alternative 1 would minimize the potential for offsite impacts. With implementation of appropriate construction stormwater management

controls, no adverse indirect impacts to offsite populations or habitat resulting from erosion and sedimentation would be expected from demolition activities.

Activities associated with mothballing would be confined to the building footprints; therefore, no impacts to the Mexican spotted owl, Peñasco least chipmunk, or Sacramento Mountains thistle are expected as a result of mothballing.

With the implementation of BMPs and mitigation measures identified previously, no impacts to the Mexican spotted owl or the Sacramento Mountains thistle are expected. With implementation of the BMPs and mitigation measures identified previously, impacts to the Peñasco least chipmunk would be short-term, adverse, and minor.

4.1.1.4.2 Alternative 1 Operations – Federally and State-Listed Threatened, Endangered, Proposed, and Candidate Species

Operation of the Sacramento Peak Observatory would likely continue during demolition, although possibly at a temporarily decreased level. Any ongoing operations would not be expected to impact threatened and endangered species because these operations would not be distinguishable from the baseline conditions of current operations, which have been ongoing for more than 50 years. After demolition is complete, a normal level of O&M at the Sacramento Peak Observatory would resume. O&M under an interested party would be similar with regard to impacts to threatened and endangered species as current operations. No change from baseline conditions would be expected and no adverse impacts to threatened and endangered species would be expected from normal O&M.

4.1.1.4.3 Endangered Species Act Determination

NSF completed a BA (Appendix 3B) that analyzed direct, indirect, and cumulative impacts (as defined under the ESA) for the Mexican spotted owl and its designated critical habitat, Sacramento Mountains thistle, and the Peñasco least chipmunk. The BA is incorporated into this DEIS by reference. In a letter dated July 25, 2017, the USFWS noted the following determinations presented in the BA and concluded consultation under Section 7:

- With the implementation of BMPs and mitigation measures, implementation of Alternative 1 would have no effect on the Mexican spotted owl, from either physical disturbance of demolition activity or from noise associated with demolition activities.
- Implementation of Alternative 1 would not negatively affect the ability of the restricted [recovery] habitat for the Mexican spotted owl on the Sacramento Peak Observatory to be restored and/or enhanced so that it could be developed into habitat that would support the Mexican spotted owl in the future.
- With the implementation of BMPs, implementation of Alternative 1 would have no effect on the Sacramento Mountains thistle.

- With the implementation of BMPs and mitigation measures, implementation of Alternative 1 would not jeopardize the continued existence of the Peñasco least chipmunk.

NSF would reinitiate Section 7 consultation with USFWS if (1) new information reveals the action may affect listed species or critical habitat in a manner, or to an extent, not previously considered, (2) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not previously considered (the Peñasco least chipmunk is listed as threatened or endangered), or (3) a new species is listed or critical habitat designated that may be affected by the action.

4.1.1.5 Regional Forester Sensitive Species Determination

4.1.1.5.1 Alternative 1 Implementation – Regional Forester Sensitive Species

The Sacramento Mountain salamander (*Aneides hardii*), northern goshawk (*Accipiter gentilis*), Sacramento Mountains checkerspot butterfly (*Euphydryas anicia cloudcrofti*), pale Townsend's big-eared bat (*Corynorhinus townsendii pallescens*), and spotted bat (*Euderma maculatum*) are Southwestern Region RF Sensitive Species that have the potential to occur at or near the Sacramento Peak Observatory.

Sacramento Mountain Salamander

The Sacramento Mountain salamander may occur near buildings that are planned for demolition. Construction activity that may disturb soils could cause injury or mortality to salamanders that are dormant beneath the surface. However, all buildings that would be demolished under Alternative 1 are relocatable modular structures that lack permanent foundations and there would be no disturbance associated with demolition of these structures that could cause injury to a dormant salamander. The Lincoln National Forest has identified a time window when Sacramento Mountain salamanders are active aboveground and would be subject to injury or mortality from the increased level of human activity associated with demolition. This season is generally July 1 to September 30; however, this timeframe is dependent on monsoonal rains and may be adjusted to account for emergence sooner or later in the year depending on seasonal rain conditions. Implementation of the seasonal restrictions that prevent demolition-related work during the period between March 1 and September 30 would prevent injury to Sacramento Mountain salamanders that are active and aboveground. NSF would coordinate with USFS to determine whether aboveground activity may occur outside the normal restricted activity period after September 30. No direct adverse impacts to the Sacramento Mountain salamander would occur.

The BMPs described in Section 4.1.1.1, *Vegetation*, would also benefit the Sacramento Mountain salamander by reducing or eliminating the potential for indirect adverse impacts to habitat as a result of erosion and sedimentation. There would be no disturbance of habitat that would be used by the Sacramento Mountain salamander under Alternative 1. Therefore, no indirect adverse impacts to the Sacramento Mountain salamander would occur.

The activities implemented under Alternative 1 would have no potential to combine with other past, present, or future projects in the area, so no cumulative impacts to the Sacramento Mountain salamander would be expected.

Activities associated with mothballing would be confined to the building footprints. There would be no potential to affect the Sacramento Mountain salamander as a result of mothballing.

Northern Goshawk

No individuals or roosting sites of the northern goshawk were identified during reconnaissance-level field surveys of the Sacramento Peak Observatory facilities. However, three PFAs have been identified by the USFS in proximity to the Sacramento Peak Observatory. The closest PFA is an approximately 640-acre area between Apache Point Road and Sacramento Canyon Road to the southeast of the Observatory, while the other two PFAs are more than 1.5-mile from the Sacramento Peak Observatory (USFS, 2016b). There is a high level of human activity at the Sacramento Peak Observatory, including O&M and tourist visits, and there is frequent recreational use of the lands surrounding the Sacramento Peak Observatory by picnickers, campers, hikers, and hunters (in season). Operation of vehicles associated with recreational users also is common. In addition to the high level of human activity, the lands surrounding the Sacramento Peak Observatory are actively ranched and regularly disturbed by cattle grazing, which reduces the ability of these areas to support prey species (for example, see Rosenstock, 1996).

As a result of the high level of human activity and the level of understory and groundcover disturbance from grazing, it is unlikely that the northern goshawk would nest or regularly forage in, or adjacent to, proposed work areas. If there are unidentified roosting or foraging sites of northern goshawk within the Sacramento Peak Observatory, it is likely these sites would occur within the more forested portions of the facility to the west of the proposed work areas, away from any proposed demolition activities under Alternative 1. Mitigation measures previously discussed for the Mexican spotted owl, consistent with the Lincoln National Forest Land and Resource Management Plan (USFS, 1986), would be implemented as part of this Alternative and would provide suitable protection for the northern goshawk, because demolition-related work would not be conducted between March 1 and September 30 to avoid the northern goshawk breeding season. Impacts to the northern goshawk are expected to be minor, adverse, and short-term.

Disturbance from demolition that would occur under Alternative 1 would not extend to the nearest PFA and no impacts to that PFA would be expected. Noise and disturbance from demolition-related activities may displace northern goshawk from the immediate work areas, but no mortality would be expected. This displacement would end once demolition was complete. Direct, short-term, adverse impacts from displacement would be expected.

The BMPs described in Section 4.1.1.1, *Vegetation*, would benefit the northern goshawk by reducing or eliminating the potential for indirect adverse impacts to habitat, particularly potential prey habitat, as a result of erosion and sedimentation. There would be no disturbance of habitat that would be used by the northern goshawk under Alternative 1. Therefore, no indirect adverse impacts to the northern goshawk would be expected.

No cumulative impacts to the northern goshawk would be expected, because the direct impacts would be temporary, no indirect impacts would occur, and the Proposed Action would not interact with other past, present, or future projects in the area.

Activities associated with mothballing would be confined to the building footprints. There would be no potential to affect the northern goshawk as a result of mothballing.

Sacramento Mountains Checkerspot Butterfly

All demolition work proposed under Alternative 1 would occur within existing maintained and landscaped areas of the Sacramento Peak Observatory where host plants for the Sacramento Mountains checkerspot butterfly do not occur and are prevented from growing by landscape maintenance. Consequently, the proposed demolition work will not directly affect the Sacramento Mountains checkerspot butterfly, its egg-laying, or its larval habitat because neither the butterfly nor its host plants would occur in the proposed work areas.

The BMPs described in Section 4.1.1.1, *Vegetation*, would benefit the Sacramento Mountains checkerspot butterfly by reducing or eliminating the potential for indirect adverse impacts to habitat and host plants as a result of erosion and sedimentation. There would be no disturbance of habitat that would be used by the Sacramento Mountains checkerspot butterfly under Alternative 1. Therefore, no indirect adverse impacts to the Sacramento Mountains checkerspot butterfly would be expected.

No cumulative impacts to the Sacramento Mountains checkerspot butterfly would be expected, because no direct or indirect impacts would occur and the proposed action would not interact with other past, present, or future projects in the area.

Activities associated with mothballing would be confined to the building footprints. There would be no potential to affect the Sacramento Mountains checkerspot butterfly as a result of mothballing.

Pale Townsend's Big-Eared Bat

No individuals or roosting sites of the pale Townsend's big-eared bat were identified during reconnaissance-level field surveys of the Sacramento Peak Observatory facilities. Given the regularly maintained open spaces at the Sacramento Peak Observatory, roosting habitat for these species is considered to be of low quality and nocturnal foraging habitat is considered of moderate quality.

There is potential for pale Townsend's big-eared bat to roost in some of the facility buildings slated for demolition, but winter roosting in the relocatable structures slated for demolition under Alternative 1 is unlikely because these structures would not maintain appropriate temperature and humidity profiles for the bats in the winter. Because no demolition would occur between March 1 and September 30, when bats would be most active in the area, demolition activities are not expected to have an effect on this species. Should demolition or mothballing activities commence between October 1 and November 30, prior to the onset of winter roosting, the structures proposed for demolition would be surveyed by qualified biologists to determine whether bats are present. If bats are found within a structure proposed for demolition or mothballing, they will be monitored according to protocols agreed upon by the USFS until roosting activities are completed. With implementation of these mitigation measures, no direct impacts to the pale Townsend's big-eared bat would be expected.

The BMPs described in Section 4.1.1.1, *Vegetation*, would benefit the pale Townsend's big-eared bat by reducing or eliminating the potential for indirect adverse impacts to habitat, particularly potential prey habitat, as a result of erosion and sedimentation. There would be no disturbance of habitat that would be used by the pale Townsend's big-eared bat under Alternative 1. Therefore, no indirect adverse impacts to the pale Townsend's big-eared bat would be expected.

No cumulative impacts to the pale Townsend's big-eared bat would be expected because no direct or indirect impacts would occur and the proposed action would not interact with other past, present, or future projects in the area.

Activities associated with mothballing may make some buildings unsuitable for subsequent roosting by the pale Townsend's big-eared bat. Bats attempting to roost but unable to access a mothballed structure would be expected to relocate to other suitable roosts in the area, either natural or man-made.

Spotted Bat

No individuals or roosting sites of the spotted bat were identified during reconnaissance-level field surveys of the Sacramento Peak Observatory facilities. Given the regularly maintained open spaces at the Sacramento Peak Observatory, roosting habitat for these species is considered to be of low quality and nocturnal foraging habitat is considered of moderate quality.

There is potential for the spotted bat to roost in some of the facility buildings slated for demolition; however, winter roosting in the relocatable structures slated for demolition under Alternative 1 is unlikely because these structures would not maintain appropriate temperature and humidity profiles for the bats in the winter. Because no demolition would occur between March 1 and September 30 when bats would be most active in the area, demolition activities are not expected to have an effect on this species. Should demolition or mothballing activities commence between October 1 and November 30, prior to the onset of winter roosting, the structures proposed for demolition would be surveyed by qualified biologists to

determine whether bats are present. If bats are found within a structure proposed for demolition or mothballing, they will be monitored according to protocols agreed upon by the USFS until roosting activities are completed. With implementation of these mitigation measures, no direct impacts to the spotted bat would be expected.

The BMPs described in Section 4.1.1.1, *Vegetation*, would benefit the spotted bat by reducing or eliminating the potential for indirect adverse impacts to habitat, particularly potential prey habitat, as a result of erosion and sedimentation. There would be no disturbance of habitat that would be used by the spotted bat under Alternative 1. Therefore, no indirect adverse impacts to the spotted bat would be expected.

No cumulative impacts to the spotted bat would be expected because no direct or indirect impacts would occur and the Proposed Action would not interact with other past, present, or future projects in the area.

Activities associated with mothballing may make some buildings unsuitable for subsequent roosting by the spotted bat. Bats attempting to roost but unable to access a mothballed structure would be expected to relocate to other suitable roosts in the area, either natural or man-made.

With the implementation of the mitigation measure described previously, impacts to the spotted bat from demolition or mothballing structures would be expected to be minor, adverse, and short-term.

4.1.1.5.2 Alternative 1 Operations – Regional Forester Sensitive Species

Sacramento Mountain Salamander

Operations following demolition and mothballing would not be expected to impact the Sacramento Mountain salamander because these operations would not be distinguishable from the baseline conditions of current operations, which have been ongoing for more than 50 years. After demolition is complete, a normal level of O&M at the Sacramento Peak Observatory would resume. O&M performed by an interested party would be similar with regard to impacts to the Sacramento Mountain salamander as current operations. No change from baseline conditions would be expected and no adverse direct, indirect, or cumulative impacts to the Sacramento Mountain salamander would be expected from normal O&M.

Northern Goshawk

Operations following demolition and mothballing would not be expected to impact the northern goshawk because these operations would not be distinguishable from the baseline conditions of current operations, which have been ongoing for more than 50 years. After demolition is complete, a normal level of O&M at the Sacramento Peak Observatory would resume. O&M performed by an interested party would be similar with regard to impacts to the northern goshawk as current operations. No change from baseline conditions would be expected and no adverse direct, indirect, or cumulative impacts to the northern goshawk would be expected from normal O&M.

Sacramento Mountains Checkerspot Butterfly

Operations following demolition and mothballing would not be expected to impact the Sacramento Mountains checkerspot butterfly because these operations would not be distinguishable from the baseline conditions of current operations, which have been ongoing for more than 50 years. After demolition is complete, a normal level of O&M at the Sacramento Peak Observatory would resume. O&M performed by an interested party would be similar with regard to impacts to the Sacramento Mountains checkerspot butterfly as current operations. No change from baseline conditions would be expected and no adverse direct, indirect, or cumulative impacts to the Sacramento Mountains checkerspot butterfly would be expected from normal O&M.

Pale Townsend's Big-Eared Bat

Operations following demolition and mothballing would not be expected to impact the pale Townsend's big-eared bat because these operations would not be distinguishable from the baseline conditions of current operations, which have been ongoing for more than 50 years. After demolition is complete, a normal level of O&M at the Sacramento Peak Observatory would resume. O&M performed by an interested party would be similar with regard to impacts to the pale Townsend's big-eared bat as current operations. No change from baseline conditions would be expected and no adverse direct, indirect, or cumulative impacts to the pale Townsend's big-eared bat would be expected from normal O&M.

Spotted Bat

Operations following demolition and mothballing would not be expected to impact the spotted bat because these operations would not be distinguishable from the baseline conditions of current operations, which have been ongoing for more than 50 years. After demolition is complete, a normal level of O&M at the Sacramento Peak Observatory would resume. O&M performed by an interested party would be similar with regard to impacts to the spotted bat as current operations. No change from baseline conditions would be expected and no adverse direct, indirect, or cumulative impacts to the spotted bat would be expected from normal O&M.

4.1.1.6 Neotropical Migratory Birds

4.1.1.6.1 Alternative 1 Implementation – Neotropical Migratory Birds

Potential NTMB nesting habitat is present on the Sacramento Peak Observatory. Due to presence of pinyon-juniper, ponderosa pine, and mixed conifer forest vegetation community types within and immediately surrounding the Sacramento Peak Observatory, 12 high-priority NTMB species have the potential to occur in the area. These include Montezuma quail (*Cyrtonyx montezumae mearnsii*), gray flycatcher (*Empidonax wrightii*), Virginia's warbler (*Vermivora virginiae*), plumbeous vireo (*Vireo plumbeus*), band-tailed pigeon (*Columba fasciata fasciata*) dusky flycatcher (*Empidonax oberholseri*), flammulated owl (*Otus flammeolus*), Grace's warbler (*Dendroica graciae graciae*), olive-sided flycatcher

(*Contopus cooperi*), red-faced warbler (*Cardellina rubrifrons*), Williamson's sapsucker (*Sphyrapicus thyroideus nataliae*), and golden-crowned kinglet (*Regulus satrapa*). The seasonal restriction for demolition put in place to protect Mexican spotted owls and northern goshawks would prevent impacts to nesting birds. Because impacts would be limited to the immediate area of structures to be demolished, which do not provide substantial amounts of habitat for NTMB species, and because work would be done outside the nesting period, impacts to NTMB species from demolition are expected to be negligible and short-term.

While potential habitat for the red-naped sapsucker (*Sphyrapicus nuchalis*), broad-tailed hummingbird (*Selasphorus platycercus platycercus*), and Macgillivray's warbler (*Oporornis tolmiei*) occurs on or near the Sacramento Peak Observatory, these birds may occur as incidentals within, or adjacent to, proposed work areas. However, because these species would occur only as transients, so no impacts to the red-naped sapsucker, broad-tailed hummingbird, and Macgillivray's warbler would occur.

Activities associated with mothballing would be confined to the building footprints; therefore, no impacts are expected as a result of mothballing.

4.1.1.6.2 Alternative 1 Operations – Neotropical Migratory Birds

Operation of the Sacramento Peak Observatory would likely continue during demolition, although possibly at a temporarily decreased level. Any ongoing operations would not be expected to impact NTMB species because these operations would not be distinguishable from the baseline conditions of current operations. Once demolition is complete, a normal level of O&M at the Sacramento Peak Observatory would resume. O&M under an interested party would be similar with regard to impacts to NTMB species as current operations. No change from baseline conditions would be expected and no adverse impacts to migratory birds would be expected from normal O&M.

4.1.1.7 Migratory Birds

4.1.1.7.1 Alternative 1 Implementation – Migratory Birds

Species protected under the MBTA be present at any time during the year. There is the potential for migratory birds to construct nests on manmade structures, such as buildings and utility poles, or in proximity to work areas. Mitigation measures implemented to avoid work during the breeding period for the Mexican spotted owl and the northern goshawk would benefit migratory birds by avoiding disturbance during their nesting period as well. This is consistent with information NSF received from USFWS regarding migratory birds during initial ESA Section 7 data collection and consultation efforts (USFWS, 2017a).

Because impacts would be limited to the immediate area of structures to be demolished, which do not provide substantial amounts of habitat for migratory birds, and because work would not be done during

the nesting period for migratory birds, impacts to migratory birds from demolition are expected to be negligible and short-term.

Activities associated with mothballing would be confined to the building footprints; therefore, no impacts are expected as a result of mothballing.

4.1.1.7.2 Alternative 1 Operations – Migratory Birds

Operation of the Sacramento Peak Observatory would likely continue during demolition, although possibly at a temporarily decreased level. Any ongoing operations would not be expected to impact migratory birds because these operations would not be distinguishable from the baseline conditions of current operations, which have been ongoing for more than 50 years. Once demolition is complete, a normal level of O&M at the Sacramento Peak Observatory would resume. O&M under an interested party would be similar with regard to impacts to migratory birds as current operations. No change from baseline conditions would be expected and no adverse impacts to migratory birds would be expected from normal O&M.

4.1.2 Alternative 2 – Transition to Partial Operations by Interested Parties with Reduced NSF Funding

4.1.2.1 Vegetation and Wildlife Impact Summary

Under Alternative 2, biological resource impacts associated with mothballing (11 facilities) and demolition (Residential House Trailer and Relocatable Housing, which includes the Recreation House) would be similar to those described under Alternative 1.

Activities under this Alternative would occur as multiple discrete events over a longer time period instead of a single continuous 24-week period. While demolition and mothballing under this Alternative would be expected to take approximately 24 weeks, it could require at least two separate work periods to complete, as the work restriction to avoid Mexican spotted owl and northern goshawk leaves only a 21-week period for demolition in a given season. Implementation of demolition of the 11 relocatable structures likely would be completed in a single 21-week period, with completion of mothballing activities potentially extending into a second work period. The length of time for which there would be disturbed soils would be extended, but appropriate BMPs and mitigation measures, as described previously, would be implemented throughout the period of demolition to minimize the potential for adverse indirect impacts.

Impacts to site vegetation, wildlife, MIS, protected species, Southwestern Region RF Sensitive Species, NTMB species, and migratory birds would be the same as those described for Alternative 1 because the level of disturbance would be comparable as the same facilities are proposed to be demolished and there is limited additional disturbance associated with mothballing 10 additional facilities. BMPs and mitigation measures, as described in for Alternative 1, would be implemented to reduce or prevent impacts.

Partial O&M performed by an interested party would be similar to current operations with regard to impacts to vegetation, wildlife, protected species, Southwestern Region RF Sensitive Species, NTMB species, and migratory birds as current operations. No change from baseline conditions would be expected and no adverse impacts to vegetation, wildlife, MIS, protected species, Southwestern Region RF Sensitive Species, and migratory birds would be expected from normal O&M.

4.1.2.2 Alternative 2 Management Indicator Species Determination

Pygmy Nuthatch

Impacts to the pygmy nuthatch would be comparable to those described for Alternative 1, as the amount of demolition would be the same. There would be no direct, indirect, or cumulative impacts to habitat for the pygmy nuthatch as a result of implementation of Alternative 2. Because Alternative 2 would not affect habitat, there would be no change in the status and trend for habitat for the pygmy nuthatch. There would be no impact to population levels and no change in population status and trends for the species because demolition would occur outside the breeding and nesting period for the pygmy nuthatch.

Hairy Woodpecker

Impacts to the hairy woodpecker would be comparable to those described for Alternative 1, as the amount of demolition would be the same. There would be no direct, indirect, or cumulative impacts to habitat for the hairy woodpecker as a result of implementation of Alternative 2. Because Alternative 2 would not affect habitat, there would be no change in the status and trend for habitat for the hairy woodpecker. There would be no impact to population levels and no change in population status and trends for the species because demolition would occur outside the breeding and nesting period for the hairy woodpecker.

Elk

Impacts to elk would be comparable to those described for Alternative 1, as the amount of demolition would be the same. There would be no direct, indirect, or cumulative impacts to habitat for elk as a result of implementation of Alternative 2. Because Alternative 2 would not affect habitat, there would be no change in the status and trend for habitat for elk. There would be no impact to population levels and no change in population status and trends for the species because no impacts to breeding and population dynamics for elk would be expected.

4.1.2.3 Endangered Species Act Determination

In a letter dated July 25, 2017, the USFWS noted the following determinations presented in the BA and concluded consultation under Section 7:

- With the implementation of BMPs and mitigation measures, implementation of Alternative 2 would have no effect on the Mexican spotted owl, from either physical disturbance of demolition activity or from noise associated with demolition activities.

- Implementation of Alternative 2 would not negatively affect the ability of the restricted [recovery] habitat for the Mexican spotted owl on the Sacramento Peak Observatory to be restored and/or enhanced so that it could be developed into habitat that would support the Mexican spotted owl in the future.
- With the implementation of BMPs, implementation of Alternative 2 would have no effect on the Sacramento Mountains thistle.
- With the implementation of BMPs and mitigation measures, implementation of Alternative 2 would not jeopardize the continued existence of the Peñasco least chipmunk.

NSF would reinitiate Section 7 consultation with USFWS if the project description or site conditions change, as described for Alternative 1.

4.1.2.4 Regional Forester Sensitive Species Determination

Sacramento Mountain Salamander

Demolition and operations under Alternative 2 would be the same as described for Alternative 1. Therefore, impacts to the Sacramento Mountain salamander would be comparable to those described for Alternative 1. There would be no direct, indirect, or cumulative impacts to the Sacramento Mountain salamander or to habitat for the Sacramento Mountain salamander as a result of implementation of Alternative 2.

Northern Goshawk

Demolition and operations under Alternative 2 would be the same as described for Alternative 1. Therefore, impacts to the northern goshawk would be comparable to those described for Alternative 1. There would be no direct, indirect, or cumulative impacts to the northern goshawk or to habitat for the northern goshawk as a result of implementation of Alternative 2.

Sacramento Mountains Checkerspot Butterfly

Demolition and operations under Alternative 2 would be the same as described for Alternative 1. Therefore, impacts to the Sacramento Mountains checkerspot butterfly would be comparable to those described for Alternative 1. There would be no direct, indirect, or cumulative impacts to the Sacramento Mountains checkerspot butterfly or to habitat for the Sacramento Mountains checkerspot butterfly as a result of implementation of Alternative 2.

Pale Townsend's Big-Eared Bat

Demolition and operations under Alternative 2 would be the same as described for Alternative 1. Therefore, impacts to the pale Townsend's big-eared bat would be comparable to those described for

Alternative 1. There would be no direct, indirect, or cumulative impacts to the pale Townsend's big-eared bat or to habitat for the pale Townsend's big-eared bat as a result of implementation of Alternative 2.

Spotted Bat

Demolition and operations under Alternative 2 would be the same as described for Alternative 1. Therefore, impacts to the spotted bat would be comparable to those described for Alternative 1. There would be no direct, indirect, or cumulative impacts to the spotted bat or to habitat for the spotted bat as a result of implementation of Alternative 2.

4.1.3 Alternative 3 – Mothballing of Facilities

4.1.3.1 Vegetation and Wildlife Impact Summary

Under Alternative 3, biological resource impacts would be similar to, but less than, those described under Alternative 1. Mothballing (31 facilities) and demolition (Residential House Trailer only) would occur over 33 weeks compared to 24 weeks under Alternative 1. BMPs, as described for Alternative 1, would be implemented to reduce or prevent impacts.

Activities under this Alternative would occur as multiple discrete events over a longer time period instead of a single continuous 33-week period. While demolition and mothballing under this Alternative would be expected to take approximately 33 weeks, it could require at least two separate work periods to complete, as the work restriction to avoid Mexican spotted owl and northern goshawk leaves only a 21-week period for demolition in a given season. Implementation of demolition of the single relocatable structure would be completed in a single 21-week period, with completion of mothballing activities potentially extending into a second work period. The length of time for which there would be disturbed soils would be extended; however, appropriate BMPs and mitigation measures, as described previously, would be implemented throughout the period of demolition to minimize the potential for adverse indirect impacts.

Impacts to wildlife from noise and vibration and impacts from increased human activity would occur for a proportionately longer time, but would be less intense in a given period of time. The impacts would be adverse, minor, and short-term because demolition would be completed in a single work period and noise from mothballing activities would not be expected to disturb wildlife. The amount of ground and vegetation disturbance would be correspondingly less than Alternative 1. Impacts to wildlife, protected species, Southwestern Region RF Sensitive Species, NTMB species, and migratory birds would be expected to be comparable to, but somewhat less than, those described in Alternative 1 because the disturbance would be similar but of a lesser magnitude. BMPs and mitigation measures, as described in Alternative 1, would be implemented to reduce or prevent impacts.

After the Sacramento Peak Observatory is in the mothball phase, ongoing maintenance would be required to keep equipment and infrastructure in suitable condition to restart operations. This maintenance would be expected to be similar with regard to impacts to biological resources as maintenance under current

operations. No change from baseline conditions would be expected and no adverse impacts to biological resources would be expected from maintenance during the mothball phase.

During the mothball phase, there would be a reduction in noise levels at the Observatory. Because day-to-day operation of the Sacramento Peak Observatory would not occur, there would be reduced noise levels that would benefit wildlife.

4.1.3.2 Alternative 3 Management Indicator Species Determination

Pygmy Nuthatch

Impacts to the pygmy nuthatch would be less than those described for Alternative 1, as the amount of demolition would be less. There would be no direct, indirect, or cumulative impacts to habitat for the pygmy nuthatch as a result of implementation of Alternative 3. Because Alternative 3 would not affect habitat, there would be no change in the status and trend for habitat for the pygmy nuthatch. Because demolition would occur outside the breeding and nesting period for the pygmy nuthatch, there would be no impact to population levels and no change in population status and trends for the species.

Hairy Woodpecker

Impacts to the hairy woodpecker would be less than those described for Alternative 1, as the amount of demolition would be less. There would be no direct, indirect, or cumulative impacts to habitat for the hairy woodpecker as a result of implementation of Alternative 3. Because Alternative 3 would not affect habitat, there would be no change in the status and trend for habitat for the hairy woodpecker. Because demolition would occur outside the breeding and nesting period for the hairy woodpecker, there would be no impact to population levels and no change in population status and trends for the species.

Elk

Impacts to elk would be less than those described for Alternative 1, as the amount of demolition would be less. There would be no direct, indirect, or cumulative impacts to habitat for elk as a result of implementation of Alternative 3. Because Alternative 3 would not affect habitat, there would be no change in the status and trend for habitat for elk. Because no impacts to breeding and population dynamics for elk would be expected, there would be no impact to population levels and no change in population status and trends for the species.

4.1.3.3 Endangered Species Act Determination

In a letter dated July 25, 2017, the USFWS noted the following determinations presented in the BA and concluded consultation under Section 7:

- With the implementation of BMPs and mitigation measures, implementation of Alternative 3 would have no effect on the Mexican spotted owl, from either physical disturbance of demolition activity or from noise associated with demolition activities.

- Implementation of Alternative 3 would not negatively affect the ability of the restricted [recovery] habitat for the Mexican spotted owl on the Observatory to be restored and/or enhanced so that it could be developed into habitat that would support the Mexican spotted owl in the future.
- With the implementation of BMPs, implementation of Alternative 3 would have no effect on the Sacramento Mountains thistle.
- With the implementation of BMPs and mitigation measures, implementation of Alternative 3 would not jeopardize the continued existence of the Peñasco least chipmunk.

NSF would reinitiate Section 7 consultation with USFWS if the project description or site conditions change, as described for Alternative 1.

4.1.3.4 Regional Forester Sensitive Species Determination

Sacramento Mountain Salamander

The amount of demolition under Alternative 3 would be less than for Alternatives 1 and 2, and operations would be discontinued for a period of time and then resumed comparable to current operations. Therefore, impacts to the Sacramento Mountain salamander would be comparable to those described for Alternative 1. There would be no direct, indirect, or cumulative impacts to the Sacramento Mountain salamander or to habitat for the Sacramento Mountain salamander as a result of implementation of Alternative 3.

Northern Goshawk

The amount of demolition under Alternative 3 would be less than for Alternatives 1 and 2, and operations would be discontinued for a period of time and then resumed comparable to current operations. Therefore, impacts to the northern goshawk would be comparable to those described for Alternative 1. There would be no direct, indirect, or cumulative impacts to the northern goshawk or to habitat for the northern goshawk as a result of implementation of Alternative 3.

Sacramento Mountains Checkerspot Butterfly

The amount of demolition under Alternative 3 would be less than for Alternatives 1 and 2, and operations would be discontinued for a period of time and then resumed comparable to current operations. Therefore, impacts to the Sacramento Mountains checkerspot butterfly would be comparable to those described for Alternative 1. There would be no direct, indirect, or cumulative impacts to the Sacramento Mountains checkerspot butterfly or to habitat for the Sacramento Mountains checkerspot butterfly as a result of implementation of Alternative 3.

Pale Townsend's Big-Eared Bat

The amount of demolition under Alternative 3 would be less than for Alternatives 1 and 2, and operations would be discontinued for a period of time and then resumed comparable to current operations. Therefore, impacts to the pale Townsend's big-eared bat would be comparable to those described for Alternative 1. There would be no direct, indirect, or cumulative impacts to the pale Townsend's big-eared bat or to habitat for the pale Townsend's big-eared bat as a result of implementation of Alternative 3.

Spotted Bat

The amount of demolition under Alternative 3 would be less than for Alternatives 1 and 2, and operations would be discontinued for a period of time and then resumed comparable to current operations. Therefore, impacts to the spotted bat would be comparable to those described for Alternative 1. There would be no direct, indirect, or cumulative impacts to the spotted bat or to habitat for the spotted bat as a result of implementation of Alternative 3.

4.1.4 Alternative 4 – Demolition and Site Restoration

Under Alternative 4, biological resource impacts would result from removal of the majority of aboveground structures at the Sacramento Peak Observatory. Demolition would occur over approximately 43 weeks compared to 24 weeks under Alternative 1. The area where demolition would occur is much larger than that for the other Alternatives because the additional facility buildings are spread out over a larger portion of the Sacramento Peak Observatory. Alternative 4 would involve the removal of all structures to approximately 4 feet (1.2 meters) below existing ground surface only to enable the restoration of the ground surface topography without limiting future surface operations or activities. The majority of aboveground structures would be removed and demolished, with belowground structures and foundations stabilized, filled, and abandoned in place. Safe demolition of the aboveground portion of DST would be accomplished using explosives (in the form of shaped charges) and conventional demolition equipment.

4.1.4.1 Vegetation

4.1.4.1.1 Alternative 4 Implementation – Vegetation

Under Alternative 4, direct impacts would occur to site vegetation from the creation of staging areas for materials and equipment, for the removal of the majority of structures onsite. Landscaped vegetation around structures and in onsite staging areas would be lost during demolition. In addition, heavy equipment would be used and their placement and operation could further disturb or damage vegetation onsite.

The demolition and removal of structures with permanent foundations would be completed to approximately 4 feet (1.2 meters) below existing ground surface grade to enable the restoration of the ground surface topography without limiting future surface operations or activities. Site restoration work

would require regrading of areas to predevelopment elevations and contours. These activities would result in impacts to surrounding landscape vegetation throughout previously maintained areas of the Sacramento Peak Observatory. Demolition of the DST would result in direct loss of a small amount of previously maintained vegetation.

There would be potential for weed species to become established in areas disturbed during demolition activities. In addition to the BMPs described for Alternative 1, NSF, in coordination with USFS and as specified in the BA (Appendix 3B), would develop and implement a Vegetation Restoration Management Plan consistent with the Lincoln National Forest Land and Resources Management Plan that would delineate boundaries for restoration, identify measures to stabilize soil and reestablish vegetation onsite, designate plant species to be used, and establish a monitoring plan that would include target goals and evaluation metrics. In addition, the Vegetation Restoration Management Plan would provide measures to prevent the spread of invasive weeds.

Overall, the impacts to vegetation from Alternative 4 would be minor, adverse, and short-term because they would occur within areas that are already regularly maintained under current operations, trees would not be removed, and revegetation would be implemented immediately following demolition in a specific area. Following demolition activities, soil would be placed where needed to support the growth of desired vegetation, native plant species would be seeded and/or transplanted, temporary erosion control would be installed where needed, and watering and weed control regimes would be maintained until desired vegetation is established. All demolition work proposed under Alternative 4 would occur within existing maintained and landscaped areas of the Sacramento Peak Observatory. As a result, no new ground disturbance to natural areas would occur under Alternative 4 and no impacts to listed plant species would be expected.

To avoid or minimize the potential for incidental impacts to vegetation during construction, the BMPs identified in Section 4.1.1.1, *Vegetation*, would be implemented during demolition.

4.1.4.1.2 Alternative 4 Operations – Vegetation

Post-demolition revegetation activities would occur immediately following the proposed demolition work. NSF, in coordination with USFS, would develop and implement a Vegetation Restoration Management Plan consistent with the Lincoln National Forest Land and Resources Management Plan that would delineate boundaries for restoration, identify measures to stabilize soils and reestablish vegetation onsite, designate plant species to be used, and establish a monitoring plan that includes target goals for species establishment and prevention of spread of invasive weeds as well as evaluation metrics. Areas revegetated following demolition activities would be maintained for a period of 18 months or less if target revegetation cover is achieved sooner. Because demolition may be done over three separate years, the Vegetation Restoration Management Plan would be implemented in stages as disturbance in a specific

area is completed. The 18-month maintenance period would apply to each disturbed area, as restoration is implemented.

The Vegetation Restoration Management Plan would include the following:

- Revegetated areas would be planted with appropriate species/community type plants to allow for future benefits to indicator wildlife species.
- Revegetated areas would be planted to allow for eventual representation of all vegetational stages by plant community.
- Appropriate species selection and seeding will be performed to prohibit the future introduction of exotic or invasive plant species into Lincoln National Forest.

4.1.4.2 Wildlife

4.1.4.2.1 Alternative 4 Implementation – Wildlife

Impacts could result from loss of habitat, noise, disturbance, and increased human activity for a longer duration than under Alternative 1. Activities under this Alternative would occur as multiple discrete events over a longer period of time instead of a single continuous 43-week period. While demolition under this Alternative would be expected to take approximately 43 weeks, it could require at least three separate demolition work periods to complete, as the work restriction to avoid Mexican spotted owl and northern goshawk leaves only a 21-week period for demolition in a given season. Implementation of demolition through multiple discrete events does not change the magnitude of assessed impacts to wildlife. The length of time for which there would be disturbed soils would be extended; however, appropriate BMPs and mitigation measures, as described previously, would be implemented throughout the period of demolition to minimize the potential for adverse indirect impacts.

Small areas of landscaped habitat around buildings would be lost and replaced as described previously. In addition, permanent direct impacts would occur for animals that use structures as habitat (e.g., roosting habitat for some bird species). This habitat would be lost following demolition, but species are expected to use similar nearby available habitat. Because of the availability of extensive habitat areas in the region and the small amount of habitat that would be lost, these adverse impacts are expected to be long-term and minor, because of the need to extend demolition over multiple years.

The demolition and removal of structures with permanent foundations would be completed to approximately 4 feet (1.2 meters) below existing ground surface grade. The subsurface removal may cause collapse of animal burrows in proximity to the structures and limited mortality of common burrowing wildlife may occur. Any mortality would be limited to the immediate area of the building and no population level impacts would be expected. Natural dispersal of animals from the surrounding area would be expected to recolonize the area after vegetation restoration is complete.

During the approximately 43-week demolition period, noise and vibration would cause moderate short-term direct impacts to wildlife. Wildlife could experience disruptions in their natural activities, including disruptions in communications, foraging, and avoiding danger. Demolition work would not be done during the period from March 1 through September 30, so there would be no disruption of breeding and reproduction. Maximum sound levels of 80 to 90 dBA at 50 feet would be expected based on the equipment expected to be used during demolition. Noise from blasting explosives (proposed only for demolition of the aboveground portion of DST) could exceed the 100-dBA range but would be limited to a single blast event. Noise from demolition would not be continuous and would attenuate as sound travels from the work areas, due to the increase in distance, terrain, and generally closed forest vegetation surrounding the Sacramento Peak Observatory.

Noise and vibration impacts to wildlife would occur over a larger area, because all structures would be demolished instead of limited relocatable structures and for a longer period of time (approximately 43 weeks compared to 24 weeks or 33 weeks) than under the other Alternatives, which would displace wildlife in surrounding areas for a greater length of time. The explosive noise event during demolition of the DST would be much louder than demolition noise for the other Alternatives. However, this noise would be muffled by the structure of the DST and likely would be indistinguishable from a strong thunderclap and would attenuate as sound travels from the DST because of the increase in distance, terrain, and generally closed forest vegetation surrounding the Sacramento Peak Observatory. Wildlife displaced by noise or increased human activity would be expected to recolonize these areas after demolition is complete. BMPs identified under Alternative 1 would also be implemented under Alternative 4. The adverse impacts to common wildlife from noise and vibration from standard demolition would be moderate and long-term-term because of the need to extend demolition over multiple years. The adverse impacts to common wildlife from noise and vibration from the use of explosives in demolition of the DST would be minor and short-term because it would be a single discrete event.

Overall impacts to wildlife and wildlife indicator species are expected to be moderate, adverse, and short-term under Alternative 4.

4.1.4.2.2 Alternative 4 Operations – Wildlife

Once demolition was complete, there would be a minor, beneficial, long-term impact to wildlife and wildlife indicator species from reduced noise and human activity as well as site restoration/revegetation. The Sacramento Peak Observatory would no longer operate, although there would still be minor utility use and maintenance by USFS or another entity, there would be less noise in the environment, and wildlife use of the area would be expected to increase.

4.1.4.2.3 Alternative 4 Management Indicator Species Determination

Pygmy Nuthatch

Impacts to the pygmy nuthatch would be comparable to those described for Alternative 1 because, even though the amount of demolition would be greater, there would be no adverse impacts to habitats used by the pygmy nuthatch and no disruption of breeding by the species. There would be no direct, indirect, or cumulative impacts to habitat for the pygmy nuthatch as a result of the implementation of Alternative 4. Because Alternative 4 would not adversely affect habitat, there would be no change in the status and trend for habitat for the pygmy nuthatch. There would be no impact to population levels and no change in population status and trends for the species because demolition would occur outside the breeding and nesting period for the pygmy nuthatch.

Hairy Woodpecker

Impacts to the hairy woodpecker would be comparable to those described for Alternative 1 because, even though the amount of demolition would be greater, there would be no adverse impacts to habitats used by the hairy woodpecker and no disruption of breeding by the species. There would be no direct, indirect, or cumulative impacts to habitat for the hairy woodpecker as a result of the implementation of Alternative 4. Because Alternative 4 would not affect habitat, there would be no change in the status and trend for habitat for the hairy woodpecker. There would be no impact to population levels and no change in population status and trends for the species because demolition would occur outside the breeding and nesting period for the hairy woodpecker.

Elk

Impacts to elk would be comparable to those described for Alternative 1 because, even though the amount of demolition would be greater, there would be no adverse impacts to habitats used by elk and no disruption of breeding by the species. There would be no direct, indirect, or cumulative impacts to habitat for elk as a result of the implementation of Alternative 4. Because Alternative 4 would not affect habitat, there would be no change in the status and trend for habitat for elk. There would be no impact to population levels and no change in population status and trends for the species because no impacts to breeding and population dynamics for elk would be expected.

4.1.4.3 Federally and State-Listed Threatened, Endangered, Proposed, and Candidate Species

4.1.4.3.1 Alternative 4 Implementation – Federally and State-Listed Threatened, Endangered, Proposed, and Candidate Species

The Peñasco least chipmunk, Mexican spotted owl, and Sacramento Mountains thistle have the potential to occur near the Sacramento Peak Observatory. Designated critical habitat for the Mexican spotted owl has also been identified for large portions of the Lincoln National Forest, surrounding the Sacramento Peak Observatory, which is designated as restricted (recovery) habitat.

Noise from blasting explosives (anticipated for the demolition of the aboveground portion of the DST) would exceed the 69-dBA threshold defined in the 2012 Mexican Spotted Owl Recovery Plan for noise impacts to nesting birds within PACs, but the blast would not occur during the nesting season. The explosive blast would be a single event consisting of a single blast or a sequence of concurrent blasts occurring within milliseconds, depending on the structure of the building and the specific placement needs to drop the building within its footprint. Whether a single detonation or a concurrent sequence is used, it would be a single noise event lasting less than 2 seconds that would be muffled by the structure of the building because the explosives would be placed within the interior of the structure. The explosive blast would not be a large explosion because explosive demolition uses multiple directional charges of the minimum size to cut the internal supports of the structure and cause the building to collapse and avoid expulsion of airborne debris.

Sound levels from blasting explosives would be short-term and would attenuate from the work areas with distance and due to the terrain. The controlled explosive demolition would be a single noise event and would be within the parameters allowable under the 2012 Recovery Plan without mitigation. Because noise levels within the PACs would not exceed 69 dBA on a continuous basis and intermittent louder noise events would not occur more than twice per hour, no adverse impacts to the Mexican spotted owl from noise from blasting would be expected. Additionally, NSF will restrict demolition-related work to occur during daylight hours outside of the breeding season to further reduce the potential for adverse impacts to the Mexican spotted owl. Additional BMPs, as described for Alternative 1, would be implemented to reduce or prevent indirect impacts, particularly to potential prey, from erosion and sedimentation. Mitigation measures identified during Section 7 consultation for the Proposed Action, as described for Alternative 1, would be implemented by NSF.

No individuals or roosting sites of the Mexican spotted owl were identified during reconnaissance-level field surveys of the Sacramento Peak Observatory facilities. Any unidentified roosting sites of listed species within the Sacramento Peak Observatory would likely occur within more forested portions of the facility, adjacent to proposed demolition activities under Alternative 4. During the approximately 43-week demolition period, noise and vibration would cause moderate, adverse, long-term-term impacts to potential roosting sites in surrounding forested areas because the demolition would occur over multiple years.

The Sacramento Mountains thistle does not occur in or near proposed work areas on the Sacramento Peak Observatory due to a lack of suitable habitat. There would be no direct impacts to this species. However, there is potential for indirect impacts resulting from stormwater runoff, which could cause erosion or sedimentation of offsite habitat. Standard construction stormwater BMPs, as specified in the site-specific SWPPP, developed in coordination with USFS and industry standards, and implemented for the demolition activities under Alternative 4 would minimize the potential for offsite impacts during construction.

Revegetation and implementation of the Vegetation Restoration Management Plan discussed previously would minimize the potential for offsite impacts following completion of demolition. With implementation of appropriate construction stormwater management controls, no adverse impacts to offsite populations of, or habitat for, the Sacramento Mountains thistle would be expected.

The Peñasco least chipmunk has the potential to occur within dense herbaceous undergrowth and rock-dominated areas around buildings slated for demolition, or could enter an active work area during demolition activities. Demolition activities subsequent to a chipmunk entering a proposed work area could injure or kill an individual of these species. Because the Peñasco least chipmunk is a Southwestern Region RF Sensitive Species, NSF would conduct biological inspections to determine whether the chipmunk, or active burrows, are in, or adjacent to, work areas prior to the start of demolition work. If animals are found, they would be captured and relocated to approved relocation areas by qualified and permitted individuals.

With implementation of these measures, impacts to the Peñasco least chipmunk expected from demolition activities would be long-term, adverse, and minor.

4.1.4.3.2 Alternative 4 Operations – Federally and State-Listed Threatened, Endangered, Proposed, and Candidate Species

Following demolition and implementation of required mitigation and restoration, the property would be returned to USFS. Subsequent to the return of the property to USFS, NSF would have no further responsibilities at the site. The Sacramento Peak Observatory would no longer operate; although there still would be minor utility use and maintenance by USFS or another entity, there would be less noise in the environment and use of the area by listed, proposed, and candidate species would be expected to increase. The reduction in human activity and habitat improvement resulting from vegetation restoration, would ultimately lead to minor, beneficial, long-term impacts to listed and candidate species.

4.1.4.3.3 Endangered Species Act Determination

In a letter dated July 25, 2017, the USFWS noted the following determinations presented in the BA and concluded consultation under Section 7:

- With the implementation of BMPs and mitigation measures, implementation of Alternative 4 would have no effect on the Mexican spotted owl, from either physical disturbance of demolition activity or from noise associated with demolition activities.
- Implementation of Alternative 4 would not negatively affect the ability of the restricted [recovery] habitat for the Mexican spotted owl on the Sacramento Peak Observatory to be restored and/or enhanced so that it could be developed into habitat that would support the Mexican spotted owl in the future.

- With the implementation of BMPs, implementation of Alternative 4 would have no effect on the Sacramento Mountains thistle.
- With the implementation of BMPs and mitigation measures, implementation of Alternative 4 would not jeopardize the continued existence of the Peñasco least chipmunk.

NSF would reinitiate Section 7 consultation with USFWS if the project description or site conditions change, as described for Alternative 1.

4.1.4.4 Regional Forester Service Sensitive Species Determination

4.1.4.4.1 Alternative 4 Implementation – Regional Forester Sensitive Species

Sacramento Mountain Salamander

Demolition under Alternative 4 would be greater than under the other Alternatives and would include demolition of structures with permanent foundations. Removal of permanent foundations to a depth of 4 feet would have the potential to harm or kill individual Sacramento Mountain salamanders as a result of burrow collapse. Prior to demolition, NSF would conduct biological surveys to determine whether the salamander, or active burrows, are in, or adjacent to, work areas prior to the start of demolition work. Surveys would follow techniques developed jointly between NMDGF and USFWS for the Jemez Mountains salamander, a species similar to the Sacramento Mountain salamander. NSF would coordinate with USFS to determine whether aboveground activity may occur outside the normal restricted activity period after September 30. If animals are found, they would be captured and relocated to approved relocation areas by qualified and permitted individuals.

With implementation of these measures, direct impacts to the Sacramento Mountain salamander from demolition activities would be expected to be long-term, adverse, and moderate because demolition would occur over multiple years. As described for Alternative 1, there would be no indirect or cumulative impacts to the species. There would be no direct, indirect, or cumulative impacts to habitat for the Sacramento Mountain salamander as a result of implementation of Alternative 4.

Northern Goshawk

Demolition under Alternative 4 would be greater than for other Alternatives; however, no work would occur between March 1 and September 30. The explosive blast from demolition of the DST may startle nearby birds, but no injury or mortality would result. Therefore, direct impacts to the northern goshawk would be short-term, adverse, and minor. As described for Alternative 1, there would be no indirect or cumulative impacts to the northern goshawk. There would be no direct, indirect, or cumulative impacts to habitat for the northern goshawk as a result of implementation of Alternative 4.

Sacramento Mountains Checkerspot Butterfly

Demolition under Alternative 4 would be greater than under other Alternatives, but it would not occur in suitable habitat for the Sacramento Mountains checkerspot butterfly. Therefore, impacts to the Sacramento Mountains checkerspot butterfly would be comparable to those described for Alternative 1. There would be no direct, indirect, or cumulative impacts to the Sacramento Mountains checkerspot butterfly or to habitat for the Sacramento Mountains checkerspot butterfly as a result of implementation of Alternative 4.

Pale Townsend's Big-Eared Bat

Demolition under Alternative 4 would be greater than under other Alternatives. However, buildings would be surveyed prior to demolition and appropriate measures would be implemented as described for Alternative 1 to prevent impacts to the species. Therefore, impacts to the pale Townsend's big-eared bat would be comparable to those described for Alternative 1. There would be no direct, indirect, or cumulative impacts to the pale Townsend's big-eared bat or to habitat for the pale Townsend's big-eared bat as a result of implementation of Alternative 4.

Spotted Bat

Demolition under Alternative 4 would be greater than under other Alternatives. However, buildings would be surveyed prior to demolition and appropriate measures would be implemented as described for Alternative 1 to prevent impacts to the species. Therefore, impacts to the spotted bat would be comparable to those described for Alternative 1. There would be no direct, indirect, or cumulative impacts to the spotted bat or to habitat for the spotted bat as a result of implementation of Alternative 4.

4.1.4.4.2 Alternative 4 Operations – Regional Forester Sensitive Species

There would be no operations under Alternative 4. Following demolition and implementation of required mitigation and restoration, the property would be returned to USFS. Subsequent to the return of the property to USFS, NSF would have no further responsibilities at the site. Once demolition is complete, a minor, beneficial, long-term impact to sensitive wildlife species would be expected from the cessation of human activity on the site. The reduction in human activity and expected habitat improvement resulting from vegetation restoration would ultimately lead to minor, beneficial, long-term impacts to Southwestern Region RF Sensitive Species.

4.1.4.5 Neotropical Migratory Birds

4.1.4.5.1 Alternative 4 Implementation – Neotropical Migratory Birds

The BMPs described for Alternative 1 would be implemented under Alternative 4 and would benefit NTMB species by reducing or eliminating the potential for indirect adverse impacts to habitat from erosion and sedimentation. Impacts to migratory birds could result from loss of foraging habitat and

physical displacement. Potential impacts to NTMB species from demolition are expected to be moderate, adverse, and long-term because demolition would occur over multiple years.

4.1.4.5.2 Alternative 4 Operations – Neotropical Migratory Birds

Following demolition, a minor, beneficial, long-term impact on migratory birds would be expected from the cessation of human activity on the site. The only activities that would occur following demolition are vegetation maintenance until desired conditions are achieved and continuing utility maintenance, which would be assumed by USFS or another entity. Vegetation restoration may have long-term indirect benefits to NTMB species through expediting habitat recovery on disturbed areas. No adverse impacts to NTMB species would result from vegetation maintenance. Utility maintenance would be comparable to that occurring under current operations. No adverse impacts to NTMB species would be expected from utility maintenance.

4.1.4.6 Migratory Birds

4.1.4.6.1 Alternative 4 Implementation – Migratory Birds

Potential migratory bird nesting habitat is present on the Sacramento Peak Observatory; demolition activities could adversely affect these species. Impacts to migratory birds could result from loss of foraging habitat and physical displacement. Potential impacts to migratory birds from demolition are expected to be moderate, adverse, and long-term because demolition would occur over multiple years.

4.1.4.6.2 Alternative 4 Operations – Migratory Birds

Following demolition, a minor, beneficial, long-term impact on migratory birds would be expected from the cessation of human activity on the site. The only activities that would occur following demolition are vegetation maintenance until desired conditions are achieved and continuing utility maintenance, which would be assumed by Apache Point Observatory. Vegetation restoration may have long-term indirect benefits to migratory birds through expediting habitat recovery on disturbed areas. No adverse impacts to migratory birds would result from vegetation maintenance. Utility maintenance would be comparable to that occurring under current operations. No adverse impacts to migratory birds would be expected from utility maintenance.

4.1.5 No Action Alternative

Under the No Action Alternative, no mothballing or demolition activities would occur. Therefore, there would be no demolition impacts to vegetation, wildlife, protected species, Southwestern Region RF Sensitive Species, or migratory birds. Current O&M would continue with no change from baseline conditions. No impacts to vegetation, wildlife, protected species, Southwestern Region RF Sensitive Species, or migratory birds would be expected because there would be no change from baseline conditions.

4.1.6 Mitigation Measures

The following is a summary of the mitigation measures and BMPs proposed to avoid or minimize the potential for incidental impacts to biological resources from the Alternatives.

- All Alternatives: Equipment used during demolition activities would be cleaned prior to entering National Forest lands to remove any debris or dirt on the equipment and to eliminate the potential for spread of seed or other propagules of noxious or invasive weeds.
- All Alternatives: BMPs for worksite marking and stormwater management would be implemented. Stormwater BMPs would minimize scour and erosion outside the work area that could otherwise affect habitat quality. These BMPs include:
  - A National Pollutant Discharge Elimination System (NPDES) permit will be obtained from EPA for stormwater discharges associated with the Proposed Action. An SWPPP will be prepared as part of the NPDES permit. Permits and plans would be prepared in coordination with USFS and in accordance with industry standards.
  - Soil-disturbing activities would take place during periods of snow-free and dry conditions. To the extent practicable, heavy equipment will only be used when the soil is relatively dry or frozen.
  - Demolition scheduling would consider the amount and duration of soil exposed to erosion by wind, rainfall, runoff, and vehicle tracking and would seek to minimize disturbed soil area during the rainy season. The sequence of ground-disturbing activities with the installation and maintenance of soil stabilization and sediment control BMPs would be provided in the Project's Demolition Plan.
  - In addition to the measures provided in the SWPPP, and where practicable, existing vegetation would be preserved to the maximum extent possible and for as long as possible on the site to reduce erosion in those areas. Erosion control measures would be in place and functional prior to commencement of soil-disturbing activities and would be maintained and remain in place until vegetation is reestablished according to the approved site restoration plan, which would be developed in coordination with USFS in advance of starting work.
- All Alternatives: Implement seasonal restrictions to avoid demolition between March 1 and September 30 to avoid impacts to the Mexican spotted owl and other avian species during their breeding and nesting periods.
- All Alternatives: Idle restrictions on heavy equipment will be enforced to reduce noise during demolition.
- All Alternatives: No clearing of wooded/forested areas would occur.

- All Alternatives: Perform proposed demolition work during daylight hours to avoid effects on nocturnal foraging by Mexican spotted owl.
- All Alternatives: Biological inspections would be conducted to determine whether chipmunks or active burrows are in, or adjacent to, work areas prior to the start of demolition work. If animals are found, they would be captured and relocated to approved relocation areas by qualified and permitted individuals.
- All Alternatives: Biological inspections of facility buildings slated for demolition would be conducted to determine whether any are being used as bat roosting sites prior to the start of demolition work. If a bat species is found within an existing structure, it will be monitored according to the protocols agreed upon by USFS until roosting activities are completed.
- If the Peñasco least chipmunk becomes federally listed prior to implementation of the selected Alternative, Section 7 ESA consultation would be reinitiated and pre-demolition surveys would be performed using cameras or live traps to identify/collect individuals before the start of the proposed work. Animals collected at buildings proposed for demolition would be relocated to a previously identified habitat area outside the proposed activities. Surveys, capture efforts, and relocation would be performed in accordance with appropriate USFWS, USFS, and NMDGF protocols and collection permits. Relocation sites would be approved by USFWS, USFS, and NMDGF.
- Alternatives 1 through 3: Re-landscape disturbed areas consistent with the other maintained grounds, as necessary.
- Alternative 4: Prior to demolition, NSF would conduct biological surveys to determine whether the salamander, or active burrows, are in, or adjacent to, work areas prior to the start of demolition work.
- Alternative 4: Develop and implement a Vegetation Restoration Management Plan.

4.1.7 Summary of Impacts

Table 4.1-2 provides a summary of impacts resulting from the Alternatives.

TABLE 4.1-2
Summary of Biological Resources Impacts

	Alternatives				
Impacts	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Proposed Action Implementation-Related Vegetation	Minor, adverse, short-term impact	Minor, adverse, short-term impact	Minor, adverse, short-term impact	Minor, adverse, short-term impact	No impact
Proposed Action Operations-Related Vegetation	No impact	No impact	No impact	No impact	No impact

TABLE 4.1-2
Summary of Biological Resources Impacts

	Alternatives				
Impacts	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Proposed Action Implementation-Related Wildlife	Minor, adverse, short-term impact	Minor, adverse, short-term impact	Minor, adverse, short-term impact	Moderate, adverse, long-term impact	No impact
Proposed Action Operations-Related Wildlife	No impact	No impact	Minor, short-term, beneficial impact (during mothball period)	Moderate, long-term, beneficial impact	No impact
Proposed Action Implementation-Related MIS	No impact	No impact	No impact	No impact	No impact
Proposed Action Operations-Related MIS	No impact	No impact	No impact	Moderate, long-term, beneficial impact	No impact
Proposed Action Implementation-Related Threatened, Endangered, or Candidate Species (Bird Species)	No impact	No impact	No impact	No impact	No impact
Proposed Action Implementation-Related Threatened, Endangered, or Candidate Species (Mammal and Amphibian Species)	No impact	No impact	No impact	No impact	No impact
Proposed Action Operations-Related Threatened or Endangered Species (Wildlife Species)	No impact	No impact	No impact	Minor, beneficial, long-term impact	No impact
Proposed Action Implementation-Related Threatened or Endangered Species (Plant Species)	No impact	No impact	No impact	No impact	No impact
Proposed Action Operations-Related Threatened or Endangered Species (Plant Species)	No impact	No impact	No impact	No impact	No impact
Proposed Action Implementation-Related Southwestern Region RF Sensitive Species (Bird and Bat Species)	Minor, adverse, short-term impact	Minor, adverse, short-term impact	Negligible, adverse, short-term impact	Minor, adverse, short-term impact	No impact
Proposed Action Implementation-Related Southwestern Region RF Sensitive Species (Insect Species)	No impact	No impact	No impact	No impact	No impact

TABLE 4.1-2
Summary of Biological Resources Impacts

	Alternatives				
Impacts	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Proposed Action Implementation-Related Neotropical Migratory Birds	Negligible, adverse, short-term impact	Negligible, adverse, short-term impact	Negligible, adverse, short-term impact	Moderate, adverse, long-term impact	No impact
Proposed Action Operations-Related Neotropical Migratory Birds	No impact	No impact	Minor, beneficial long-term impact (during mothball period)	Minor, beneficial, long-term impact	No impact
Proposed Action Implementation-Related Migratory Birds	Negligible, adverse, short-term impact	Negligible, adverse, short-term impact	Negligible, adverse, short-term impact	Moderate, adverse, long-term impact	No impact
Proposed Action Operations-Related Migratory Birds	No impact	No impact	Minor, long-term, beneficial impact (during mothball period)	Minor, long-term, beneficial impact	No impact

4.2 Cultural Resources

This section describes the potential impacts to cultural resources within the APE as a result of implementing the Alternatives or as a result of the No Action Alternative. The APE for the Alternatives is defined as the Sacramento Peak Observatory's overall property limits (approximately 250 acres, with approximately 83 acres developed), which includes the main Observatory area, the Sewage Treatment Plant and associated water wells, and the section of Sunspot Highway that connects this area to the main Observatory, as well as the remains of the helicopter landing area northwest of the Observatory. Because NEPA and NHPA Section 106 are parallel processes that are closely related in their findings of consequences for cultural resources, this section presents the findings for both regulations. For purposes of clarity, this section uses the term "impact" when discussing NEPA and the term "effect" when discussing Section 106. No important non-NRHP cultural resources were identified; therefore, impacts are discussed only for historic properties that contribute to the NRHP-eligible historic district. Under Section 106, the Proposed Action is referred to as the undertaking, as defined in Section 2.0, *Description of Proposed Action and Alternatives*, of this DEIS.

Methodology

As described in Section 3.2, *Cultural Resources*, the Sacramento Peak Observatory is a federally owned property that is eligible for listing in the NRHP as a historic district with 63 contributing resources. SHPO concurred with these determinations of eligibility on May 18, 2017. Therefore, the Proposed Action has the potential to affect NRHP-eligible historic properties. All four Alternatives would result in adverse effects to historic properties. The resolution of adverse effects would be addressed in a Section 106

Programmatic Agreement (PA), which would be executed prior to signing the NEPA ROD. An unanticipated discovery plan would be developed in coordination with USFS and would be in place prior to any demolition activities associated with the selected Alternative to address archaeological resources that might be discovered during demolition.

After historic properties were identified within the APE, each Alternative was analyzed to determine whether it would have direct or indirect impacts on those properties, either during implementation of each Alternative or during operations. Then the intensity level of the impact was determined under NEPA, and whether any effects found would be adverse under Section 106.

To determine the direct impacts under NEPA on historic properties from implementing the Proposed Action under each of the Alternatives, the following information was analyzed:

- Potential partial or complete demolition of historic properties
- Potential alterations to historic properties
- Potential physical changes to the setting and integrity of NRHP-eligible or contributing properties
- General demolition activities

The extent to which these types of activities could impact historic properties was examined based on the Proposed Action and the types of historic properties identified.

For indirect impacts, broader changes that the Proposed Action may cause (such as changes in land use) were identified and analyzed qualitatively, based primarily on those seen from previous similar projects. This analysis could include activities that are caused by the Proposed Action but that occur at a later time and distance from the Proposed Action activities. No indirect impacts to historic properties were identified for the Alternatives or the No Action Alternative. Therefore, no further discussion of indirect impacts is included for cultural resources. Additionally, although there were major adverse impacts identified to cultural resources, these impacts would be confined to the Observatory site and would not interact with the identified cumulative activities (see Section 4.13.1, *Cumulative Activities*); therefore, there would be no cumulative impacts to cultural resources under any alternative and there is no further discussion of cumulative impacts to cultural resources.

Section 106 Assessment of Effects

Because this section addresses both NEPA and Section 106, the following presents an explanation of how Section 106 evaluates consequences of project actions on historic properties. The ACHP's regulations implementing Section 106 of the NHPA create a process by which federally assisted projects are reviewed for their effects on historic properties. After the historic property is identified and evaluated, the Criteria of Adverse Effect (36 C.F.R. §800.5[1]) are applied. These criteria are used to determine whether

the undertaking could change the characteristics that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Section 106 of NHPA allows the following three findings for effects on historic properties:

- No Historic Properties Affected
- No Adverse Effect
- Adverse Effect

An effect is adverse under Section 106 if it diminishes the integrity of the property's historically significant characteristics. Examples of adverse effects include, but are not limited to, the following:

- Demolition of the historic property
- Relocation of the historic property
- Introduction of visual, audible, or atmospheric elements that are out of character with the setting of the historic property

The federal agency makes the determination of effects for each historic property. Based on these determinations, an overall finding of effect for the undertaking is reached, in consultation with the SHPO and other consulting parties. In the case of an adverse effect, the agency must notify the ACHP of the finding (see Table 5.1-2 for specific steps and dates of the Section 106 process for this project).

The term mothballing is used in this DEIS to refer to the process of removing a facility or structure from daily use while maintaining the general condition for a defined period and removing equipment and structures from use while keeping them in working order. The NPS guidelines for mothballing, presented in Preservation Brief 31, "Mothballing Historic Buildings," applies specifically to historic buildings rather than instruments or equipment (Park, 1993). However, since a similar approach would be used to preserve certain historic instruments and structures at the Observatory, the term mothballing is used in this section for historic instruments, as well as historic buildings, to indicate that they will be preserved and protected, and maintained in an operational readiness condition. Historic instruments and equipment at Sacramento Peak Observatory would be protected and preserved in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* (Grimmer, 2017).

Section 106 Resolution of Effects

As stipulated in 36 C.F.R. §800.1(a), the goal of consultation is to identify historic properties potentially affected by the undertaking, assess effects to the historic properties, and identify ways to avoid, minimize, or mitigate adverse effects on historic properties. When an undertaking is found to have an adverse effect,

Section 106 requires notification to the ACHP and consultation with SHPO and other interested parties regarding appropriate avoidance, minimization, or mitigation measures. Minimization measures might include redesigning aspects of a project to lessen the impacts on historic properties, while mitigation measures could include relocating or documenting buildings and/or structures. Under a finding of adverse effect, the product of consultation is typically an MOA per 36 C.F.R. §800.6(c) or a PA per 36 C.F.R. §800.14(b) among the SHPO, federal agency, ACHP if it chooses to participate, and other consulting parties. This agreement contains stipulations specifying measures to be implemented that would avoid, minimize, or mitigate the adverse effects. For this Proposed Action, a PA would be drafted to resolve potential adverse effects from the Proposed Action.

NEPA Impact Thresholds and Section 106 Effects

Table 4.2-1 identifies thresholds of NEPA impacts relevant to historic properties for this Proposed Action, and lists the correlation between NEPA impacts and NHPA Section 106 effects.

TABLE 4.2-1
Impact and Effect Thresholds for NEPA and Section 106

Impact Intensity	**Description**
Negligible	Impacts to historic properties would not be expected to be detectable and would not alter resource characteristics. *The NHPA Section 106 determination would be no historic properties affected or no adverse effect on historic properties.*
Minor	Impacts to historic properties would result in little, if any, loss of integrity and would be slight but noticeable. Impacts would not appreciably alter resource characteristics. *The NHPA Section 106 determination would be no adverse effect on historic properties.*
Moderate	Impacts to historic properties would result in some loss of integrity and would be noticeable. Impacts could appreciably alter resource characteristics. Measures to mitigate impacts would be sufficient to reduce the intensity of impacts to a level less than major under NEPA. *The NHPA Section 106 determination would likely be no adverse effect, but only after implementing minimization or mitigation measures sufficient to reduce the adverse effects on historic properties.*
Major	Impacts to historic properties would result in disturbance to an important site, substantial loss of integrity, and/or severe alteration of property conditions, the result of which would significantly affect the human environment. Mitigation would not be sufficient to reduce the intensity of impacts to a level less than major under NEPA. *The NHPA Section 106 determination would be adverse effect on historic properties. Measures to avoid, minimize, and/or mitigate adverse effects under Section 106 would be decided through consultation and stipulated in an MOA or a PA.*

Duration: Short-term – Occurs only during the implementation of the Proposed Action.
Long-term – Continues after the implementation of the Proposed Action.

Note: Text shown in italics is the corresponding Section 106 Finding of Effect.

4.2.1 Alternative 1 – Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding

4.2.1.1 Alternative 1 Implementation – Architectural Resources

Alternative 1 involves the demolition of facilities at the Sacramento Peak Observatory that contribute to the NRHP-eligible historic district; therefore, Alternative 1 would result in major, adverse, long-term impacts under NEPA and adverse effects under Section 106. Table 4.2-2 lists proposed activities that would impact historic properties under Alternative 1. Any historic properties not listed in Table 4.2-2 would be kept and maintained.

TABLE 4.2-2
Alternative 1 – Description of Proposed Activities

Historic/NRHP-Eligible Historic District Properties to be Mothballed	John Evans Facility Grain Bin Dome Storage 3037
Historic/NRHP-Eligible Historic District Properties to be Demolished	Relocatable Housing (21 Buildings, including the Recreation House)

Two properties that contribute to the NRHP-eligible historic district would be demolished under Alternative 1. The removal of historic architectural resources results in measurable impacts that are both severe and permanent. Although mitigation would be implemented, demolition of a historic building cannot be mitigated to less than a major impact because it is a permanent removal of historic fabric. NSF will continue to consult with the New Mexico SHPO and other consulting parties to determine the appropriate ways in which to avoid, minimize, and/or mitigate these impacts. It is anticipated that measures that result from those consultations would be documented in a PA.

Three properties that contribute to the NRHP-eligible historic district would be mothballed under Alternative 1 (the Storage Building 3024 would also be mothballed under Alternative 1, but it is not considered a historic property). Mothballing involves removing a building from daily use while maintaining the general condition for a defined period of time. A similar process applies to preserving structures or instruments, protecting and maintaining them in operational readiness condition. Preparing historic properties for mothballing could involve securing buildings and their associated components, turning off utilities, weatherizing, and providing adequate ventilation. These steps could involve some building treatments that could have minor, adverse, short-term impacts under NEPA and no adverse effects on historic properties under Section 106. Modifications to buildings required during mothballing would be compatible with the historic property style and materials, and would be executed in accordance with the NPS Preservation Brief 31, “Mothballing Historic Buildings” (Park, 1993). Instruments and equipment would be preserved in accordance with *The Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings*(Grimmer, 2017). If historic properties were returned to use at a future

date, alterations performed as part of the mothballing process could be reversed without physical harm to the historic properties.

Although 21 contributing buildings would be demolished, Alternative 1 would retain the two NRHP-eligible telescopes located within the Sacramento Peak Observatory. In addition, Alternative 1 would retain 42 historic properties that contribute to the NRHP-eligible historic district, preserving a unique historical moment in the field of solar astronomy. Because more than half of the contributing resources would remain extant, including the historic district's primary instruments – the John Evans Facility and DST – the historic district would retain sufficient integrity to convey its historic significance under Criterion A. Of the four Alternatives, Alternative 1 would result in the least impacts to historic properties when compared to Alternatives 2, 3, and 4.

4.2.1.2 Alternative 1 Operations – Architectural Resources

Operations would continue under Alternative 1 with an interested party. Under Alternative 1, three historic properties would be mothballed: the John Evans Facility, the Grain Bin Dome, and Storage 3037. The John Evans Facility and the Grain Bin Dome are currently not in active use, therefore, mothballing would not alter the existing operations of the instruments or the historic district. Although they would not be used for observations or research, the equipment and structures would be protected, maintained and kept in working order. Mothballing of historic instruments and equipment would follow *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings*) (Grimmer, 2017). Mothballing the structures could result in a beneficial impact by maintaining the instruments for future use rather than leaving them abandoned. Storage 3037 is a small concrete storage facility; mothballing the building would have a negligible impact on the operations of the historic district. Mothballing would be planned and completed in accordance with the NPS Preservation Brief 31, "Mothballing Historic Buildings" (Park, 1993). Therefore, operation of Alternative 1 would not alter characteristics of the remaining Sacramento Peak Observatory historic properties that qualify them as eligible for the NRHP and would result in beneficial, short-term impacts to historic properties and no adverse effects under Section 106.

4.2.1.3 Alternative 1 Implementation and Operations – Archaeological Resources

Ground disturbance under Alternative 1 would be limited to activities associated with the demolition of a non-historic-era Residential House Trailer and the demolition of 21 NRHP-contributing Relocatable Housing units (one of which is identified as the Recreation House). There are no known archaeological resources within the APE that are eligible for or listed in the NRHP, and therefore no impacts to archaeological resources under NEPA and no effects on archaeological historic properties under Section 106 are anticipated. An unanticipated discovery plan would be in place prior to demolition to address archaeological resources that might be discovered during demolition. If previously unidentified archaeological resources were discovered during demolition, ground-disturbing activities would halt in

the vicinity of the find and NSF would consult with the New Mexico SHPO and other consulting parties as appropriate regarding eligibility for listing in the NRHP, project impacts, necessary mitigation, or other treatment measures, as outlined in the unanticipated discovery plan. Additional archaeological investigations could be conducted if substantial ground disturbance is required or if work is performed in areas that are currently undisturbed.

4.2.2 Alternative 2 – Transition to Partial Operations by Interested Parties with Reduced NSF Funding

4.2.2.1 Alternative 2 Implementation – Architectural Resources

Similar to Alternative 1, Alternative 2 involves the demolition of facilities at the Sacramento Peak Observatory that contribute to the NRHP-eligible historic district; therefore, Alternative 2 would result in major, adverse, long-term impacts under NEPA and adverse effects under Section 106. Table 4.2-3 lists proposed activities that would impact historic properties under Alternative 2. Any historic properties not listed in Table 4.2-3 would be kept in active use and maintained.

TABLE 4.2-3
Alternative 2 – Description of Proposed Activities

Historic / NRHP-Eligible Historic District Properties to be Mothballed	John Evans Facility Grain Bin Telescope Hilltop Dome ISOON Building Main Lab Storage (3 Quonset Huts) Storage 3037 Machine/Electronics Shop Welding Shop/Library
Historic / NRHP-Eligible Historic District Properties to be Demolished	Relocatable Housing (21 Buildings, including the Recreation House)

Demolition activities for Alternative 2 would be similar to Alternative 1, in that both involve the demolition of 21 contributing resources to the NRHP-eligible historic district (Relocatable Housing, one of which is identified as the Recreation House), but would also avoid complete demolition of the historic district. Both NRHP-eligible solar telescopes would be retained under Alternative 2; the John Evans Facility would be mothballed and DST would be kept in active use and maintained.

Alternative 2 would involve mothballing more historic properties than Alternative 1. Preparations for mothballing historic properties under Alternative 2 would involve the same activities as those described for Alternative 1 and would result in minor, adverse, short-term impacts under NEPA and no adverse effects on historic properties under Section 106. Modifications required during mothballing would follow the NPS Preservation Brief 31, “Mothballing Historic Buildings” (Park, 1993). A similar approach would be used for historic instruments and equipment, following *The Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and*

Reconstructing Historic Buildings (Grimmer, 2017). If historic properties were returned to use at a future date, alterations performed as part of the mothballing process could be reversed without physical harm to the historic fabric.

Although 21 contributing buildings would be demolished and 11 historic properties would be mothballed (a total of 14 buildings and structures would be mothballed under Alternative 2, but Storage Building 3024, Storage Building 3029, and the Recreation Court are not considered historic properties), Alternative 2 would retain a substantial collection of contributing buildings with sufficient integrity that as a group could convey significance in the field of solar astronomy. Alternative 2 would result in more impacts to historic properties than Alternative 1, and fewer significant impacts to historic properties than Alternatives 3 and 4.

4.2.2.2 Alternative 2 Operations – Architectural Resources

Limited site operations would continue under Alternative 2, under the management of an interested party. A total of 11 historic buildings and structures that contribute to the NRHP-eligible historic district would be mothballed, including the John Evans Facility. Impacts to the John Evans Facility as a result of the operation of Alternative 2 would be the same as those described for Alternative 1.

Impacts to the NRHP-eligible historic district as a result of operation activities for Alternative 2 would be similar to Alternative 1, in that the historic district would retain sufficient integrity to qualify as a historic district. However, under Alternative 2, eight more historic buildings would be mothballed than under Alternative 1, including several solar instruments and administrative buildings. The Hilltop Dome is currently decommissioned; therefore, operations with the instrument mothballed would not result in a significant change from existing conditions. As described for the John Evans Facility and the Grain Bin Telescope under Alternative 1, preserving the Hilltop Dome as a mothballed structure could result in a beneficial impact by ensuring that it is protected, regularly maintained and kept in working order for future use.

Operation of Alternative 2 would result in a more substantial change to the historic district use and setting than Alternative 1, since several additional properties would be mothballed and removed from active use. Historic properties at the Sacramento Peak Observatory are primarily scientific instruments or utilitarian buildings and their use is a primary component of their significance. Removing a building or structure from use would diminish the historic district's integrity of association and feeling and result in noticeable impacts to the historic district. Measures could be implemented to ensure that the effects over time of mothballing 11 historic properties are minimized. These measures could include: photographic documentation of historic properties, detailed conditions assessment of the historic properties, compliance with certain security and maintenance standards, and regular monitoring of the facilities onsite. Mothballing buildings would be planned and completed in accordance with the NPS Preservation Brief 31, "Mothballing Historic Buildings" (Park, 1993). A similar approach would be used to preserve historic

instruments and equipment, following *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* (Grimmer, 2017). If the procedures for mothballing outlined in these references were followed, operation of Alternative 2 would not substantially alter characteristics of the remaining Sacramento Peak Observatory historic properties that qualify as eligible for the NRHP and would result in moderate, adverse, short-term impacts under NEPA and no adverse effects under Section 106.

4.2.2.3 Alternative 2 Implementation and Operations – Archaeological Resources

Demolition activities for Alternative 2 would be the same as those described for Alternative 1 because the same buildings would be demolished under the two Alternatives; consequently, the demolition impacts under NEPA and the effects under Section 106 on archaeological resources for Alternative 2 would be the same as those described for Alternative 1: no impacts to archaeological resources under NEPA and no effects on archaeological historic properties under Section 106 are anticipated.

4.2.3 Alternative 3 – Mothballing of Facilities

4.2.3.1 Alternative 3 Implementation – Architectural Resources

Similar to Alternatives 1 and 2, Alternative 3 involves the demolition of facilities at the Sacramento Peak Observatory that contribute to the NRHP-eligible historic district; therefore, Alternative 3 would result in major, adverse, long-term impacts under NEPA and adverse effects under Section 106. Table 4.2-4 lists proposed activities that would impact historic properties under Alternative 3. Any historic properties not listed in Table 4.2-4 would be kept in active use and maintained.

TABLE 4.2-4
Alternative 3 – Description of Proposed Activities

Historic / NRHP-Eligible Historic District Properties to be Mothballed	John Evans Facility Grain Bin Telescope Hilltop Dome DST ISOON Building Main Lab Storage (3 Quonset Huts) CE Shops (2 Buildings) Equipment Storage / Salt Barn Storage 3037 Weather Station Machine/Electronics Shop Welding Shop/Library Community Center Paint Storage Laundromat Visitor Officers Quarters Redwood Family Housing Duplex Units (3 Buildings) Redwood Family Housing Units (10 Buildings) Emergency Generator Building and Fuel Storage Sewage Treatment Plant (4 Buildings)
Historic / NRHP-Eligible Historic District Properties to be Demolished	Relocatable Housing (21 Buildings, including the Recreation House)

Under Alternative 3, 38 buildings and structures that contribute to the NRHP-listed historic district would be mothballed and 21 historic properties would be demolished. Four historic buildings and structures that contribute to the NRHP-eligible historic district would be kept in active use and maintained: the Water Tower, the Pump Station Reservoir, and the two Water Well Buildings.

Demolition activities for Alternative 3 would be similar to Alternatives 1 and 2, in that they involve the demolition of 21 contributing resources to the NRHP-eligible historic district (Relocatable Housing, one of which is identified as the Recreation House), but would also avoid complete demolition of the historic district. Both NRHP-eligible solar telescopes would be retained under Alternative 3; the John Evans Facility would be mothballed and DST would be kept in active use and maintained.

Alternative 3 would involve mothballing more historic properties than Alternatives 1 and 2. Preparations for mothballing historic properties under Alternative 3 would involve the same activities as those described for Alternatives 1 and 2 and would result in minor, adverse, short-term impacts under NEPA and no adverse effects on historic properties under Section 106. Modifications required during the mothballing of buildings would follow the NPS Preservation Brief 31, "Mothballing Historic Buildings" (Park, 1993). A similar approach would be used to preserve and protect historic instruments and equipment, following *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* (Grimmer, 2017). If historic properties were returned to use at a future date, alterations performed as part of the mothballing process could be reversed without physical harm to the historic fabric.

Although 21 contributing buildings would be demolished and 38 historic properties would be mothballed (a total of 45 resources would be mothballed under Alternative 3, but only 38 of the mothballed resources are historic properties), Alternative 3 would retain a substantial collection of contributing buildings with sufficient integrity that as a group could convey significance in the field of solar astronomy. Alternative 3 would result in more impacts to historic properties than Alternatives 1 and 2, and fewer significant impacts to historic properties than Alternative 4.

4.2.3.2 Alternative 3 Operations – Architectural Resources

Operation activities for Alternative 3 would be suspended for an undetermined time frame. Under Alternative 3, the NRHP-historic district, including 38 contributing resources, would be mothballed, which would include the removal of each facility from daily use, while maintaining the general condition of historic properties for a defined period. Mothballing the primary telescopes – including the still in use DST – and the other contributing facilities at the Sacramento Peak Observatory would significantly alter the use and setting of the site. Both the John Evans Facility and DST have made a significant contribution to the field of solar astronomy. DST is also notable for its design and engineering. Mothballing these two historic structures would not affect their design or engineering. The John Evans Facility is not in active

use, so mothballing the instrument would result in a beneficial impact by maintaining it for future use and would not alter its NRHP eligibility. The DST remains in active use; taking it out of use and mothballing it would not impact the structure's association and feeling. It would remain in place with physical features sufficiently intact to convey the property's historic character and convey the relationship between the DST and the field of solar astronomy to an observer.

Impacts to the NRHP-eligible historic district under Alternative 3 as a result of suspended operations and mothballing historic structures would be similar to those described under Alternative 2, due to a change in use that would affect the historic district integrity of setting and feeling. However, out of the four Alternatives, Alternative 3 would involve mothballing the greatest number of historic properties. The John Evans Facility and the Grain Bin Telescope are currently not in active use, and the Hilltop Dome is currently decommissioned; therefore, operations with these instruments mothballed would not result in a significant change from existing conditions. As described previously, preserving the John Evans Facility, the Grain Bin Dome, and the Hilltop Dome as mothballed structures could result in beneficial impacts by ensuring that they are regularly maintained and kept in working order for future use. The temporary suspension of operations under Alternative 3 would result in a more substantial change to the historic district use and setting than Alternatives 1 and 2. Only four infrastructure-related buildings and structures that contribute to the NRHP-eligible historic district would be kept in active use and maintained. The same measures that were described for Alternative 2 could be implemented to ensure that the effects on historic buildings from suspending use and mothballing are minimized (Park, 1993; Grimmer, 2017). If the procedures outlined by the NPS were followed, Alternative 3 would not significantly alter characteristics of the NRHP-eligible historic district or contributing elements that qualify as eligible for the NRHP, and would result in moderate, adverse, short-term impacts under NEPA and no adverse effects under Section 106.

4.2.3.3 Alternative 3 Implementation and Operations – Archaeological Resources

Demolition activities under Alternative 3 would be the same as those described for Alternatives 1 and 2 because the same buildings would be demolished under the two Alternatives; consequently, the demolition impacts under NEPA and the effects under Section 106 on archaeological resources for Alternative 3 would be the same as those described for Alternatives 1 and 2: no impacts to archaeological resources under NEPA and no effects on archaeological historic properties under Section 106 would be anticipated.

4.2.4 Alternative 4 – Demolition and Site Restoration

4.2.4.1 Alternative 4 Implementation – Architectural Resources

Alternative 4 would involve demolition of 59 historic properties that contribute to the NRHP-eligible historic district, resulting in major, adverse, long-term impacts under NEPA and adverse effects on historic properties under Section 106. Table 4.2-5 lists proposed activities that would impact historic

properties under Alternative 4. Any historic properties not listed in Table 4.2-5 would be kept in active use and maintained.

TABLE 4.2-5
Alternative 4 – Description of Proposed Activities

Historic / NRHP-Eligible Historic District Properties to be Demolished	John Evans Facility Grain Bin Telescope Hilltop Dome DST ISOON Building (Patrol Dome) Main Lab Storage (3 Quonset Huts) CE Shops (2 Buildings) Equipment Storage / Salt Barn Storage 3037 Weather Station Machine/Electronics Shop Welding Shop/Library Community Center Paint Storage Laundromat Visitor Officers Quarters Redwood Family Housing Duplex Units (3 Buildings) Redwood Family Housing Units (10 Buildings) Relocatable Housing (21 Buildings, including the Recreation House) Emergency Generator Building and Fuel Storage Sewage Treatment Plant (4 Buildings)

Alternative 4 would involve the demolition of most of the NRHP-listed historic district resulting in major, adverse, long-term impacts under NEPA and adverse effects on historic properties under Section 106. Under Alternative 4, the primary solar telescopes and administrative buildings would be demolished. Only four historic properties would remain extant: the Water Tower, Water Wells and Water Well Buildings, and Pump Station Reservoir. The four contributing buildings that would remain are part of the site infrastructure and are not defining elements of the NRHP-eligible district. As a result of demolition of all solar instruments and research support facilities within Sacramento Peak Observatory, the historic district would lose integrity of materials, design, workmanship, feeling, association, and setting. As a result, demolition under Alternative 4 would result in a significant loss of integrity for the remaining structures, and the historic district would no longer retain sufficient integrity to be considered eligible for the NRHP. Therefore, of the four Alternatives, Alternative 4 would incur the most severe impacts to historic properties.

When an undertaking is found to have an adverse effect, Section 106 requires consultation with SHPO and other consulting parties regarding appropriate avoidance, minimization, or mitigation measures. The product of consultation for the Proposed Action is expected to be a PA per 36 C.F.R. §800.14(b) between

the SHPO, NSF, and possibly other consulting parties. NSF will continue to consult with the New Mexico SHPO to determine the appropriate mitigation measures for these impacts.

4.2.4.2 Alternative 4 Operations – Architectural Resources

Operations would completely cease under Alternative 4; therefore, operation of Alternative 4 would result in no impacts to historic properties under NEPA and no historic properties affected under Section 106.

4.2.4.3 Alternative 4 Implementation and Operations – Archaeological Resources

Ground disturbance for Alternative 4 would be associated with demolition activities. Alternative 4 involves the demolition of nearly all buildings and structures located within Sacramento Peak Observatory. As a result, Alternative 4 would involve the most ground disturbance of the four Alternatives. More extensive ground disturbance would pose a greater risk for encountering previously unidentified archaeological resources. However, there are no known archaeological resources within the APE that are eligible for or listed in the NRHP and therefore no impacts to archaeological resources under NEPA and no effects on archaeological historic properties under Section 106 are anticipated. An unanticipated discovery plan would be in place prior to demolition to address archaeological resources that might be discovered during demolition. If previously unidentified archaeological resources were discovered during demolition, ground-disturbing activities would halt in the vicinity of the find and NSF would consult with the New Mexico SHPO and other consulting parties as appropriate regarding eligibility for listing in the NRHP, project impacts, necessary mitigation, or other treatment measures, as outlined in the unanticipated discovery plan. Additional archaeological investigations could be conducted if substantial ground disturbance is required or if work is performed in areas that are currently undisturbed. The BMPs summarized in Section 4.2.6, *Mitigation Measures*, would be implemented prior to demolition.

4.2.5 No Action Alternative

Under the No Action Alternative, current activities would continue at the Sacramento Peak Observatory, and no mothballing or demolition would occur. Current activities at the Sacramento Peak Observatory include regular maintenance of buildings and structures, and alterations to resources that contribute to the NRHP-eligible historic district to adapt to changes in science and technology. Therefore, maintaining the current conditions of the Sacramento Peak Observatory could involve minor alterations to historic properties to retain their utility; however, a review of proposed alterations would occur prior to action being taken to determine if there are impacts on NRHP-eligible properties. No proposed alterations are currently pending and, therefore, there are no impacts to historic properties anticipated under NEPA and no adverse effect on historic properties under Section 106.

4.2.6 Mitigation Measures

The following is a summary of the proposed mitigation measures for cultural resources related to the Alternatives:

- All Alternatives: Implement stipulations specified in the Section 106 PA. These stipulations would also suffice to address the necessary mitigation for major impacts to cultural resources under NEPA. Specific mitigation measures would be developed in consultation with the SHPO and consulting parties.
- All Alternatives: An unanticipated discovery plan would be developed prior to demolition to address archaeological resources that might be discovered during demolition.
- Alternatives 1, 2, and 3: Mothballing of historic buildings would be completed in accordance with the NPS Preservation Brief 31, "Mothballing Historic Buildings" (Park, 1993). Similar methods would be used to preserve and protect historic structures. Preservation and protection of historic instruments and equipment would be completed in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* (Grimmer, 2017).

4.2.7 Summary of Impacts and Effects

Table 4.2-6 provides a summary of impacts and effects resulting from the Alternatives.

TABLE 4.2-6
Summary of Cultural Resources Impacts and Effects

	Alternatives				
	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Proposed Action Implementation-Related Impacts to Known Historic Properties (Architectural Resources)	Major, adverse, long-term impact *Adverse effect on historic properties*	Major, adverse, long-term impact *Adverse effect on historic properties*	Major, adverse, long-term impact *Adverse effect on historic properties*	Major, adverse, long-term impact *Adverse effect on historic properties*	No impact *No adverse effect on historic properties*
Proposed Action Operations-Related Impacts to Known Historic Properties (Architectural Resources)	Beneficial, short-term impact *No adverse effect on historic properties*	Moderate, adverse, short-term impact *No adverse effect on historic properties*	Moderate, adverse, short-term impact (during mothball period) *No adverse effect on historic properties*	No impact *No historic properties affected*	No impact *No adverse effect on historic properties*
Potential Impacts to Archaeological Resources	No impact *No historic properties affected*	No impact *No historic properties affected*	No impact *No historic properties affected*	No impact *No historic properties affected*	No impact *No historic properties affected*

Note: Text shown in italics is the corresponding Section 106 Finding of Effect.

4.3 Visual Resources

This section describes the potential impacts to visual resources within the ROI as a result of implementing the Alternatives or as a result of the No Action Alternative.

Methodology

The methods used to determine whether the Alternatives would have impacts on visual resources are as follows:

- Determine if the Proposed Action would result in a perceivable change to the existing visual character of the area (i.e., a change in how the viewed environment appears).
- Evaluate how the perceivable changes of the visual character would alter the existing visual quality (high, average, low).
- Determine if there would be a substantial change to the existing visual quality of the site.

Table 4.3-1 identifies the impact thresholds for visual resources.

TABLE 4.3-1
Impact Thresholds for Visual Resources

	Impact Intensity Description
Negligible	No or nearly unperceivable impacts to visual resources would be expected.
Minor	There would be only a slight change to the existing appearance (visual character) of the area; however, the changes would provide the same visual quality as the current conditions (that is, remain high, average, or low).
Moderate	There would be perceivable change to the existing appearance (visual character) of the area; however, the changes would provide the same visual quality as the current conditions (that is, remain high, average, or low).
Major	There would be a substantial change to the existing appearance (visual character) of the area that would result in an alteration of the visual quality of a broad area and/or historic district.
Duration:	**Short-term –** Occurs only during the implementation of the Proposed Action. **Long-term –** Continues after the implementation of the Proposed Action.

4.3.1 Alternative 1 – Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding

4.3.1.1 Alternative 1 Implementation – Visual Resources

Mothballing activities under Alternative 1 would result in negligible impacts to visual resources, as there would be nearly unperceivable changes in appearance. Demolition activities during Alternative 1 would alter the visual character of the natural landscape and the NRHP-eligible historic district. Fugitive dust from demolition activities, increased traffic, and reduced access to facilities could temporarily alter the appearance of the site. In addition, construction activities could disrupt the natural setting and could temporarily diminish the visual quality of the site. The facilities proposed for demolition under Alternative 1 (Residential House Trailer and the Relocatable Housing units, which includes the Recreation House) have a residential character; they are not considered aesthetically or architecturally significant. The Relocatable Housing units (which includes the Recreation House) contribute to the NRHP-eligible historic district as a result of their historical associations, rather than their design or

architectural significance. They are simple buildings that have low visual and aesthetic quality. Their demolition would change the visual character in those locations from residential to a natural setting. This change in character would remove visual components that currently disrupt the natural landscape, which is the dominant visual character of the site. As a result, the visual quality of the site would remain high, or would potentially become more open and thus more dramatic. From a visual perspective, this change could result in beneficial impacts to the overall visual quality by returning the area to a more consistently natural environment. Impacts to visual resources during demolition under Alternative 1 would be moderate, beneficial, and long-term.

4.3.1.2 Alternative 1 Operations – Visual Resources

Under Alternative 1, operations, staffing, and visitation would be comparable to existing conditions, resulting in no anticipated change in the existing visual character or the visual resources within the Sacramento Peak Observatory and would not alter the visual quality of the overall site. Therefore, operations under Alternative 1 would result in no impact to visual resources.

4.3.2 Alternative 2 – Transition to Partial Operations by Interested Parties with Reduced NSF Funding

4.3.2.1 Alternative 2 Implementation – Visual Resources

Demolition activities for Alternative 2 would be the same as those described for Alternative 1, in that the same buildings would be demolished (Residential House Trailer and Relocatable Housing units, which include the Recreation House). Mothballed buildings would result in negligible impacts to visual resources. Consequently, the impacts to visual resources under Alternative 2 would be the same as those described for Alternative 1 and would result in moderate, beneficial, and long-term impacts.

4.3.2.2 Alternative 2 Operations – Visual Resources

Under Alternative 2, operations, staffing, and visitation would be less than, but comparable to, existing conditions, resulting in no anticipated change in the existing visual character or the visual resources within the Sacramento Peak Observatory. Under Alternative 2, the visual quality of the overall site would not be altered. Therefore, operations under Alternative 2 would result in no impact to visual resources.

4.3.3 Alternative 3 – Mothballing of Facilities

4.3.3.1 Alternative 3 Implementation – Visual Resources

Demolition activities under Alternative 3 would be the same as those described for Alternative 1, in that the same buildings would be demolished (Residential House Trailer and Relocatable Housing units, which include the Recreation House). Most of the remaining facilities would be mothballed, which would have negligible impacts on visual resources. Consequently, the impacts to visual resources under Alternative 3 would be the same as those described for Alternative 1 and would result in moderate, beneficial, and long-term impacts to visual resources. Impacts from fugitive dust or traffic would be negligible and short-term, and would not alter the visual quality of the site.

4.3.3.2 Alternative 3 Operations – Visual Resources

Operation activities would be suspended for an undetermined time frame under Alternative 3, thereby eliminating access to the Sacramento Peak Observatory by its current primary viewers, including Sacramento Peak Observatory staff and visitors. However, visual quality of the overall site would remain high and visual resources within the site would be preserved for future viewing. Therefore, Alternative 3 would result in minor, adverse, and short-term impacts to visual resources.

4.3.4 Alternative 4 – Demolition and Site Restoration

4.3.4.1 Alternative 4 Implementation – Visual Resources

Alternative 4 would involve demolition of 59 historic properties that contribute to the NRHP-eligible historic district, resulting in a substantial change to the existing appearance (visual character) of the site. The visual character would change from a science facility situated in a natural setting to solely a natural setting. Demolition activities would remove most manmade facilities, including the DST, and restore the site to a more natural state within the Lincoln National Forest. While the Sacramento Peak Observatory structures would not exist and would not be accessible to visitors or visible in the backdrop of the Tularosa Basin, the natural setting of the site would retain high visual quality, or would potentially become more open and thus more dramatic. This change would result in a moderate, long-term impact because the visual character of the site would be noticeably altered. This impact may be viewed as adverse or beneficial, depending on an individual's preferences. From a visual perspective, this change could be perceived as beneficial impacts to the overall visual quality by returning the area to a more consistently natural environment, or adverse if a viewer enjoys seeing the DST when looking at the Sacramento Peak Observatory from the valley below.

4.3.4.2 Alternative 4 Operations – Visual Resources

Operations would completely cease under Alternative 4. As a result of the lack of operations, the location of the former Observatory would be accessible to new visitors in the area who could enjoy the natural setting and surrounding landscapes. Therefore, Alternative 4 would result in a moderate, long-term impact, which may be viewed as adverse or beneficial, depending on an individual's preferences.

4.3.5 No Action Alternative

Under the No Action Alternative, current activities would continue at the site, and no mothballing or demolition would occur. The visual character of the site would not change and the visual quality of the site would not be altered. Therefore, the No Action Alternative would have no impact to visual resources.

4.3.6 Summary of Impacts

Table 4.3-2 provides a summary of impacts resulting from the Alternatives to visual resources.

TABLE 4.3-2
Summary of Visual Resources Impacts

	Alternatives				
Impact	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Proposed Action Implementation-Related Visual Resources	Moderate, beneficial, long-term impact	Moderate, beneficial, long-term impact	Moderate, beneficial, long-term impact (during mothball period)	Moderate, long-term impact (beneficial or adverse, depending on individual)	No impact
Proposed Action Operation-Related Visual Resources	No impact	No impact	Minor, adverse, short-term impact (during mothball period)	Moderate, long-term impact (beneficial or adverse, depending on individual)	No impact

4.4 Geology and Soils

This section identifies potential direct and indirect impacts to geology and soils that may result from implementing the Alternatives for the Sacramento Peak Observatory site, including the No Action Alternative. The ROI for geology and soils is the Sacramento Peak Observatory site and immediately adjacent areas.

Methodology

Impacts to geologic and soil resources were evaluated by determining the importance or rarity of each resource that would be impacted by the Alternatives. The methods used to determine whether the Alternatives would have impacts on geology and soils are as follows:

- Determine whether implementation of an Alternative would result in impacts to topography, soil resources, or geologic processes or features (e.g., landslides or karst features).
- Evaluate each Alternative to determine its potential for causing the loss of established or potential mineral-bearing resources of economic value. No established potential mineral-bearing resources of economic value are present at the Sacramento Peak Observatory, as evidenced by the lack of mining activities at the site. As described in Section 3.4, *Geology and Soils*, the potential for mineral-bearing resources of economic value present at the Sacramento Peak Observatory is small enough to be discountable.

Table 4.4-1 summarizes the impact thresholds for geology and soil resources.

TABLE 4.4-1
Impact Thresholds for Geology and Soil Resources

Impact Intensity	Description
Negligible	The impact would be below or at the lower levels of detection.
Minor	The Alternative would result in a detectable change to geologic or soil resources; however, the impact would be small, localized, and of little consequence. Changes to the geologic conditions would not threaten human life or property or result in a disturbance of water flow pathways in the underlying karst geology.
Moderate	The Alternative would result in a readily apparent change to geologic or soil resources or over a relatively wide area. However, changes to the geologic conditions would not threaten human life or property.
Major	The Alternative would result in a substantial change to the character or usability of geologic or soil resources, affecting a large area. Changes to the geologic conditions could threaten human life or property.

Duration: **Short-term –** Occurs only during the implementation of the Proposed Action.
Long-term – Continues after the implementation of the Proposed Action.

4.4.1 Alternative 1 – Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding

4.4.1.1 Alternative 1 Implementation – Geology and Soils

Under Alternative 1, the majority of the telescopes and related research and support facilities would continue to be used. Four facilities would be mothballed (John Evans Facility, Grain Bin Telescope, and two Storage buildings) and the Residential House Trailer and Relocatable Housing (including the Recreation House) would be demolished. Mothballing activities involve removing a facility or structure from daily use while maintaining the general condition of equipment and structures, and as such, mothballing activities would not impact topography, soil resources, or underlying geology, including karst features.

Demolition activities would include the removal of structures to approximately 4 feet (1.2 meters) below existing ground surface grade only to enable the restoration of the ground surface topography without limiting future surface operations or activities, resulting in no impacts to topography. Demolition would be expected to result in minor, adverse, short-term impacts to soil resources. Demolition impacts would be limited to surface disturbances and would not impact the underlying geology of the site, including karst features. The following BMPs, in addition to the stormwater BMPs described in Section 4.1.1.3, *Federally and State-Listed Threatened, Endangered, Proposed, and Candidate Species*, would be implemented to avoid or minimize impacts from Alternative 1:

- All demolition would be completed in accordance with industry standard BMPs.
- Ground-disturbing activities would be conducted in a manner that minimizes the alteration of existing topography.

- A spill prevention, control, and countermeasure (SPCC) plan would be developed in coordination with USFS to address risks to karst features and associated groundwater from potential spills. The SPCC plan would address equipment inspections, equipment refueling, equipment servicing and maintenance, equipment washing, and the use and storage of any hazardous materials, chemicals, fuels, lubricating oils, and other petroleum products. In the event of an accidental spill or if contamination of water resources is suspected, a hazardous materials specialist would assess the situation and determine the corrective actions to take, per state and federal standards.
- Before any demolition begins, a geophysical survey would be conducted in accordance with industry standards to inspect designated work areas and note any suspected karst features, including sinkholes, solution cavities, and areas of soil subsidence that could be affected by demolition work. The survey would also evaluate soil stability and the vertical and horizontal projection of sinkholes. These features would be avoided when possible and protected with sandbags, nets, and filter fabric. The identified areas would be monitored during the work for changes such as soil subsidence, collapse, water infiltration, and clogging.
- Previously unknown karst features that are identified during invasive work activities, including subgrade activities, will be addressed as follows:
  - Work would stop within a 100-foot radius of the karst feature and the feature would be assessed to identify its potential for connectivity to and impact on other karst features such as groundwater conduits, surface water conduits, and caves. The assessment method could include visual assessment, geophysical survey, or other techniques for subsurface characterization of karst features.
  - Karst features would be either isolated or temporarily sealed to minimize impacts during demolition work (e.g., blocked with sandbags and protected with baskets, nets, or filter fabric).
  - In the event that a feature cannot be avoided, or project activities are observed to result in changes to the karst features, activities within a 100-foot radius of the feature or change will be stopped and necessary surveys and studies will be completed to determine a path forward that will protect the karst feature.

4.4.1.2 Alternative 1 Operations – Geology and Soils

Under Alternative 1, operations, staffing, and visitation would be comparable to existing conditions, with no anticipated change in the use of the Observatory. Therefore, operations under Alternative 1 would result in no impacts to topography, soil resources, or underlying geology, including karst features.

4.4.2 Alternative 2 – Transition to Partial Operations by Interested Parties with Reduced NSF Funding

4.4.2.1 Alternative 2 Implementation and Operations - Geology and Soils

Geology and soil resource impacts associated with mothballing (14 facilities), demolition (Residential House Trailer and 21 Relocatable Housing units, including the Recreation House), and operations under Alternative 2 would be similar to those described for Alternative 1. Impacts to geology and soils would be the same as those described for Alternative 1 because the level of disturbance would be comparable as the same facilities are proposed to be demolished and there is limited additional disturbance associated with mothballing ten additional facilities. The BMPs developed for Alternative 1 would also apply to Alternative 2.

4.4.3 Alternative 3 – Mothballing of Facilities

4.4.3.1 Alternative 3 Implementation – Geology and Soils

Alternative 3 includes mothballing 45 facilities and demolition of the Residential House Trailer and 21 Relocatable Housing units, including the Recreation House. Mothballing activities involve removing a facility or structure from daily use while maintaining the general condition of equipment and structures, and as such, mothballing activities would not impact topography, soil resources, or underlying geology, including karst features. Impacts to geology and soils would be the same as those described for Alternative 1 because the level of disturbance would be comparable as the same facilities are proposed to be demolished. The BMPs developed for Alternative 1 would also apply to Alternative 3.

4.4.3.2 Alternative 3 Operations – Geology and Soils

Under Alternative 3, operations at the Observatory would cease, with the exception of limited maintenance during the mothball period; therefore, no impacts to local topography, geology, or soil resources are anticipated.

4.4.4 Alternative 4 – Demolition and Site Restoration

4.4.4.1 Alternative 4 Implementation – Geology and Soils

Under Alternative 4, minor, adverse, short-term impacts would occur to site topography from the creation of staging areas for materials and equipment and from the use of equipment during demolition. Following demolition, the structure locations and staging areas would be stabilized and revegetated. The belowgrade structure of DST extends into the ground approximately 220 feet (67 meters). This portion of the structure would be stabilized, filled, and abandoned in place, and the ground surface would be sufficiently domed or capped such that the remaining structure does not accumulate water. Fill material, as required, would be free of contaminants regulated by federal or state laws and would be from a certified weed-free source whenever feasible. If possible, soil used as fill material would be sourced proximal to the site and be of the same soil type.

To avoid or minimize the potential for incidental impacts to soil, the BMPs developed for Alternative 1 would also be implemented during demolition under Alternative 4. Additionally, a Vegetation Restoration

Management Plan would be developed and implemented, in coordination with USFS. Demolition would be expected to result in minor, adverse, short-term impacts to soil resources.

Mechanical, explosive, or a combination of both means could be used to remove the solar telescope building. Any use of explosives would be limited to low-force, shaped charges that are designed to transfer the explosive force only to the structure that is designated for removal. The Sacramento Peak Observatory is underlain by karst limestone and karst features such as sinkholes that could be impacted by demolition activities (including the use of explosives) through alteration, collapse, or spills. The SPCC plan would be developed and implemented to minimize the potential for impacts from accidental spills. All necessary surveys and studies would be completed prior to any blasting activities, and appropriately credentialed and accredited personnel would be used to accomplish the blasting event. A Blast Management Plan would be developed and implemented to identify and control safety and environmental risks associated with blasting. Additionally, the BMPs developed for Alternative 1 would be implemented during demolition under Alternative 4 to limit impacts to underlying geologic resources, including karst features. Impacts to underlying karst features would be moderate, adverse, and long-term although impacts to underlying geologic resources would be minor, adverse, and short-term.

4.4.4.2 Alternative 4 Operations – Geology and Soils

With the exception of select utilities to be maintained and operated by USFS or another entity, there would be no operations following demolition. Continued operation of these utilities by USFS or another entity would be consistent with current utilities O&M and would not result in any impacts to topography, geology, or soil resources.

4.4.5 No Action Alternative

Under the No Action Alternative, no mothballing or demolition activities would occur, and there would be no impact to local topography, geology, geologic and soil resources.

4.4.6 Mitigation Measures

The following is a summary of the BMPs proposed to minimize impacts to geology and soil resources from the Alternatives.

- All Alternatives: A NPDES permit will be obtained from EPA for stormwater discharges associated with the Proposed Action. A SWPPP will be prepared in coordination with USFS as part of the NPDES permit.
- All Alternatives: All demolition would be completed in accordance with industry standard BMPs.
- All Alternatives: Soil-disturbing activities would take place during periods of snow-free and dry conditions. To the extent practicable, heavy equipment will only be used when the soil is relatively dry or frozen.

- All Alternatives: Demolition scheduling would consider the amount and duration of soil exposed to erosion by wind, rainfall, runoff, and vehicle tracking and would seek to minimize disturbed soil area during the rainy season. The sequence of ground-disturbing activities with the installation and maintenance of soil stabilization and sediment control BMPs would be provided in the project's Demolition Plan.
- All Alternatives: In addition to the measures provided in the SWPPP, and where practicable, existing vegetation would be preserved to the maximum extent possible and for as long as possible on the site to reduce erosion in those areas. Erosion control measures would be in place and functional prior to commencement of soil-disturbing activities and would be maintained and remain in place until vegetation is reestablished according to the approved site restoration plan.
- All Alternatives: Equipment will arrive clean and free of weed propagules.
- All Alternatives: Ground-disturbing activities would be conducted in a manner that minimizes the alteration of existing topography.
- All Alternatives: Disturbed areas would be stabilized and revegetated to minimize the potential for erosion after demolition is completed.
- All Alternatives: Soil-disturbing activities would take place during periods of snow-free and dry conditions. To the extent practicable, heavy equipment will only be used when the soil is relatively dry or frozen.
- All Alternatives: An SPCC plan would be developed to address risks to karst features and associated groundwater from potential spills. The SPCC plan would address equipment inspections, equipment refueling, equipment servicing and maintenance, equipment washing, and the use and storage of any hazardous materials, chemicals, fuels, lubricating oils, and other petroleum products. In the event of an accidental spill or if contamination of water resources is suspected, a hazardous materials specialist would assess the situation and determine the corrective actions to take, per state and federal standards.
- All Alternatives: Demolition stormwater controls would be implemented and maintained as required to minimize scour and soil loss from runoff.
- All Alternatives: Before any demolition begins, a geophysical survey would be conducted in accordance with industry standards to inspect designated work areas and note any suspected karst features, including sinkholes, solution cavities, and areas of soil subsidence that could be affected by demolition work. The survey would also evaluate soil stability and the vertical and horizontal projection of sinkholes. These features would be avoided when possible and protected with sandbags, nets, and filter fabric. The identified areas would be monitored during the work for changes such as soil subsidence, collapse, water infiltration and clogging.

- All Alternatives: Previously unknown karst features that are identified during invasive work activities, including subgrade activities, will be addressed as follows:
  - Work would stop within a 100-foot radius of the karst feature and the feature would be assessed to identify its potential for connectivity to and impact on other karst features such as groundwater conduits, surface water conduits, and caves. The assessment method could include visual assessment, geophysical survey, or other techniques for subsurface characterization of karst features.
  - Karst features would be either isolated or temporarily sealed to minimize impacts during demolition work (e.g., blocked with sandbags and protected with baskets, nets, or filter fabric).
  - In the event that a feature cannot be avoided, or activities are observed to result in changes to the karst features, activities within a 100-foot radius of the feature or change will be stopped and necessary surveys and studies will be completed to determine a path forward that will protect the karst feature.
- Alternative 4: Any use of explosives would be limited to low-force, shaped charges that are designed to transfer the explosive force to only the structure that is designated for removal. All necessary surveys and studies would be completed prior to any blasting activities, and appropriately credentialed and accredited personnel would be utilized to accomplish the blasting event. A Blast Management Plan would be developed and implemented to identify and control safety and environmental risks associated with blasting.
- Alternative 4: A Vegetation Restoration Management Plan would be developed and implemented.

4.4.7 Summary of Impacts

Table 4.4-2 provides a summary of geology and soil impacts resulting from the Alternatives.

TABLE 4.4-2
Summary of Geology and Soil Impacts

	Alternatives				
Impacts	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Proposed Action Implementation-Related Topography	No impact	No impact	No impact	Minor, adverse, short-term impact	No impact
Proposed Action Implementation-Related Soils	Minor, adverse, short-term impact	Minor, adverse, short-term impact	Minor, adverse, short-term impact	Minor, adverse, short-term impact	No impact
Proposed Action Implementation-Related Geologic Resources	No impact	No impact	No impact	Minor, adverse, short-term impact	No impact

TABLE 4.4-2
Summary of Geology and Soil Impacts

	Alternatives				
Impacts	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Proposed Action Implementation-Related Karst Features	No impact	No impact	No impact	Moderate, adverse, long-term impact	No impact
Proposed Action Operations-Related Impacts	No impact	No impact	No impact	No impact	No impact

4.5 Groundwater

This section identifies the potential direct and indirect impacts to groundwater resources that may result from implementing the Alternatives for the Sacramento Peak Observatory, including the No Action Alternative. The ROI for groundwater is the Sacramento Peak Observatory and immediately adjacent aquifer recharge areas, including the headwaters of the Sacramento River that occur in the vicinity of the Sacramento Peak Observatory site.

Methodology

The methods used to determine whether the Alternatives would have impacts on groundwater are as follows:

- Evaluate each Alternative to determine the potential for impacts on groundwater because of contamination or substantial alteration of recharge areas.
- Assess the compliance of each Alternative with applicable federal regulations that apply to the protection of groundwater.

Table 4.5-1 summarizes the impact thresholds for groundwater.

TABLE 4.5-1
Impact Thresholds for Groundwater

Impact Intensity	**Description**
Negligible	Changes to groundwater quality and existing recharge area would be below or at the lower levels of detection.
Minor	There would be detectable changes to groundwater quality and/or drainage features; however, the impact would be small, localized, and of little consequence.
Moderate	There would be readily apparent changes to groundwater quality and/or drainage features or would occur over a relatively wide area.
Major	There would be substantial changes to the water quality or usability of groundwater resources, affecting a large area.

Duration **Short-term –** Occurs only during the implementation of the Proposed Action.
Long-term – Continues after the implementation of the Proposed Action.

4.5.1 Alternative 1 – Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding

4.5.1.1 Alternative 1 Implementation – Groundwater

Alternative 1 would involve the transition of full site operations of the Sacramento Peak Observatory to an interested party that would be responsible for future maintenance and upgrade activities at the site. Four facilities would be mothballed (John Evans Facility, Grain Bin Telescope, and two Storage buildings) and the Residential House Trailer and Relocatable Housing, including the Recreation House, would be demolished. Mothballing activities involve removing a facility or structure from daily use while maintaining the general condition of equipment and structures, and as such, mothballing activities would not impact groundwater.

Demolition of the Residential House Trailer and Relocatable Housing, including the Recreation House, would result in ground disturbance in the vicinity of the structures. Potential impacts to groundwater resources could be related to ground-disturbing activities and infiltration of stormwater runoff into aquifers. The BMPs developed to minimize impacts to geology and soils, summarized in Section 4.3.6, *Summary of Impacts*, would also minimize impacts to groundwater resources from stormwater runoff during demolition. Stormwater BMPs would be developed as part of the SWPPP and implemented prior to the start of demolition activities. These activities could include:

- Erosion control measures such as compost blankets, mulching, riprap, geotextile fabrics, and slope drains to protect exposed soil and minimize erosion.
- Use of check dams, slope diversions, and temporary diversion dikes for runoff control.
- Sediment control measures including compost filter berms and socks; fiber rolls or berms; sediment basins, rock dams, filters, chambers, or traps; silt fences; and weed-free hay bales.
- As necessary, water drainage features would be designed to divert water runoff from roads to stabilize vegetated areas.
- Good housekeeping measures during demolition.

With implementation of the BMPs outlined, impacts to groundwater would be minor, adverse, and short-term.

4.5.1.2 Alternative 1 Operations – Groundwater

Under Alternative 1, operations, staffing, and visitation would be comparable to existing conditions, with no anticipated change in the use of the Observatory. Therefore, operations under Alternative 1 would have no impacts to groundwater.

4.5.2 Alternative 2 – Transition to Partial Operations by Interested Parties with Reduced NSF Funding

4.5.2.1 Alternative 2 Implementation and Operations - Groundwater

Groundwater impacts associated with mothballing (14 facilities), demolition (Residential House Trailer and Relocatable Housing, which includes the Recreation House), and operations under Alternative 2 would be similar to those described for Alternative 1. Impacts to groundwater would be the same as those described for Alternative 1 because the level of disturbance would be comparable as the same facilities are proposed to be demolished and there is limited additional disturbance associated with mothballing 10 additional facilities. BMPs described for Alternative 1 would also be implemented under Alternative 2.

4.5.3 Alternative 3 – Mothballing of Facilities

4.5.3.1 Alternative 3 Implementation – Groundwater

Implementation of Alternative 3 would result in demolition of the same structures identified under Alternative 1, and mothballing of all non-utility structures at the Sacramento Peak Observatory. Mothballing activities involve removing a facility or structure from daily use while maintaining the general condition of equipment and structures, and as such, mothballing activities would not impact groundwater. Impacts to groundwater would be the same as those described for Alternative 1 because the level of disturbance would be comparable as the same facilities are proposed to be demolished and there is limited additional disturbance associated with mothballing 41 additional facilities. BMPs described for Alternative 1 would also be implemented under Alternative 3.

4.5.3.2 Alternative 3 Operations – Groundwater

Under Alternative 3, with the exception of select utilities to be maintained and operated by USFS or another entity, operations at the Sacramento Peak Observatory would cease. Continued operation of these utilities would be consistent with current utilities O&M and would not result in any impacts to groundwater.

4.5.4 Alternative 4 – Demolition and Site Restoration

4.5.4.1 Alternative 4 Implementation – Groundwater

Under Alternative 4, potential impacts to groundwater resources would be greater than under the other Alternatives, given the extent of demolition proposed under Alternative 4. Potential impacts to groundwater resources would be directly related to ground-disturbing activities and the management of soil, rock, and stormwater during demolition.

The belowground portion of the tower consists of 3-foot-thick walls, which would remain intact following removal of the aboveground portion of the telescope. A previous study by Souder-Miller Associates suggested using the rubble from the aboveground portion of the concrete tower to fill the belowground portion. Any known contaminants would be removed prior to demolition and use of the rubble as fill material. Depending on aquifer depth and proximity to the site, the area around the edges of the underground portion of the tower could potentially serve as a direct conduit to underground aquifers;

however, there would be no change in this potential as a result of demolition because the underground portion of the tower would remain in place and would be capped. Contaminated media surrounding the tower is not anticipated to be discovered, and not expected to pose a threat for groundwater contamination, even if water traveled along the concrete into an aquifer.

Construction stormwater BMPs would be designed, implemented, and maintained to minimize the downslope movement of soil and to control stormwater, thereby protecting groundwater quality. Impacts could also occur from regrading activities following the removal of the structures and their foundations, and these activities would be completed within a BMP-protected perimeter. Following demolition, the structure locations and staging areas would be stabilized and revegetated. Additionally, the BMPs described for Alternative 1 would also be implemented under Alternative 4. As a result, impacts to groundwater quality from stormwater runoff during demolition would be minor, adverse, and short-term.

4.5.4.2 Alternative 4 Operations – Groundwater

With the exception of select utilities to be maintained and operated by USFS or another entity, there would be no operations following demolition. Continued operation of these utilities would be consistent with current utilities O&M and would not result in any impacts to groundwater.

4.5.5 No Action Alternative

Under the No Action Alternative, no mothballing or demolition activities would occur. Therefore, there would be no impacts to groundwater.

4.5.6 Mitigation Measures

The following is a summary of the BMPs proposed to minimize impacts to groundwater:

- All Alternatives: Before demolition begins, a geophysical survey would be conducted to inspect designated work areas and note any suspect karst features that could be affected by demolition work. These features would be avoided when possible and protected with sandbags, nets, and filter fabric. The identified areas would be monitored during the work for changes such as soil subsidence, collapse, water infiltration, and clogging.
- All Alternatives: Stormwater BMPs would be implemented prior to the start of demolition activities. Erosion control measures such as compost blankets, mulching, riprap, geotextile fabrics, and slope drains could be used to protect exposed soil and minimize erosion. BMPs such as check dams, slope diversions, and temporary diversion dikes could be implemented for runoff control. Sediment control measures that could be implemented include compost filter berms and socks; fiber rolls or berms; sediment basins, rock dams, filters, chambers, or traps; silt fences; and weed-free hay bales. As necessary, water drainage features would be designed to divert water runoff from roads to stabilize vegetated areas. Good housekeeping measures would be practiced during demolition. Site-specific

stormwater BMPs would be detailed in a SWPPP, which would be prepared before ground-disturbing activities begin.

- All Alternatives: An SPCC plan would be developed for the project to address risks to groundwater from potential spills. The SPCC plan would address equipment inspections, equipment refueling, equipment servicing and maintenance, equipment washing, and the use and storage of any hazardous materials, chemicals, fuels, lubricating oils, and other petroleum products.
- All Alternatives: Previously unknown karst features that are identified during invasive work activities, including subgrade activities, will be addressed as follows:
  - Work would stop within a 100-foot radius of the feature and the feature would be assessed to identify its potential for connectivity to and impact on other karst features such as groundwater conduits and surface water recharge conduits. The assessment method could include visual assessment, geophysical survey, or other techniques for subsurface characterization of karst features.
  - The karst feature would be either isolated or temporarily sealed to minimize impacts during demolition work (e.g., blocked with sandbags, protected with baskets, nets, or filter fabric).
  - Any use of explosives (Alternative 4 only) would be limited to low-force charges designed to transfer the explosive force only to the structure that is designated for removal.

4.5.7 Summary of Impacts

Table 4.5-2 provides a summary of groundwater impacts resulting from the Alternatives.

TABLE 4.5-2
Summary of Groundwater Impacts

	Alternatives				
Impacts	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Proposed Action Implementation – Groundwater	Minor, adverse short-term impact	Minor, adverse short-term impact	Minor, adverse short-term impact	Minor, adverse short-term impact	No impact
Proposed Action Operations – Groundwater	No impact	No impact	No impact	No impact	No impact

4.6 Hazardous Materials

This section describes the potential impacts related to hazardous materials, including hazardous waste within the ROI. The ROI for hazardous materials is defined as the area within the Sacramento Peak Observatory, adjoining properties, and a 1-mile search area. As applicable, handling and disposal of all hazardous and nonhazardous solid waste shall be done in accordance with the Resource Conservation and Recovery Act.

Methodology

The method used to determine whether the Alternatives would have impacts related to hazardous materials is as follows:

- Existing and past actions were reviewed and evaluated with respect to the production and management of hazardous waste to identify the potential impact of each Alternative on the use and disposal of hazardous materials.

Table 4.6-1 summarizes the impact thresholds for hazardous materials.

TABLE 4.6-1
Impact Thresholds for Hazardous Materials

Impact Intensity	Description
Negligible	The Alternative would result in a change (beneficial or adverse) so small that it would not be of measurable or perceptible consequence.
Minor	The Alternative would result in a perceptible change to hazardous material contamination, but the change (beneficial or adverse) would be small and remain onsite.
Moderate	The Alternative would result in a measurable and consequential change to hazardous material contamination.
Major	The Alternative would result in a substantial change to hazardous material contamination; the change (beneficial or adverse) would be measurable and result in a severely adverse or major beneficial impact.

Duration: Short-term – Occurs only during the implementation of the Proposed Action.
Long-term – Continues after the implementation of the Proposed Action.

4.6.1 Alternative 1 – Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding

4.6.1.1 Alternative 1 Implementation – Hazardous Materials

Under Alternative 1, the majority of the telescopes and related research and support facilities would be kept and maintained and the interested parties would be responsible for future maintenance and future upgrades.

Four facilities (John Evans Facility, Grain Bin Telescope, and two Storage buildings) would be placed in a mothballed condition so that the facilities could be made operational in the future for scientific or other purposes. Chemicals and hazardous materials associated with the mothballed facilities would be removed from the site, which would require transport, temporary storage, and disposal of these materials.

Demolition of the Residential House Trailer and Relocatable Housing (including the Recreation House) would involve disconnecting utilities, demolishing the structures, and transporting the waste materials offsite for disposal at a permitted solid waste facility, which could require the temporary transport of hazardous materials, if such materials are identified in these structures as assumed. Prior to implementing Alternative 1, an assessment to determine the extent of hazardous building materials, such as ACM and

LBP, would be performed for the facilities to be demolished under this Alternative. All friable ACM identified during survey would be removed and disposed of in accordance with local, state, and federal regulations. As necessary, abatement work would include establishing roll-off bins, emergency shower units, portable toilets, and other onsite small equipment and safety facilities, and establishing curtained enclosures for containment of airborne contaminants and worker safety as required by applicable federal and/or state regulations. Waste management and materials pollution control BMPs would be designed to limit or reduce potential pollutants at their source before they come in contact with stormwater. Non-friable ACM and building materials contaminated with asbestos or LBP would be managed and disposed in accordance with federal and state regulations. Personnel involved with removal and disposal of ACM and LBP would be properly trained and certified, and supported by appropriate personal protective equipment (PPE). Specialized equipment would be used according to industry standards to minimize the exposure risk associated with removal and proper disposal of these materials.

Prior to demolition, the demolition contractors would prepare a Demolition Management Plan in coordination with USFS that would prescribe activities for workers to follow in the event that unexpected contamination is encountered. The Demolition Management Plan would be implemented during demolition activities and would include, at a minimum, a list of contact persons in case of discovery of undocumented contamination; provisions for immediate notification of the observation to the demolition management team; and notification of the regulatory agency with jurisdiction, if required. If previously unknown contamination is found, demolition would halt in the vicinity of the find and the next steps would be determined in consultation with the appropriate regulatory agency.

- Contractors would develop a spill response plan in coordination with USFS for managing hazardous materials onsite and transporting hazardous materials. This plan would be implemented during demolition activities.
- Accidental spills or releases associated with the transport, temporary storage, and disposal of hazardous materials could occur during mothballing or demolition that could create a hazard to public health and the environment. Hazardous materials would be transported, stored, and disposed in compliance with applicable laws and regulations. Identification, generation, transportation, storage, treatment, and disposal of hazardous materials and hazardous wastes would be conducted in compliance with federal and state regulations. With implementation of mitigation measures and a spill response plan, impacts to the environmental integrity of areas within the ROI from hazardous materials would be minor, adverse, and short-term. These measures include site characterization and removal or remediation of ACM, LBP, or other hazardous building materials that would be completed prior to demolition of structures designated for removal.

- As necessary, abatement work would include establishing roll-off bins, emergency shower units, portable toilets, and other onsite small equipment and safety facilities, and establishing curtained enclosures for containment of airborne contaminants and worker safety as required by applicable federal and/or state regulations.
- Waste management and materials pollution control BMPs would be designed to limit or reduce potential pollutants at their source before they come in contact with stormwater. Pollutants such as LBP would be properly contained.
- During demolition, hazardous materials and wastes would be used, stored, transported, and disposed of in compliance with applicable laws and regulations.
- Fill material, as required, would be free of contaminants regulated by state or federal laws and would be from a certified weed-free source whenever feasible. If possible, soil used as fill material would be sourced proximal to the site and be of the same soil type.
- NSF would require all demolition contractors to create and implement a Demolition Management Plan that would include, at a minimum, a list of contact persons in case of a possible encounter with undocumented contamination; provisions for immediate notification of the observation to construction management; and notification of the regulatory agency with jurisdiction. If previously unknown contamination is found, demolition would halt in the vicinity of the find and the next steps would be decided in consultation with the regulatory agency. In addition, a related Health and Safety Plan (including compliance with Occupational Health and Safety Act of 1970 [OSHA] safety protocols) would be developed in coordination with USFS and would be implemented.

4.6.1.2 Alternative 1 Operations – Hazardous Materials

Chemicals and hazardous materials typically used for building maintenance, operation of scientific equipment, landscaping, water treatment, fuel, and vehicle maintenance are currently used by the Sacramento Peak Observatory. The majority of hazardous materials and petroleum products are stored in the Oil Storage Building (which is proposed to be removed as part of all Alternatives) or in aboveground storage tanks. Details regarding the aboveground storage tanks are provided in Appendix 3D. Additional mercury not currently used in DST is stored in the Mercury Storage Building. Lesser quantities of products are stored in appropriate lockers for flammable materials at buildings where they were intended to be used (CH2M, 2016). Materials are used, stored, and disposed of in accordance with federal and state regulations.

Chemicals and hazardous materials used for operation of the mothballed or demolished facilities would no longer be needed for site operations. Overall, the use of chemicals and hazardous materials during operations would be reduced under Alternative 1. It is assumed that the future manager of the site would comply with the requirements of federal and state regulations; therefore, impacts to the environmental

integrity of areas within the ROI from hazardous materials from future operations are expected to be negligible, beneficial, and long-term.

4.6.2 Alternative 2 – Transition to Partial Operations with Interested Parties

4.6.2.1 Alternative 2 Implementation – Hazardous Materials

Compared to Alternative 1, Alternative 2 would result in demolition of the same structures and mothballing of an additional 10 facilities, including the Machine/Electronics Shop and the Welding Shop. Implementation of Alternative 2 would therefore require removal and disposal of additional potential hazardous materials (solvents, lubricants, etc.) and an associated greater risk of accidental leaks, spills, or releases of potential contaminants compared to Alternative 1.

BMPs described for Alternative 1 would also be implemented under Alternative 2. With implementation of the BMPs and implementation of a spill response plan, impacts to the environmental integrity of areas within the ROI from hazardous materials would be minor, adverse, and short-term.

4.6.2.2 Alternative 2 Operations – Hazardous Materials

Operations impacts related to Alternative 2 would be less than those for Alternative 1, since more materials would be removed during its implementation. It is assumed that the future manager of the site would comply with the requirements of federal and state regulations; therefore, impacts to the environmental integrity of areas within the ROI from hazardous materials from future operations are expected to be negligible, beneficial, and long-term.

4.6.3 Alternative 3 – Mothballing of Facilities

4.6.3.1 Alternative 3 Implementation – Hazardous Materials

Compared to Alternative 1, Alternative 3 would result in demolition of the same structures and mothballing of all non-utility structures at the Observatory. Implementation of Alternative 3 would therefore require removal and disposal of additional potential hazardous materials (solvents, lubricants, etc.) and an associated greater risk of accidental leaks, spills or releases of potential contaminants compared to Alternative 1.

BMPs described for Alternative 1 would also be implemented under Alternative 3. With implementation of the BMPs and implementation of a spill response plan, impacts to the environmental integrity of areas within the ROI from hazardous materials would be minor, adverse, and short-term.

4.6.3.2 Alternative 3 Operations – Hazardous Materials

Operations impacts related to Alternative 3 would be less than those for Alternative 1, since more materials would be removed during its implementation. It is assumed that the future manager of the site would comply with the requirements of federal and state regulations; therefore, impacts to the environmental integrity of areas within the ROI from hazardous materials from future operations (during the mothball period) are expected to be negligible, beneficial, and long-term.

4.6.4 Alternative 4 – Demolition and Site Restoration

4.6.4.1 Alternative 4 Implementation – Hazardous Materials

Prior to implementing Alternative 4, an assessment to determine the extent of hazardous building materials, such as ACM and LBP, would be performed for the facilities to be demolished under this Alternative. All friable ACM identified during survey would be removed and disposed of in accordance with local, state, and federal regulations. As necessary, abatement work would include establishing roll-off bins, emergency shower units, portable toilets, and other onsite small equipment and safety facilities, and establishing curtained enclosures for containment of airborne contaminants and worker safety as required by applicable federal and/or state regulations. Waste management and materials pollution control BMPs would be designed to limit or reduce potential pollutants at their source before they come in contact with stormwater. Pollutants such as LBP would be properly contained. Non-friable ACM and building materials contaminated with asbestos or LBP would be managed and disposed in accordance with federal and state regulations. Personnel involved with removal and disposal of ACM and LBP would be properly trained and certified, supported by appropriate PPE, and would follow the demolition Health and Safety Plan (including compliance with OSHA safety protocols) to be developed for the project. Specialized equipment would be utilized according to industry standards to minimize the exposure risk associated with removal and proper disposal of these materials. Remediation of hazardous building materials associated with the facilities would result in a minor, long-term, beneficial impact to the site.

The presence of contaminated soil and/or groundwater associated with the RECs and areas of concern identified in the 2016 EBS would be determined through a Phase II Environmental Site Assessment prior to the demolition, which would involve surface and subsurface investigations to identify the presence of potential contaminants. If concentrations of contaminants exceed regulatory limits, additional investigations would be needed to define the extent of the contamination. Remediation, if required based on the results of the Phase II Environmental Site Assessment and subsequent investigations, would require transport, temporary storage, and disposal of impacted and potentially hazardous materials. As part of the Phase II Environmental Site Assessment a complete inventory of the hazardous materials known to be present at the Observatory would be completed. These materials would be properly managed and disposed of in accordance with local, state, and federal regulations. A minor, long-term, beneficial impact would result from the removal and proper disposal of hazardous materials currently stored onsite. The remediation of the potential existing soil and groundwater contamination would result in a minor, beneficial, long-term impact at the site, commensurate with the severity of contamination to be remediated.

Alternative 4 would require transport, use, temporary storage, and disposal of hazardous materials and wastes during demolition activities. Hazardous materials commonly used at demolition sites, such as diesel fuel, lubricants, paints and solvents, and cement products containing basic or acidic chemicals, may be used. Additionally, explosive materials in the form of shaped charges would be used for blasting associated

with demolition of the aboveground portion of DST. Hazardous wastes generated during demolition would include fuel and lubricant containers, paint and solvent containers, and cement products.

Accidental spills or releases associated with the temporary transport, storage, use, and disposal of hazardous materials and wastes could occur during demolition and remediation efforts. However, hazardous materials and wastes would be used, stored, disposed of, and transported in compliance with applicable laws and regulations. Identification, generation, transportation, storage, treatment, and disposal of hazardous materials and hazardous wastes would be conducted in compliance with federal and state regulations and the site-specific plan prepared for the Proposed Action.

Any use of explosives during demolition of the aboveground portion of DST would be limited to low-force, shaped charges that are designed to transfer the explosive force to only the structure that is designated for removal. All necessary surveys and studies would be completed prior to any blasting activities, and appropriately credentialed and accredited personnel would be utilized to accomplish each blasting event. A Blast Management Plan would be developed and implemented to identify and control safety and environmental risks associated with blasting.

In addition, demolition of DST would require the removal, transportation, temporary storage, and long-term storage of approximately 8 to 10 metric tons of mercury and the additional mercury not currently used in DST that is stored in the Mercury Storage Building. A specialized contractor would be required to safely remove the mercury from the seal, float and swivel, and neutralize residual mercury from these bearings, before arranging its proper storage, transport and disposal. The contractor would follow the Mercury Management Plan which would be developed for the Proposed Action.

Federal regulations prohibit federal agencies from conveying, selling, or distributing metallic mercury under the control or jurisdiction of the federal agency to any other federal agency, any state or local government agency, or any private individual or entity, unless it is a transfer to allow long-term storage of the mercury. The U.S. Department of Energy (DOE) is developing and obtaining permits for a long-term mercury storage facility. Until that facility is permitted, metallic mercury can be sent for storage at one of the permitted private facilities that has been listed with DOE. The private facility would transfer the mercury to the final DOE facility after the DOE facility is permitted. At this time, the specific facility to which the mercury would be taken for temporary storage is undetermined. A qualified contractor would be used to transport the mercury, and any necessary studies would be completed, including analysis of transportation routes to minimize the use of high-risk transport areas and heavily populated areas. In addition, all appropriate regulatory restrictions would be followed. This information would be compiled into the Mercury Management Plan which would be developed for the Proposed Action.

The use of explosives and removal, transportation, temporary storage, and long-term storage of mercury increases the risk for adverse impact to the ROI from hazardous materials during demolition. However,

by following the measures in the Blast Management Plan, Mercury Management Plan, Demolition Management Plan, demolition Health and Safety Plan (including compliance with OSHA safety protocols), and other applicable plans, the risk of adverse environmental impacts will be minimized. In the event that hazardous materials are released during demolition, affected media will be properly remediated and/or removed and disposed. Risks to individual resources (e.g., geologic resources and groundwater) are described in the respective sections of this document.

In addition to the BMPs described for Alternative 1, the following mitigation measures would be implemented under Alternative 4:

- Site characterization and removal or remediation of contamination would be completed prior to demolition.
- Develop and implement a Mercury Management Plan addressing the handling, removal, transportation, storage, and disposal/recycling of mercury.
- Develop and implement a Blast Management Plan to identify and control safety and environmental risks associated with explosive blasting. Explosive materials would be used in accordance with federal, state, and local regulations pertaining to explosives (29 C.F.R. §1926.900).

With implementation of the prescribed BMPs and mitigation measures, impacts to the environmental integrity of areas within the ROI from releases of hazardous materials would be minor, adverse, and short-term.

4.6.4.2 Alternative 4 Operations – Hazardous Materials

Alternative 4 involves the demolition of the majority of structures at the Sacramento Peak Observatory, with the exception of select utilities to be maintained and operated by USFS or another entity. Chemicals and hazardous materials typically used for building maintenance, operation of scientific equipment, landscaping, water treatment, fuel, and vehicle maintenance would no longer be used. These materials would be removed from the site and disposed in accordance with federal and state regulations. A limited amount of hazardous waste removal and transport would likely be required. There would be a moderate, beneficial, long-term impact expected from the reduction in the use and storage of hazardous materials at the Sacramento Peak Observatory.

4.6.5 No Action Alternative

The No Action Alternative is the continuation of the current operation of the Sacramento Peak Observatory. Under the No Action Alternative, current activities, including proper management of hazardous materials would continue, and mothballing or demolition would not occur. Consequently, there would be no additional impacts associated with existing contamination and the use of hazardous materials compared to current operations.

4.6.6 Mitigation Measures

The following is a summary of the BMPs for hazardous materials related to the Alternatives:

- All Alternatives: Site characterization and removal or remediation of ACM, LBP, or other hazardous building materials would be completed prior to demolition of structures designated for removal.
- All Alternatives: As necessary, abatement work would include establishing roll-off bins, emergency shower units, portable toilets, and other onsite small equipment and safety facilities, and establishing curtained enclosures for containment of airborne contaminants and worker safety as required by applicable federal and/or state regulations.
- All Alternatives: Waste management and materials pollution control BMPs would be designed to limit or reduce potential pollutants at their source before they come in contact with stormwater. Pollutants such as LBP would be properly contained.
- All Alternatives: During demolition, hazardous materials and wastes would be used, stored, transported, and disposed of in compliance with applicable laws and regulations.
- All Alternatives: Contractors would create and implement a spill response plan for managing hazardous materials onsite and transporting hazardous materials.
- All Alternatives: Fill material, as required, would be free of contaminants regulated by state or federal laws and would be from a certified weed-free source whenever feasible. If possible, soil used as fill material would be sourced proximal to the site and be of the same soil type.
- All Alternatives: NSF would require all demolition contractors to create and implement a Demolition Management Plan that would include, at a minimum, a list of contact persons in case of a possible encounter with undocumented contamination; provisions for immediate notification of the observation to construction management; and notification of the regulatory agency with jurisdiction. If previously unknown contamination is found, demolition would halt in the vicinity of the find and the next steps would be decided in consultation with the regulatory agency. In addition, a related Health and Safety Plan (including compliance with OSHA safety protocols) would be developed and implemented for the project.
- Alternative 4: Site characterization and removal or remediation of contamination would be completed prior to implementing the Alternative.
- Alternative 4: A Mercury Management Plan would be developed and implemented, addressing the handling, removal, transportation, storage, and disposal/recycling of mercury.
- Alternative 4: A Blast Management Plan would be developed and implemented, identifying and controlling safety and environmental risks associated with explosive blasting. Explosive materials

would be used in accordance with federal, state, and local regulations pertaining to explosives (29 C.F.R. §1926.900).

4.6.7 Summary of Impacts

Table 4.6-2 provides a summary of impacts resulting from the Alternatives.

TABLE 4.6-2
Summary of Impacts from Hazardous Materials

Impacts	Alternatives				
	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Proposed Action Implementation – Related Hazardous Materials	Minor, adverse, short-term impact	Minor, adverse, short-term impact	Minor, adverse, short-term impact	Minor, adverse, short-term impact	No impact
Proposed Action Operations – Related Hazardous Materials	Negligible, beneficial, long-term impact	Negligible, beneficial, long-term impact	Negligible, beneficial, long-term impact (during mothball period)	Moderate, beneficial, long-term impact	No impact

4.7 Solid Waste

This section describes the potential impacts related to solid waste for each of the Alternatives. The ROI for solid waste includes the Sacramento Peak Observatory and the demolition materials landfill.

Methodology

The methods used to determine whether the Alternatives would have impacts related to solid waste are as follows:

- Quantify the estimated amount of solid waste associated with each Alternative.
- Determine whether the Otero-Greentree Regional Landfill has confirmed capacity to receive the amount of solid waste estimated to be generated under each Alternative. The Otero-Greentree Regional Landfill is not located on USFS lands.

Table 4.7-1 presents the impact thresholds for solid waste.

TABLE 4.7-1
Impact Thresholds for Solid Waste

Impact Intensity	Intensity Description
Negligible	The Proposed Action would result in a change that would be so small that it would not be of any measurable or perceptible consequence to the capacity of the local landfills.
Minor	The solid waste generated from the Proposed Action would be an increase from current conditions, but would be within the capacity of local landfills.
Moderate	The solid waste generated from the Proposed Action would be a significant increase from current conditions, but would be within the capacity of local landfills.
Major	The solid waste generated from the Proposed Action would be a significant increase from current conditions, and would result in an exceedance of capacity at local landfills.

Duration: **Short-term –** Occurs only during the implementation of the Proposed Action.
Long-term – Continues after the implementation of the Proposed Action.

4.7.1 Alternative 1 – Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding

4.7.1.1 Alternative 1 Implementation – Solid Waste

Solid waste would be generated under Alternative 1 during mothballing activities at four facilities (John Evans Facility, Grain Bin Telescope, and two Storage buildings) and demolition of the Residential House Trailer and Relocatable Housing (including the Recreation House). Table 4.7-2 provides a summary of the estimated volume of solid waste that would be generated under Alternative 1.

TABLE 4.7-2
Estimated Demolition Solid Waste Volume - Alternative 1

	Metric Tons	Cubic Meters
Demolition Debris [a]	360	378
Asbestos Abatement	120	126
LBP	10	11
Universal Waste	5	5
Electrical Equipment/Goods [b]	5	5
Liquid Waste, Non-Specific	5	5
Salvage/Recycle – Non-Ferrous	10	11
Salvage/Recycle – Ferrous	10	11
Total	**525**	**552**

[a] All concrete, masonry and pavement materials would be sized/crushed to 3 inches minus and would be used during restoration (fill and contouring) or available for offsite beneficial reuse.

[b] Petroleum products would be recycled. Household waste, paint, etc., would be landfilled.

When possible, materials such as soil from grading would be used onsite**.** A portion of the debris would be diverted from landfills through reuse and recycling.

Based on these estimates, the total quantity of demolition-related waste from Alternative 1 would be approximately 525 metric tons before reuse or recycling, or less than 1 percent of the landfill's annual receipts. The Otero-Greentree Regional Landfill has confirmed capacity to receive this quantity of solid waste. Based on the remaining capacity and annual receipts of the landfill, this amount of waste would shorten the anticipated 20.5-year lifespan of the landfill by less than 3 working days. Because the solid waste to be sent to the landfill would be a small percentage of the landfill's annual receipts and would not result in an exceedance of the landfill's current capacity, implementation of Alternative 1 would result in a minor, adverse, long-term impact to the landfill's capacity.

4.7.1.2 Alternative 1 Operations – Solid Waste

Operations-related waste generation is typically based on the number of staff working at a facility and visitors to the facility. The number of staff at the Sacramento Peak Observatory is not expected to change under Alternative 1; therefore, the amount of waste generated during operations under Alternative 1 is

assumed to be the same amount as under the current conditions. It is also assumed that the interested parties at the Sacramento Peak Observatory would continue to implement solid waste management and waste reduction, including recycling programs, to minimize the amount of waste from operations going to the landfills. Based on these assumptions, operation-related solid waste generated as part of Alternative 1 would not result in additional impact on the landfill's capacity.

4.7.2 Alternative 2 – Transition to Partial Operations by Interested Parties with Reduced NSF Funding

4.7.2.1 Alternative 2 Implementation and Operations – Solid Waste

Solid waste volumes generated during mothballing (14 facilities), demolition (Residential House Trailer and Relocatable Housing, including the Recreation House), and operations under Alternative 2 would be similar to those described for Alternative 1 because the same facilities are proposed to be demolished and there would be limited additional solid waste associated with mothballing 10 additional facilities. Solid waste volumes generated during operations would be the same as those described for Alternative 1, since operations activities would be essentially the same. Based on these assumptions, implementation of Alternative 2 would result in a minor, adverse, long-term impact to the landfill's capacity. Operation-related solid waste generated as part of Alternative 2 would not result in additional impact to the landfill's capacity.

4.7.3 Alternative 3 – Mothballing of Facilities

4.7.3.1 Alternative 3 Implementation – Solid Waste

Under Alternative 3, solid waste associated with operations and visitors (approximately 15,000 visitors per year) would cease. All solid waste generated during the implementation of Alternative 3 would be associated with mothballing (45 facilities) and demolition (Residential House Trailer only). Demolition of the Residential House Trailer would involve disconnecting utilities, demolishing the structure, and transporting the waste materials offsite for disposal at the Otero-Greentree Regional Landfill. Table 4.7-3 provides a summary of the estimated solid waste volume that would be generated under Alternative 3.

When possible, materials such as soil from grading would be used onsite**.** A portion of the debris would be diverted from landfills through reuse and recycling.

Based on these estimates, the total quantity of waste from Alternative 3 would be less than 2 metric tons before reuse or recycling, or significantly less than 1 percent of the landfill's annual receipts. The Otero-Greentree Regional Landfill has confirmed capacity to receive this quantity of solid waste. Based on the remaining capacity and annual receipts of the landfill, this amount of waste would shorten the anticipated 20.5-year lifespan of the landfill by less than 1 working day. Because the solid waste to be sent to the landfill would be a small percentage of the landfill's annual receipts and would not result in an exceedance of the landfill's current capacity, implementation of Alternative 3 would result in a minor, adverse, long-term impact to the landfill's capacity.

TABLE 4.7-3
Estimated Demolition Solid Waste Volume - Alternative 3

	Metric Tons	Cubic Meters
Demolition Debris [a]	1	11
Asbestos Abatement	<1	1
LBP	<1	1
Universal Waste	<1	1
Electrical Equipment/Goods [b]	<1	1
Liquid Waste, Non-Specific	<1	1
Salvage/Recycle – Non-Ferrous	<1	1
Salvage/Recycle – Ferrous	<1	1
Total	**<2**	**18**

[a] All concrete, masonry and pavement materials would be sized / crushed to 3 inches minus and would be used during restoration (fill and contouring) or available for offsite beneficial reuse.

[b] Petroleum products would be recycled. Household waste, paint, etc. would be landfilled.

4.7.3.2 Alternative 3 Operations – Solid Waste

Under Alternative 3, solid waste associated with Sacramento Peak Observatory operations and visitors would cease for an undetermined amount of time. As a result of the elimination of operations and visitor solid waste during mothballing, Alternative 3 would be expected to result in a reduction in the volume of solid waste that is sent to the landfill, and would therefore have a negligible, beneficial, long-term impact (during the mothball period) to the landfill's capacity.

4.7.4 Alternative 4 – Demolition and Site Restoration

4.7.4.1 Alternative 4 Implementation – Solid Waste

Under Alternative 4, the majority of aboveground structures would be removed and demolished, with belowground structures and foundations stabilized, filled, and abandoned in place, with the exception of select utilities to be maintained and operated by USFS or another entity. Table 4.7-4 provides a summary of the estimated solid waste volumes that would be generated under Alternative 4.

TABLE 4.7-4
Estimated Demolition Solid Waste Volume - Alternative 4

	Metric Tons	Cubic Meters
Demolition Debris [a]	4,220	4,431
Asbestos Abatement	240	252
LBP	40	42
Universal Waste	40	42
Electrical Equipment/Goods [b]	40	42
Liquid Waste, Non-Specific	100	105

TABLE 4.7-4
Estimated Demolition Solid Waste Volume - Alternative 4

	Metric Tons	Cubic Meters
Salvage/Recycle – Non-Ferrous	160	168
Salvage/Recycle – Ferrous	1,200	1,260
Total	**6,040**	**6,342**

[a] All concrete, masonry and pavement materials would be sized/crushed to 3 inches minus and would be used during restoration (fill and contouring) or available for offsite beneficial reuse.

[b] Petroleum products would be recycled. Household waste, paint, etc. would be landfilled.

When possible, materials such as soil from grading would be used onsite. A portion of the debris would be diverted from landfills through reuse and recycling.

Based on the estimates, the total quantity of waste from Alternative 4 would be approximately 6,040 metric tons before reuse or recycling, or approximately 10.5 percent of the landfill's annual receipts. When possible, materials such as soil from grading would be used onsite**.** A portion of the debris would be diverted from landfills through reuse and recycling. The Otero-Greentree Regional Landfill has confirmed capacity to receive this quantity of solid waste. Based on the remaining capacity and annual receipts of the landfill, this amount of waste would shorten the anticipated 20.5-year lifespan of the landfill by about 28 working days. Because the solid waste to be sent to the landfill would be a more than 10 percent increase of the landfill's annual receipts but would not result in an exceedance of the landfill's current capacity, implementation of Alternative 4 would result in a moderate, adverse, long-term impact to the landfill's capacity.

4.7.4.2 Alternative 4 Operations – Solid Waste

Operations-related waste generation would essentially cease under Alternative 4, as the utility buildings and structures to remain are not significant sources of solid waste. Consequently, there would be a reduction in the volume of solid waste that is sent to the landfill, and Alternative 4 would have a negligible, beneficial, long-term impact on the landfill's capacity.

4.7.5 No Action Alternative

Under the No Action Alternative, current activities would continue at the Sacramento Peak Observatory, and no mothballing or demolition would occur. Because there would be no change from current conditions, the No Action Alternative would not result in additional impact on the landfill's capacity.

4.7.6 Mitigation Measures

The following is a summary of the BMPs for solid waste related to the Alternatives:

- All Alternatives: Whenever possible, demolition debris (such as concrete, masonry, etc.) would be used onsite.
- All Alternatives: Demolition debris would be diverted from the landfill through reuse and recycling to the extent practicable.

4.7.7 Summary of Impacts

Table 4.7-5 provides a summary of impacts resulting from the Alternatives.

TABLE 4.7-5
Summary of Solid Waste Impacts on the Receiving Landfill's Capacity

	Alternatives				
Impact Category	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Proposed Action Implementation-Related Solid Waste	Minor, adverse, long-term impact	Minor, adverse, long-term impact	Minor, adverse, long-term impact	Moderate, adverse, long-term impact	No impact
Proposed Action Operations-Related Solid Waste	No impact	No impact	Negligible, beneficial, long-term impact (during mothball period)	Negligible, beneficial, long-term impact	No impact

4.8 Health and Safety

This section describes the potential short- and long-term impacts to health and safety within the ROI of the Sacramento Peak Observatory as a result of implementing the Alternatives.

The ROI for the health and safety analysis is defined as follows:

- Public Safety – The Sacramento Peak Observatory and along the potential route to the demolition materials landfill.
- Occupational Health – The Sacramento Peak Observatory and along the potential route to the demolition materials landfill.
- Protection of Children – The land within 0.5-mile of the Sacramento Peak Observatory and 0.5 mile around the roadway network leading from the Sacramento Peak Observatory along the potential route to the demolition materials landfill.

Methodology

The methods used to determine whether the Alternatives would have impacts related to health and safety are as follows:

- Identify potential impacts to health and safety for the Alternatives and evaluate the impacts with respect to public safety, occupational health, and the protection of children.

- Assess the compliance of each Alternative with applicable federal regulations that apply to health and safety, with specific focus on E.O. 13045 and OSHA.

Table 4.8-1 presents the impact thresholds for health and safety.

TABLE 4.8-1
Impact Thresholds for Health and Safety

Impact Intensity	Intensity Description
Negligible	Potential impacts to health and safety would be so small they would not be measurable or of perceptible consequence.
Minor	Potential impacts would result in a change to public safety, occupational health, and protection of children, but the change would be small and localized.
Moderate	Potential impacts would result in a measurable and consequential change to public safety, occupational health, and protection of children.
Major	Potential impacts would result in a substantial change to public safety, occupational health, and protection of children; the change would be measurable and result in a severe impact.

Duration: **Short-term –** Occurs only during the implementation of the Proposed Action.
Long-term – Continues after the implementation of the Proposed Action.

4.8.1 Alternative 1 – Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding

4.8.1.1 Alternative 1 Implementation – Public Safety

Under Alternative 1, the majority of the telescopes and related research and support facilities would continue to be used. Four facilities would be mothballed (John Evans Facility, Grain Bin Telescope, and two Storage buildings) and the Residential House Trailer and Relocatable Housing (including the Recreation House) would be demolished. Mothballing activities involve removing a facility or structure from daily use while maintaining the general condition of equipment and structures, and as such, mothballing activities would not impact public safety. Demolition sites would be fenced off and the general public would not have access to the site. Airborne matter, such as fugitive dust and asbestos fibers generated during demolition, may pose risks to public safety. However, BMPs developed and implemented under Alternative 1 would eliminate or reduce the associated impacts. These BMPs include development and implementation of a Demolition Health and Safety Plan, compliance with OSHA safety protocols, a maintenance and security program for mothballed facilities, and use of fencing and signage around demolition. Public safety concerns related to transporting demolition waste along public roadways would be limited by the number of haul-truck trips required (estimated to be 30 trips) to transport demolition waste to the demolition materials landfill. Even though the traffic increases associated with the transport of demolition debris are expected to be negligible and short-term, an increased number of large trucks along the potential route to the demolition materials landfill would represent a minor, short-term impact to public safety. A Traffic Management Plan outlining measures to reduce potential traffic-related

safety issues would be developed in coordination with USFS and implemented during demolition activities.

Considering the increased activity at the Sacramento Peak Observatory, use of heavy equipment for demolition, and the limited increase in traffic, Alternative 1 would have a minor, adverse, short-term impact to public safety.

4.8.1.2 Alternative 1 Operations – Public Safety

Under Alternative 1, operations, staffing, and visitation would be comparable to existing conditions, with no anticipated change in the use of the Sacramento Peak Observatory. Therefore, operations under Alternative 1 would have no impacts to public safety.

4.8.1.3 Alternative 1 Implementation – Occupational Health

Airborne matter, such as fugitive dust and asbestos fibers generated during demolition activities may pose a risk to public safety. Demolition workers, equipment operators, and workers completing mothballing activities would be required to wear appropriate PPE and be properly trained for the work being performed. Solid or hazardous waste generated during demolition would be removed and properly disposed at the Otero-Greentree Regional Landfill, which is a New Mexico-permitted solid waste facility designed to dispose of residential, commercial, and construction waste and is permitted to accept asbestos waste. See Section 4.6, *Hazardous Materials*, for a detailed discussion of hazardous material handling and protection measures. Traffic safety measures discussed in Section 4.12, *Traffic and Transportation*, will be implemented to reduce the safety risks to drivers and the public associated with transporting the demolition waste.

The demolition contractor would be required to develop and implement a Health and Safety Plan to ensure worker safety during demolition activities. All demolition areas would be clearly marked with appropriate signage, would be fenced off and the general public would not have access to the site. The demolition contractor would be required to comply with OSHA, as well as other applicable regulations and other applicable permit conditions. Workers completing mothballing activities would be subject to appropriate plans and safety measures to safeguard their occupational health. In addition, the BMPs described in Section 4.8.1.1, *Alternative 1 Implementation – Public Safety*, would eliminate or reduce the associated impacts to occupational health. Considering the risks and BMPs to be implemented, Alternative 1 would be expected to have a minor, adverse, short-term impact to the occupational health of workers.

4.8.1.4 Alternative 1 Operations – Occupational Health

Alternative 1 would not significantly change the operation of the Sacramento Peak Observatory with regard to occupational health, because the interested parties would also be required to follow OSHA regulations and guidelines. Consequently, Alternative 1 would have no additional impacts to occupational health.

4.8.1.5 Alternative 1 Implementation – Protection of Children

No child-centric community resources are located within 0.5-mile of the Sacramento Peak Observatory and all demolition and mothballing activities would occur within a fenced-in area with posted signage warning of potential danger. Children may be affected by the increase in haul-truck traffic along the potential route to the demolition materials landfill. However, the BMPs described in Section 4.12, *Traffic and Transportation*, would reduce potential impacts. With implementation of the BMPs, there would be negligible, adverse, short-term impacts to child safety expected from implementation of Alternative 1.

4.8.1.6 Alternative 1 Operations – Protection of Children

Alternative 1 would not significantly change the operation of the Sacramento Peak Observatory with regard to the protection of children. Consequently, Alternative 1 would have no impacts to child safety.

4.8.2 Alternative 2 – Transition to Partial Operations by Interested Parties with Reduced NSF Funding

4.8.2.1 Alternative 2 Implementation and Operations – Public Safety, Occupational Health, and Protection of Children

Impacts to public safety, occupational health, and the protection of children associated with demolition activities and operations under Alternative 2 would be the same as those described for Alternative 1 since the same facilities are proposed to be demolished. Mothballing activities involve removing a facility or structure from daily use while maintaining the general condition of equipment and structures, and as such, mothballing activities would not impact public safety. Although Alternative 2 would result in the mothballing of 10 additional facilities, impacts to public safety, occupational health, and the protection of children would be similar to those described for Alternative 1 since there are limited, additional health and safety risks associated with mothballing these additional facilities. BMPs described under Alternative 1 would also be implemented under Alternative 2.

4.8.3 Alternative 3 – Mothballing of Facilities

4.8.3.1 Alternative 3 Implementation – Public Safety

Impacts to public safety associated with demolition activities under Alternative 3 would be the same as those described for Alternative 1 since the same facilities are proposed to be demolished. Although Alternative 3 would result in the mothballing of 41 additional facilities, impacts to public safety would be similar to those described for Alternative 1 since there are limited, additional health and safety risks associated with mothballing these additional facilities. BMPs described under Alternative 1 would also be implemented under Alternative 3. Implementation of Alternative 3 would be expected to result in a negligible, adverse, short-term impact to public safety.

4.8.3.2 Alternative 3 Operations – Public Safety

Compared to Alternative 1, impacts to public safety during operations would be considerably reduced by implementation of Alternative 3. There would be maintenance and security programs to protect the facility from vandalism, theft, and looting during the mothball period. Because of the security and

maintenance measures, there would be limited potential for the facility to become a local hazard to the public during the mothball period. With the exception of routine maintenance and security at the few utilities and utility-based structures remaining in use, visitation would be significantly reduced, resulting in a negligible, long-term beneficial impact to public safety during operations.

4.8.3.3 Alternative 3 Implementation – Occupational Health

Impacts to occupational health associated with demolition activities under Alternative 3 would be the same as those described for Alternative 1 since the same facilities are proposed to be demolished. As for impacts to public health, impacts to occupational health would be similar to those described for Alternative 1 since there are limited, additional threats to occupational health associated with mothballing these additional facilities. Implementation of Alternative 3 would be expected to result in a negligible, adverse, short-term impact to the occupational health of workers.

4.8.3.4 Alternative 3 Operations – Occupational Health

Compared to Alternative 1 and Alternative 2, impacts to occupational health would be reduced during operations under Alternative 3. There would be a maintenance and security program to protect the facility from vandalism, theft, and looting during the mothball period. The inherent risk of these activities would be expected to be the same as the current conditions, resulting in no new impacts.

4.8.3.5 Alternative 3 Implementation – Protection of Children

Impacts to child safety associated with demolition activities under Alternative 3 would be the same as those described for Alternative 1 since the same facilities are proposed to be demolished. All demolition activities would occur within a fenced-in area with posted signage warning of potential danger. Similar to public health and occupational health, impacts to child safety would be similar to those described for Alternative 1 since there are limited additional threats to children associated with mothballing these additional facilities. Implementation of Alternative 3 would be expected to result in a negligible, adverse, short-term impact to child safety.

4.8.3.6 Alternative 3 Operations – Protection of Children

Children would no longer visit the facility during the mothball period; therefore, potential impacts from visiting the Sacramento Peak Observatory would be eliminated, resulting in no impacts to child safety.

4.8.4 Alternative 4 – Demolition and Site Restoration

4.8.4.1 Alternative 4 Implementation – Public Safety

Implementation of Alternative 4 would result in the most potential impacts to public safety, as the majority of aboveground structures would be demolished, with belowground structures and foundations stabilized, filled, and abandoned in place. Explosives and conventional demolition equipment would be used to demolish the aboveground portion of DST. The demolition sites would be fenced off and the general public would not have access to the site.

Demolition planning is critical for Alternative 4. It is anticipated that shaped charge explosives will be used to initiate demolition of the aboveground portion of the DST with final demolition accomplished using tracked excavators equipped with hydraulic shears, grapplers and hoe rams, hydraulic cranes, and rubber tired and tracked loaders. The John Evans Facility, Grain Bin Telescope, and Hilltop Dome will be demolished, processed onsite, and stockpiled. Miscellaneous support equipment units will be used to complete demolition work. It is anticipated that the contractor would operate most efficiently with separate, specialty crews (i.e., heavy equipment operators, electricians, and dismantling crews) that travel from one structure to the next with the subsequent crew following behind.

Increased demolition-related traffic would result under Alternative 4; however, no more than 12 haul-truck round-trips hauling demolition waste would operate on any given 8-hour workday, representing less than a 2 percent increase in traffic volume on the road, with the least traffic volume along the potential route to the demolition materials landfill (New Mexico Highway 6563). Traffic safety measures discussed in Section 4.12, *Traffic and Transportation*, would be implemented to reduce the safety risks to drivers and the public associated with transporting the demolition waste. Additionally, the BMPs described for Alternative 1 would also be implemented for Alternative 4. Public safety would also be protected by following the previously described Blast Management Plan, Mercury Management Plan, Demolition Management Plan, Traffic Management Plan, and Demolition Health and Safety Plan (including compliance with OSHA safety protocols) that would be prepared specifically for the Proposed Action.

Considering the implementation of the BMPs and the limited increase in traffic associated with demolition waste, Alternative 4 would be expected to result in minor, adverse, short-term impacts to public safety.

4.8.4.2 Alternative 4 Operations – Public Safety

Alternative 4 involves the demolition of the majority of structures at the Sacramento Peak Observatory, with the exception of select utilities (including a water tank maintained for use as a water supply for fire-fighting) to be maintained and operated by USFS or another entity. All staffing and visitation would cease, resulting in a decrease in traffic along the access routes to the Sacramento Peak Observatory. USFS or another entity would be required to take over the maintenance duties associated with the water tank to ensure that it still is serviceable and able to supply water for fire-fighting, resulting in no change in the effects on public safety related to risks associated with wildfire. The decrease in visitor and operation-related traffic would be expected to result in a negligible, beneficial, long-term impact to public safety.

4.8.4.3 Alternative 4 Implementation – Occupational Health

The BMPs described for Alternative 1 would also be implemented under Alternative 4. However, Alternative 4 would involve substantially more demolition than the other Alternatives and would include the use of explosives and management of hazardous materials, including LBP, ACM, and mercury.

Prior to implementing Alternative 4, an assessment to determine the extent of hazardous building materials, such as ACM and LBP, would be performed for the facilities to be demolished under this Alternative. All friable ACM identified during survey would be removed and disposed of in accordance with local, state, and federal regulations. Non-friable ACM and building materials contaminated with asbestos or LBP would be managed and disposed of in accordance with federal and state regulations. Personnel involved with removal and disposal of ACM and LBP would be properly trained and certified, supported by appropriate PPE, and would follow the demolition Health and Safety Plan (including compliance with OSHA safety protocols) to be developed for the project. Specialized equipment would be used according to industry standards to minimize the exposure risk associated with removal and proper disposal of these materials.

The measures listed above for protection of public safety will also serve to protect the occupational health of workers completing the demolition. These measures include following the Blast Management Plan, Mercury Management Plan, Demolition Management Plan, and Demolition Health and Safety Plan (including compliance with OSHA safety protocols) that would be prepared specifically for the project. With the adherence to these protection measures, the impacts to occupational health from Alternative 4 would be expected to be minor, adverse, and short-term.

4.8.4.4 Alternative 4 Operations – Occupational Health

Implementation of Alternative 4 would eliminate staffing and visitation at the Sacramento Peak Observatory. Consequently, there would be no impacts to occupational health from operations.

4.8.4.5 Alternative 4 Implementation – Protection of Children

Implementation of Alternative 4 could result in impacts to child safety. However, the demolition sites would be fenced off and children would not have access to the site during these activities. There are houses that may contain children in proximity to the proposed haul route to the demolition materials landfill. The small increase in truck traffic along the potential route to the demolition materials landfill could cause a correspondingly small increase in the potential for an accident involving children. However, the traffic safety measures discussed in Section 4.12, *Traffic and Transportation*, will be implemented to reduce the safety risks to children associated with transporting the demolition waste. Consequently, the impacts to child safety from Alternative 4 would be negligible, adverse, and short-term.

4.8.4.6 Alternative 4 Operations – Protection of Children

Children would no longer visit the facility following demolition. Consequently, there would be no impacts to child safety.

4.8.5 No Action Alternative

Under the No Action Alternative, no mothballing or demolition would occur and there would be no change in the operation and visitation to the Sacramento Peak Observatory. Consequently, there would be no impacts to public safety, occupational health, or child safety.

4.8.6 Mitigation Measures

The following is a summary of the BMPs for health and safety related to the Alternatives:

- All Alternatives: A Demolition Health and Safety Plan would be developed and implemented.
- All Alternatives: A Traffic Management Plan would be developed and implemented.
- All Alternatives: Sacramento Peak Observatory personnel would comply with OSHA safety protocols.
- All Alternatives: Fencing and signage would be installed around demolition sites.
- Alternatives 1, 2, and 3: A maintenance and security program would be implemented for mothballed facilities.
- Alternative 4: A Blast Management Plan to identify and control safety and environmental risks associated with explosive blasting would be developed and implemented. Individuals handling explosives would be properly trained and industry standard safety protocols would be implemented.
- Alternative 4: A Mercury Management Plan addressing the handling, removal, transportation, storage, and disposal/recycling of mercury would be developed and implemented.

4.8.7 Summary of Impacts

Table 4.8-2 provides a summary of impacts resulting from the Alternatives.

TABLE 4.8-2
Summary of Health and Safety Impacts

	Alternatives				
Impacts	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Proposed Action Implementation-Related Public Safety	Minor, adverse, short-term impact	Minor, adverse, short-term impact	Negligible, adverse, short-term impact	Minor, adverse, short-term impact	No impact
Proposed Action Operations-Related Public Safety	No impact	No impact	Negligible, beneficial, and long-term	Negligible, beneficial, long-term impact	No impact
Proposed Action Implementation-Related Occupational Health	Minor, adverse, short-term impact	Minor, adverse, short-term impact	Negligible, adverse, short-term impact	Minor, adverse, short-term impact	No impact
Proposed Action Operations-Related Occupational Health	No impact	No impact	No impact	No impact	No impact

TABLE 4.8-2
Summary of Health and Safety Impacts

	Alternatives				
Impacts	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Proposed Action Implementation-Related Protection of Children	Negligible, adverse, short-term impact	Negligible, adverse, short-term impact	Negligible, adverse, short-term impact	Negligible, adverse short-term impact	No impact
Proposed Action Operations-Related Protection of Children	No impact	No impact	No impact	No impact	No impact

4.9 Noise

Noise impacts were determined based on potential increased noise levels around noise-sensitive land uses. Noise-sensitive land uses are locations where unwanted sound would adversely affect the designated use and typically include residential areas, hospitals, places of worship, libraries, schools, historic structures/ districts, and wildlife preserves and parks. Discussion in this section is confined to the human perception of noise and sound. Noise impacts to wildlife are discussed above in Section 4.1, *Biological Resources*.

The nearest offsite noise-sensitive land uses include Apache Point Observatory, located approximately 0.35 mile (0.56 km) from the Sacramento Peak Observatory, and a residential area, located 1.1 miles (1.7 km) from the Sacramento Peak Observatory.

Methodology

The methods used to determine whether the Alternatives would have impacts on noise-sensitive land uses are as follows:

- Evaluate each Alternative to determine its potential for increasing or decreasing noise levels on noise-sensitive land uses under each Alternative, including noise related to traffic impacts.
- Assess the compliance of each Alternative with applicable regulations that apply to noise.

The ROI for noise includes the Sacramento Peak Observatory, the potential route to the demolition materials landfill, and adjacent properties. Table 4.9-1 presents the impact thresholds for noise under the Proposed Action.

TABLE 4.9-1
Impact Thresholds for Noise

Impact Intensity	**Description**
Negligible	Demolition and operation-related noise would result in a less than 3 dBA (not perceptible) noise increase.
Minor	Demolition and operation-related noise would result in a 3 to 5 dBA (barely perceivable) noise increase.

TABLE 4.9-1
Impact Thresholds for Noise

Moderate	Demolition and operation-related noise would result in a 5 to 10 dBA (readily perceivable) noise increase.
Major	Demolition and operation-related noise would result in a greater than 10 dBA (twice as loud) noise increase.

Duration: **Short-term –** Occurs only during the implementation of the Proposed Action.
Long-term – Continues after the implementation of the Proposed Action.

4.9.1 Alternative 1 – Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding

4.9.1.1 Alternative 1 Implementation – Noise

Under Alternative 1, the majority of the telescopes and related research and support facilities would continue to be used, and as such, there would be no change in the noise associated with the facilities. Four facilities (John Evans Facility, Grain Bin Telescope, and two Storage buildings) would be placed in a mothballed condition so that they could be made operational in the future for scientific or other purposes. Mothballing activities are not expected to result in perceptible increases in noise.

Demolition of the Residential House Trailer and Relocatable Housing (including the Recreation House) would generate additional noise, although this noise would be barely perceivable at the nearest noise sensitive receptor (Apache Point Observatory) and not perceptible at the nearest residential area (please refer to additional discussion about noise attenuation over distance below). All industrial machinery and equipment will be in good repair and maintained in accordance with manufacturer's specifications in compliance with Otero County Ordinance 95-02 §170-1. Traffic increases and associated noise along the access routes to the Sacramento Peak Observatory for mothballing and demolition would be expected to be negligible, adverse, and short-term. Overall, mothballing and demolition activities completed during implementation of Alternative 1 would be expected to result in a negligible, adverse, short-term increase in noise.

4.9.1.2 Alternative 1 Operations – Noise

Demolition of the Residential House Trailer and Relocatable Housing (including the Recreation House) would remove these facilities from operation, resulting in a negligible decrease in operation-based noise. Similarly, mothballing four facilities would eliminate daily activity at these sites and result in a negligible decrease in operation-based noise at these facilities. Overall, mothballing and demolition activities completed under Alternative 1 would be expected to result in a negligible, beneficial, long-term reduction in noise during operations.

4.9.2 Alternative 2 – Transition to Partial Operations by Interested Parties with Reduced NSF Funding

4.9.2.1 Alternative 2 Implementation and Operations – Noise

Noise impacts associated with mothballing (14 facilities), demolition (Residential House Trailer and Relocatable Housing, including the Recreation House), and operation activities under Alternative 2 would be similar to those described for Alternative 1. As with Alternative 1, all industrial machinery and equipment will be in good repair and maintained in accordance with manufacturer specifications. Noise impacts would be the same as those described for Alternative 1 because the noise generated would be comparable as the same facilities are proposed to be demolished, there are limited noise impacts associated with mothballing 10 additional facilities, and operational noise impacts would be less than those for Alternative 1, since fewer buildings would be operated.

4.9.3 Alternative 3 – Mothballing of Facilities

4.9.3.1 Alternative 3 Implementation – Noise

Noise impacts associated with demolition activities under Alternative 3 would be the same as those described for Alternative 1 since the same facilities are proposed to be demolished. Although Alternative 3 would result in the mothballing of 41 additional facilities, impacts to noise would be similar to those described for Alternative 1 since mothballing activities are not expected to result in perceptible increases in noise. As with Alternative 1, all industrial machinery and equipment will be in good repair and maintained in accordance with manufacturer specifications in compliance with Otero County Ordinance 95-02 §170-1. Implementation of Alternative 3 would be expected to result in a negligible, adverse, short-term increase in noise.

4.9.3.2 Alternative 3 Operations – Noise

Under Alternative 3, most noise associated with staffing and all visitation would cease until the mothball period ends, resulting in a decrease in traffic-related noise along the access routes to the Sacramento Peak Observatory during the mothball period. In addition, noise related to the operation of the Sacramento Peak Observatory facilities would be reduced to that associated with routine maintenance activities. Alternative 3 would be expected to result in a negligible, beneficial, short-term (during the mothball period only) decrease in noise associated with operation-related traffic and reduction of operations activities.

4.9.4 Alternative 4 – Demolition and Site Restoration

4.9.4.1 Alternative 4 Implementation – Noise

Implementation of Alternative 4 would generate the greatest noise impacts, compared to the other Alternatives, due to the increase in demolition-related noise and noise generated during the blasting event. Mechanical means would be used to remove most structures but demolition would involve use of explosives for the removal of the solar telescope building. Individuals working at the facility during demolition activities would be exposed to increased noise conditions but would be assumed to wear

appropriate noise protection equipment. Standard demolition techniques would generate noise from diesel-powered earth-moving equipment such as dump trucks and bulldozers, backup alarms on certain equipment, and compressors. This noise would be generated during the various phases of demolition and would be expected to be similar to the typical noise levels listed in Table 4.9-2 for outdoor construction. Demolition-related noise at receptor locations would usually be dominated by the loudest one or two pieces of equipment operating during a given time period.

TABLE 4.9-2
Typical Noise Levels Associated with Main Phases of Outdoor Construction

Demolition Phase	Noise Level at 50 feet (dBA)
Ground Clearing	84
Excavation, Grading	89
Foundations	78
Structural	85
Finishing	89

Source: EPA, 1971.

The loudest equipment listed in Table 4.9-2 generally emits noise in the range of 80 to 90 dBA at 50 feet. Because noise dissipates depending on the distance to the source, the noise level at the residential area 1.1 miles (1.7 km) away would not be perceptibly affected, especially considering the dense intervening forest. Although the Apache Point Observatory is located 0.35-mile south of the Sacramento Peak Observatory, these observatories are separated by a deep forested valley that would not be expected to significantly attenuate the sound generated during demolition activities. Additionally, demolition would occur during daylight hours which would not impact the Apache Point Observatory operations that occur during the nighttime hours since their research is focused on night-sky research and all industrial machinery and equipment will be in good repair and maintained in accordance with manufacturer specifications. As a result, equipment-generated noise impacts during demolition would be discernable at the Apache Point Observatory but would be expected to be moderate, adverse, and short-term.

Noise from blasting explosives (such as the explosives proposed for demolition of the aboveground portion of DST) can exceed the 100-dBA range. At the Apache Point Observatory, noise from blasting would be easily heard, although such noise would be short-term in nature as this would be a single blasting event. After the detonation, the building would not be safe to enter for placement of additional charges. If the blasting fails to drop the building, then conventional demolition procedures would be necessary. The blasting would occur during daylight hours and would not impact the Apache Point Observatory research operations. The separation distance between the Sacramento Peak Observatory and the residential area located 1.1 miles (1.7 km) from the potential blast site, would result in a substantially decreased noise exposure, expected to be in the 50- to 60-dBA range. This noise range would be roughly

equivalent to a range from quiet urban daytime environment to heavy traffic at a distance of 300 feet and would be expected to be a less than 10-dBA increase from current conditions. Impacts would be no greater than moderate and very short-term in nature. Additionally, the dense vegetation surrounding the Sacramento Peak Observatory would further mitigate the noise from blasting activities.

A site-specific Blast Management Plan would be required and would provide more details on the location, duration, timing, charge size, etc., of blasting activities. The Blast Management Plan also would provide an estimation of the air blast overpressure and/or modeling of the sound pressure wave and the potential effects of the wave on the noise-sensitive areas (NSAs). Blasting activities would be expected to be designed to minimize the intensity and duration of noise impacts to nearby NSAs.

Communities along the potential route to the demolition materials landfill would be exposed to increased demolition-related traffic noise during the demolition period. However, these sporadic spikes in noise would have minimal change on the existing Leq(h) dBA. The added heavy truck traffic from demolition would result in an up to 3-dBA increase in noise level along the route at a distance of 100 feet (Caltrans, 1998). The 3-dBA increase is based on the conservative assumption that the traffic levels would rise to double in some rural areas. Based on this conservative assumption, noise impacts from increased traffic volumes would be expected to be negligible, adverse, and short-term.

Overall, implementation of Alternative 4 would result in an increase in noise impacts at the nearest NSAs that would be moderate, adverse, and short-term.

4.9.4.2 Alternative 4 Operations – Noise

Under Alternative 4, noise associated with staffing and visitation would cease at the Sacramento Peak Observatory. In addition, noise related to the operation of the Sacramento Peak Observatory facilities would be eliminated, with the minor exception of personnel using select utilities to be maintained and operated by USFS or another entity. Alternative 4 would be expected to result in a negligible, beneficial, long-term impact for noise associated with operation-related traffic and the elimination of operations activities.

4.9.5 No Action Alternative

The No Action Alternative is the continuation of the current operation of the Sacramento Peak Observatory. Under the No Action Alternative, current activities would continue, and mothballing or demolition would not occur. Consequently, there would be no change in noise impacts associated with this Alternative.

4.9.6 Mitigation Measures

The following is a summary of the BMPs for noise abatement related to the Alternatives:

- All Alternatives: All industrial machinery and equipment will be in good repair and maintained in accordance with manufacturer specifications in compliance with Otero County Ordinance 95-02 §170-1.
- Alternative 4: Blasting would be limited to a single event conducted during daylight hours. Any use of explosives would be limited to low-force charges that are designed to transfer the explosive force to the structure that is designated for removal. A site-specific Blast Management Plan would be prepared and would provide more details on the location, duration, timing, charge size, etc., of blasting activities. The Blast Management Plan also would provide an estimation of the air blast overpressure and/or modeling of the sound pressure wave and the potential effects of the wave on the NSAs. Blasting activities would be expected to be designed to minimize the intensity and duration of noise impacts to nearby NSAs.

4.9.7 Summary of Impacts

Table 4.9-3 provides a summary of noise impacts resulting from the Alternatives.

TABLE 4.9-3
Summary of Noise Impacts

	Alternatives				
Impacts	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Proposed Action Implementation-Related Noise	Negligible, adverse, short-term impact	Negligible, adverse, short-term impact	Negligible, adverse, short-term impact	Moderate, adverse, short-term impact	No impact
Proposed Action Implementation Traffic-Related Noise	Negligible, adverse, short-term impact	Negligible, adverse, short-term impact	Negligible, adverse, short-term impact	Negligible, adverse, short-term impact	No impact
Proposed Action Operations- Related Noise	Negligible, beneficial, short-term impact	Negligible, beneficial, short-term impact	Negligible, beneficial, short-term impact (during mothball period)	Negligible, beneficial, long-term impact	No impact

4.10 Socioeconomics

This subsection analyzes the potential impacts to socioeconomic resources from changes at the Sacramento Peak Observatory as a result of the Alternatives. The ROI for population, housing, employment, economy, and income is defined as Otero County. Because of its remote location in the central portion of Otero County, the Sacramento Peak Observatory is closest to the Village of Cloudcroft. It is assumed that the majority of those employed onsite live nearby in the Village of Cloudcroft and access the City of Alamogordo for local services, as needed. The ROI for education and tourism is also

Otero County to characterize the potential effects of a reduction or total loss in the number of students and visitors to Otero County from across the state for the education and tourist activities.

Methodology

The primary drivers for potential impacts on socioeconomic resources include the short-term increases in employment during the implementation of the Alternatives and the reduction in permanent employment when operations are reduced (Alternative 2) or cease (Alternatives 3 and 4). An additional socioeconomic driver is the expenditures by visitors, including tourists and students, to the Sacramento Peak Observatory and Visitor Center. Table 4.10-1 provides a summary of how these and related indicators compare across alternatives, including the No Action Alternative.

Relative to the No Action Alternative, potential impacts during implementation of the Alternatives include changes to temporary housing resources associated with the workforce, as well as changes in economic output, employment, and earnings associated with the expenditures on materials and workforce payroll. Expenditures for activities may include the purchase of fuel for equipment and materials, such as fencing and supplies for erosion and sedimentation control. Although there may be potential impacts associated with tax revenues from earnings and sales taxes, these were not assessed because the majority of the workers are assumed to live in the region already.

Table 4.10-1 summarizes the factors influencing the scale of the impacts for each of the Alternatives. The analysis includes the following assumptions:

- **Population** is characterized by the magnitude and distribution of demographic change for Otero County, City of Alamogordo, and Village of Cloudcroft. It is assumed that no new permanent jobs would be created as result of any of the Alternatives. Under Alternatives 1 and 2, it is assumed that there would be no net change in operational jobs and the Visitor Center jobs would be retained. For Alternative 3, it is assumed that five grounds and maintenance personnel would remain to conduct periodic maintenance and security functions.

TABLE 4.10-1
Summary of Factors Influencing Socioeconomic Impact Findings

	Alternatives				
	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Alternative Implementation Approximate Duration	24 weeks	24 weeks	33 weeks	43 weeks	N/A
Total Staff [a]	25	25	25	81	
Onsite Workers	4	4	4	30	
Equipment Operators	2	2	2	19	
Environmental Specialists (pre-demolition surveys)	7	7	7	7	
Onsite Facility Personnel	3	3	3	3	
Abatement Workers	9	9	9	9	

TABLE 4.10-1
Summary of Factors Influencing Socioeconomic Impact Findings

	Alternatives				
	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Specialty Personnel	0	0	0	13	
Origin of Staff					
Local	16	16	16	59	
Non-local	9	9	9	22	
Estimated Demolition Costs (Fiscal Year 2015)[b]	$2.5M ($1.8M - $4.2M)	$2.8M ($2.0M - $4.2M)	$6.1M ($4.3M - $9.2M)	$14.1M ($9.9M - $21.2M)	
Total Operation Staffing	**18**	**16**	**5**	**0**	20
Researchers	0	0	0	0	2
Services	9	7	0	0	9
Grounds and Maintenance	5	5	5	0	5
Temporary Academic Guides (Educators)	1	1	0	0	1
Telescope Operators	2	2	0	0	2
Visitor Center Personnel	1	1	0	0	1
Annual O&M Cost [e]	**$565,000**	**$507,000**	**$316,000**	**$0**	**> $565,000**
Visitation [e]	< 15,000	< 15,000	0	0	15,000

Source: Reese, 2016.

[a] Up to 9 abatement workers would be non-local but from within the New Mexico; Alternative 4 could require 13 specialty demolition contractors from outside New Mexico for approximately 1 month (Reese, 2016).

[b] Class 4 estimates as defined by the Association for the Advancement of Cost Engineering International, and are considered accurate to +50%/-30%.

[c] It is assumed that this is the cost of mothballing the facility, after which the building will remain mothballed for some unknown duration of time.

[d] Assumes the use of explosives for demolition of the DST.

[e] O&M costs reflect maintenance of structures and provision of utilities and are not inclusive of all staff. The cost of science research, education operations, and dedicated security staff and facilities are not included. Dedicated security staff and facilities, should they be needed, could cost an additional $315,000 to $675,000 annually.

- **Housing.** It is assumed that up to 9 of the 25 workers for Alternatives 1, 2, and 3 would be non-local, while 22 (additional specialty contractors) of the 81 workers for Alternative 4 would be non-local and may or may not need temporary housing for up to 1 month (see Table 4.10-1). It is assumed that these workers would find temporary housing in either the Village of Cloudcroft or the City of Alamogordo.

  While some operations personnel may relocate over time because of personal choice and opportunities, it is difficult to predict the specific number of people that would relocate. However, an indirect effect of each of the Alternatives could be an increase in housing vacancies as the workforce potentially relocates over time in search of comparable employment.

- **Economy, Employment, and Income.** Of the 20 current staff, 1 person works at the Visitor Center (5 percent), 2 are researchers (10 percent), 5 are grounds and maintenance staff (25 percent), 9 provide services (45 percent), 1 is a temporary academic guide (5 percent), and 2 are telescope operators (10 percent). Table 4.10-1 summarizes the workforce distribution for each Alternative. The

direct effects of the Alternatives on the employment and income of Otero County are quantified, while the effects on the economy are qualitatively described to account for secondary (indirect and induced) economic effects. Examples of indirect effects include "inter-industry" activities such as the purchase of materials and/or supplies from another industry or the benefit of recycling and reusing materials from the demolition activities. Induced effects result from labor income spending, such as a worker eating at a local restaurant or lodging at a local hotel.

- **Education.** The Sacramento Peak Observatory has two onsite researchers (included in the staff numbers in the previous bullet) and accommodates researchers who conduct scientific research remotely using the facilities at the Sacramento Peak Observatory. It is assumed that any visiting researchers are housed entirely onsite. It is assumed that Alternatives 1 and 2 would continue to support the current level of research and education; however, Alternatives 3 and 4 would result in the loss of visiting scientific researchers and students.
- **Tourism.** Approximately 15,000 tourists visit the Sacramento Peak Observatory and Visitor Center annually. This represents 3 percent of the 600,000 tourists annually to nearby White Sands National Monument; therefore, it is assumed that the majority of these tourists do not travel to Otero County for the sole purpose of visiting the Sacramento Peak Observatory and would not forego their visit if the Sacramento Peak Observatory were no longer available (OCEDC, 2016b). It is assumed that Alternatives 1 and 2 would continue to generate this level of visitation and Alternatives 3 and 4 would result in no tourist activities at the Sacramento Peak Observatory. Based on the factors in Table 4.10-1 and the assumptions described previously, the socioeconomic impacts are assessed in the following sections and described using the thresholds summarized in Table 4.10-2.

TABLE 4.10-2
Impact Thresholds for Socioeconomics

Impact Finding	Intensity Description
Negligible	The Alternative would result in a change to socioeconomic resources (beneficial or adverse) that would be so small, it would be an immeasurable or imperceptible consequence.
Minor	The Alternative would result in a change to socioeconomic resources but the change (beneficial or adverse) would be small and localized.
Moderate	The Alternative would result in a measurable and consequential change to socioeconomic resources.
Major	The Alternative would result in a substantial change to socioeconomic resources; the change (beneficial or adverse) would be measurable and result in a severely adverse or major beneficial impact.
Duration: **Short-term –** Occurs only during the implementation of the Proposed Action. **Long-term –** Continues after the implementation of the Proposed Action.	

4.10.1 Alternative 1 – Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding

Alternative 1 would involve the transition of full site operations of the Sacramento Peak Observatory for solar research to interested parties. NSF would reduce funding of the Sacramento Peak Observatory and the interested parties would be responsible for future maintenance and any future upgrades. It would involve the least change to the current facility and the majority of the telescopes and related research and support facilities would be kept and maintained. This Alternative includes mothballing the John Evans Facility, Grain Bin Telescope, and two Storage buildings and demolishing the Residential House Trailer and Relocatable Housing (including the Recreation House).

4.10.1.1 Alternative 1 Implementation – Population and Housing

Under Alternative 1, it is assumed that approximately 25 temporary demolition jobs would be created, of which nine abatement workers would be non-local (Reese, 2016). It is assumed that the majority of these workers would be local and would not require temporary housing. It is assumed that these workers may commute daily with a negligible number seeking temporary housing in the area. Because the duration of their work is 24 weeks, it is assumed that non-local workers would not relocate or bring their families to Otero County. Accordingly, permanent jobs would not be created, workers would not relocate, and there would be no impact to the population of Otero County. As discussed in Section 3.10.2, *Economy, Employment, and Income*, existing housing vacancy rates for the City of Alamogordo and Otero County are approximately 13 and 23 percent, respectively, which reflects approximately 1,797 vacant units in the City and 7,075 vacant units in Otero County in 2014. The housing vacancy rate for the Village of Cloudcroft was 72 percent in 2014, 814 units, reflecting the large number of units used for seasonal, recreational, or occasional purposes. Additionally, there are approximately 14 hotels in the City of Alamogordo offering over 400 rooms to accommodate non-local workers (TripAdvisor, 2016) and 3 hotels in the Village of Cloudcroft. Therefore, the temporary presence of nine non-local abatement workers would likely result in no impacts to housing in the ROI.

4.10.1.2 Alternative 1 Operations – Population and Housing

Most of the current jobs would be retained under Alternative 1. As a result, there would be no movement of workers into or away from the community. Therefore, there would be no impact to population or housing.

4.10.1.3 Alternative 1 Implementation – Economy, Employment, and Income

Alternative 1 activities are expected to create 25 temporary jobs over a period of approximately 24 weeks and cost approximately $2.5 million (see Table 4.10-1). These jobs would create income and spending for a 24-week period. The activities would result in additional income in Otero County. This income would be derived from the salary of the workers and revenue from the purchase of supplies. Therefore, as this increase in economic activity is relatively short in duration, the temporary increase in salaries and

expenditures and the associated indirect effects would provide a negligible, beneficial, short-term impact to the economy, employment, and income of Otero County.

4.10.1.4 Alternative 1 Operations – Economy, Employment, and Income

Otero County unemployment rate (not seasonally adjusted) in June 2016 was 6.7 percent, while the City of Alamogordo unemployment rate was estimated at 5.6 percent (compared to 6.2 percent in New Mexico and 4.9 percent nationally) (BLS, 2016). BLS does not track unemployment for smaller communities such as the Village of Cloudcroft. The per capita income in Otero County was $19,803 (for the previous 12 months in 2014 dollars), $22,768 in the City of Alamogordo, $27,852 in the Village of Cloudcroft, while the State of New Mexico per capita income was $23,948, (USCB, 2015f). Under Alternative 1, there would be a reduction of two operations workers at the Sacramento Peak Observatory. Because of low unemployment rates locally, it would be expected that these workers can gain employment elsewhere in the region without relocating. Therefore, Alternative 1 would result in no impact to the local economy, employment, and income.

4.10.1.5 Alternative 1 Implementation – Education and Public Outreach

The limited number of non-local workers and relatively short duration of Alternative 1 are not expected to result in relocations of families. Therefore, the school population is not expected to increase during implementation of Alternative 1 and no schools are close enough to experience periodic noise, which could be disruptive to learning, from the Alternative 1 activities. All activity would be temporary and periodic; therefore, there would be a negligible, adverse, short-term impact to education and outreach from Alternative 1.

4.10.1.6 Alternative 1 Operations – Education and Public Outreach

Under Alternative 1, there would be no change in education and public outreach activities at the Sacramento Peak Observatory. Therefore, there would no impact to education and public outreach**.**

4.10.1.7 Alternative 1 Implementation – Tourism

Alternative 1 activities may result in the temporary disruption of tourist activities at the Sacramento Peak Observatory to accommodate demolition and mothballing activities. All activity would be temporary; therefore, any associated impacts on tourism would be negligible, adverse, and short-term.

4.10.1.8 Alternative 1 Operations – Tourism

Under Alternative 1, the Visitor Center may be retained and all tourism would continue as it does under current operations. Therefore, there would be no impact to tourism.

4.10.2 Alternative 2 – Transition to Partial Operations by Interested Parties with Reduced NSF Funding

Socioeconomic impacts associated with mothballing (14 facilities), demolition (Residential House Trailer and Relocatable Housing, including the Recreation House), and operations under Alternative 2 would be similar to those described for Alternative 1.

4.10.2.1 Alternative 2 Implementation – Population and Housing

Under Alternative 2, it is assumed that approximately 25 temporary jobs would be created, which would include nine non-local abatement workers (Reese, 2016). It is assumed that the majority of these workers would be local and would not require temporary housing. Because the duration of work is approximately 24 weeks, it is assumed that non-local workers would not relocate or bring their families to Otero County. In addition, permanent jobs would not be created. As a result, there would be no impact to the population of Otero County. As discussed in Section 3.10.2, *Economy, Employment, and Income*, existing housing vacancy rates for the City of Alamogordo and Otero County are approximately 13 and 23 percent, respectively, which reflects approximately 1,797 vacant units in the City and 7,075 vacant units in Otero County in 2014. The housing vacancy rate for the Village of Cloudcroft was 72 percent in 2014, 814 units, reflecting the large number of units used for seasonal, recreational, and occasional purposes. Additionally, there are approximately 14 hotels in the City of Alamogordo offering over 400 rooms to accommodate non-local workers (TripAdvisor, 2016). Therefore, the temporary presence of nine non-local abatement workers would likely result in no impacts to the housing in the ROI.

4.10.2.2 Alternative 2 Operations – Population and Housing

Most of the current jobs would be retained under Alternative 2. It is assumed that there would be a minor change in the number of jobs (four positions) at the Sacramento Peak Observatory, with two research positions and two of the nine existing service staff not retained in these capacities (see Table 4.10-1). This reduction in jobs may result in less than four employees and their families relocating away from Otero County. This small number of individuals would result in a negligible, adverse, long-term impact to population and housing in Otero County.

4.10.2.3 Alternative 2 Implementation – Economy, Employment, and Income

Alternative 2 activities are expected to create 25 jobs over a period of approximately 24 weeks and cost approximately $2.8 million (see Table 4.10-1). These impacts would be similar to Alternative 1 with the exception of a small increase of $0.2 million in costs. Therefore, impacts would be similar to those described for Alternative 1. These jobs would create income and spending for a 24-week period. The Alternative 2 activities would result in additional income in Otero County. This income would be derived from the salary of the workers and revenue from the purchase of supplies. Therefore, the temporary increase in economic activity from salaries and expenditures would be a negligible, beneficial, short-term impact to the economy, employment, and income of Otero County.

4.10.2.4 Alternative 2 Operations – Economy, Employment, and Income

Under Alternative 2, onsite research conducted with the current facilities would be greatly reduced. The majority of the research conducted is accomplished remotely; therefore, there would be no significant reduction in travel-related spending to the economy of Otero County. Similar to Alternative 1, it is assumed that the small change in the number of jobs (four positions) at the Sacramento Peak Observatory could result in negligible, adverse, long-term, impacts to the local economy, employment and income.

Because of the low unemployment rates locally, it would be expected that these workers can gain employment elsewhere in the region without relocating.

4.10.2.5 Alternative 2 Implementation – Education and Public Outreach

Under Alternative 2, education and public outreach programs may continue and the limited number of non-local workers are not expected to relocate with their families. Therefore, no effects on the local school system are anticipated during implementation of Alternative 2. All activity would be temporary; therefore, there would be a negligible, adverse, short-term impact to education and outreach under Alternative 2.

4.10.2.6 Alternative 2 Operations – Education and Public Outreach

Under Alternative 2, it is assumed there would be no change in education and public outreach activities at the Sacramento Peak Observatory; however, such decisions will be up to the new operator. Noticeable changes in local enrollment are not anticipated as a result of research and service staff relocating. Therefore, there would no impact to education and public outreach**.**

4.10.2.7 Alternative 2 Implementation – Tourism

Activities related to the implementation of Alternative 2 may result in the temporary disruption of tourist activities at the Sacramento Peak Observatory to accommodate demolition and mothballing activities. All activity would be temporary; therefore, any associated impacts on tourism would be negligible, adverse, and short-term.

4.10.2.8 Alternative 2 Operations – Tourism

Under Alternative 2, the Visitor Center may be retained and all tourism would continue as it does under current operations. Therefore, there would be no impact to tourism.

4.10.3 Alternative 3 – Mothballing of Facilities

Alternative 3 includes mothballing 45 facilities and demolishing the Residential House Trailer and Relocatable Housing (including the Recreation House). Mothballing activities involve removing a facility or structure from daily use while maintaining the general condition of equipment and structures. A maintenance program would be required to protect the remaining facilities from deterioration, vandalism, and other damage. Regular security patrols would be performed to monitor the site.

4.10.3.1 Alternative 3 Implementation – Population and Housing

Under Alternative 3, there would be approximately 25 jobs created for a period of approximately 33 weeks for mothballing activities, which would include 9 non-local abatement workers (Reese, 2016). It is assumed that the majority of these workers would be local, not require temporary housing because they may commute daily. It is assumed that non-local workers would not relocate or bring their families to Otero County. Therefore, because no permanent jobs would be created and no workers would relocate, there would be no impact to the population of Otero County. As discussed in Section 3.10.2, *Economy, Employment, and Income*, existing housing vacancy rates for the City of Alamogordo and Otero County

are approximately 13 and 23 percent, respectively, which reflects approximately 1,797 vacant units in the City and 7,075 vacant units in Otero County in 2014. The housing vacancy rate for the Village of Cloudcroft was 72 percent in 2014, 814 units, reflecting the large number of units used for seasonal, recreational, or occasional purposes. Additionally, there are approximately 14 hotels in the City of Alamogordo offering over 400 rooms to accommodate non-local workers (TripAdvisor, 2016) and 3 hotels in Cloudcroft. Therefore, the temporary presence of nine non-local abatement workers would likely result in no impacts to the housing in the ROI.

4.10.3.2 Alternative 3 Operations – Population and Housing

Under this alternative, it is assumed that the five current grounds and maintenance positions will be retained. The balance of the staff positions (15 researchers, telescope operators, and service providers) would be discontinued until the mothballing period ends. It is assumed that these staff would not relocate in the short term; instead, they would attempt to find other employment in the same fields elsewhere in Otero County. However, if these 15 staff are unable to find local employment and must ultimately leave, there could be a negligible, adverse, long-term impact to the current population of Otero County (0.02 percent of 65,415 persons) (USCB, 2015a). As with population, the loss of local employment is not likely to immediately affect housing, with the potential exception of those workers renting instead of owning their housing, because these workers have greater flexibility and could relocate closer to their new employment or leave the region altogether. Overall, existing housing vacancy rates for the City of Alamogordo, Otero County, and the State of New Mexico are 12.6, 22.8, and 15.7 percent, respectively, which reflects approximately 1,797 vacant units in the City of Alamogordo and 7,075 vacant units in Otero County in 2014 (USCB, 2015c). The housing vacancy rate for the Village of Cloudcroft was 72 percent in 2014, or 814 units. Should operations workers choose to relocate, this overall vacancy rate could increase by 1.3 percent in the Village of Cloudcroft, 0.1 percent in the City of Alamogordo, and by less than 0.1 percent in Otero County if all 15 operations workers left the ROI. Negligible, adverse, long-term impacts are expected to occur to the housing resources in the ROI.

4.10.3.3 Alternative 3 Implementation – Economy, Employment, and Income

Alternative 3 activities are expected to create 25 jobs over a period of approximately 33 weeks and cost approximately $6.1 million (see Table 4.10-1). These jobs would create income and spending for a 33-week period and result in additional income in Otero County. This income would be derived from the salary of the workers and revenue from the purchase of supplies. The temporary increase in economic activity from salaries and expenditures would result in a negligible, beneficial, short-term impact to the economy, employment, and income of Otero County.

4.10.3.4 Alternative 3 Operations – Economy, Employment, and Income

The regional economy is driven by the presence of Holloman AFB, which represented 25 percent of the Otero County workforce and 47 percent of the City of Alamogordo civilian workforce in 2013 (Border

Research, 2015). Qualitative analysis of the loss of 15 jobs at the Sacramento Peak Observatory until the mothballing period ends indicates that negligible, adverse, long-term impacts would occur to the economy, employment, and income of Otero County. While these effects could be felt in the Village of Cloudcroft due to the small size of its workforce, 253 in 2014, because unemployment rates locally are low, this limited number of workers are expected to gain employment elsewhere without relocating. Of the 15 jobs lost, a limited number represent positions (4 researchers and telescope operators) that could potentially relocate to gain comparable employment.

4.10.3.5 Alternative 3 Implementation – Education and Public Outreach

Education and public outreach would be discontinued during implementation of Alternative 3. Non-local staff would not be expected to relocate their families, which would limit the effects to local enrollment and result in a negligible, adverse, long-term impact to education and public outreach.

4.10.3.6 Alternative 3 Operations – Education and Public Outreach

All education and public outreach programs would cease during operations under Alternative 3. Under Alternative 3, all of the STEM activities and educational visits would be eliminated until the mothballing period ends. While other STEM programs may be available in Otero County and New Mexico, they would not have the unique features of the facilities at the Sacramento Peak Observatory. Therefore, mothballing the facility would result in negligible, adverse, long-term impacts to education and public outreach in the ROI.

4.10.3.7 Alternative 3 Implementation – Tourism

Implementation of Alternative 3 would result in the elimination of formal tourist activities at the Sacramento Peak Observatory, resulting in the loss of approximately 15,000 official visitors annually and minor, adverse, long-term impacts to tourism in Otero County.

4.10.3.8 Alternative 3 Operations – Tourism

Under Alternative 3, the Visitor Center would be mothballed and formal tourist activities at Sacramento Peak Observatory would cease until the mothballing period ends, resulting in an annual loss of approximately 15,000 tourists that would be expected to visit the Sacramento Peak Observatory. This reduction in visitation would result in a minor, adverse, long-term impact to tourism in the Village of Cloudcroft and Otero County.

4.10.4 Alternative 4 – Demolition and Site Restoration

Alternative 4 would involve the removal of the majority of structures to approximately 4 feet (1.2 meters) below existing ground surface grade to enable the restoration of the ground surface topography without limiting future surface operations or activities. Aboveground structures would be removed and demolished, with belowground structures and foundations stabilized, filled, and abandoned in place. Alternative 4 is estimated to occur over a period of approximately 43 weeks using a workforce of 81 people, 22 of whom are anticipated to be non-local.

4.10.4.1 Alternative 4 Implementation – Population and Housing

Implementation of Alternative 4 is anticipated to require up to 22 non-local workers who would use temporary housing (rentals or hotels) in the Village of Cloudcroft or City of Alamogordo. Because of the duration of this work, it is assumed these non-local workers would not relocate or bring their families to Otero County. Because no permanent jobs would be created and no workers would relocate, there would be no impact to the population of Otero County. As discussed in Section 3.10.2, *Economy, Employment, and Income*, existing housing vacancy rates for the City of Alamogordo and Otero County are approximately 13 and 23 percent, respectively, which reflects approximately 1,797 vacant units in the City and 7,075 vacant units in Otero County in 2014. The housing vacancy rate for the Village of Cloudcroft was 72 percent in 2014, or 814 units. Additionally, there are approximately 14 hotels in the City of Alamogordo offering over 400 rooms to accommodate non-local workers (TripAdvisor, 2016). Therefore, the temporary presence of up to 22 non-local workers would result in no impact to the ROI population and could have a negligible, adverse, short-term impact to housing within the ROI.

4.10.4.2 Alternative 4 Operations – Population and Housing

It is assumed that there will be no onsite staff retained under Alternative 4, see Table 4.10-1. This will result in 18 staff positions being eliminated. It is assumed that these staff would not relocate in the short-term; instead, they would attempt to find other employment in the same fields elsewhere in Otero County. However, if all current employees were to leave, there would be a negligible, adverse, long-term impact to the current population of Otero County (0.04 percent of 65,415 persons) (USCB, 2015a).

Should operations workers choose to relocate, this overall vacancy rate could increase by 1.6 percent in the Village of Cloudcroft, 0.1 percent in the City of Alamogordo, and by less than 0.1 percent in Otero County if all 18 operations workers left the ROI. Negligible, adverse, long-term impacts are expected to occur to the housing resources in the ROI.

4.10.4.3 Alternative 4 Implementation – Economy, Employment, and Income

The estimated cost to implement Alternative 4 is $14.1 million (in 2015 dollars) (see Table 4.10-1), of which the majority is equipment rental and the disposal of materials. It is assumed that implementation of Alternative 4 would directly benefit those entities receiving materials for reuse and recycling, as well as local waste disposal companies used for waste transportation and disposal. The 81 jobs would create income and spending for a 43-week period. This income would be derived from the salary of the local workers and revenue from the purchase of supplies and food and accommodations by the non-local workforce. Therefore, a minor, beneficial, short-term impact to the economy, income, and employment of Otero County is anticipated.

4.10.4.4 Alternative 4 Operations – Economy, Employment, and Income

Similar to Alternative 3, a qualitative analysis of the loss of 18 jobs at the Sacramento Peak Observatory indicates that negligible, adverse, long-term impacts would occur to the economy, employment, and

income of Otero County. Because unemployment rates locally are low, this limited number of workers would be expected to generally gain employment elsewhere without relocating. However, a few (four researchers and telescope operators) could potentially choose to relocate to gain comparable employment.

4.10.4.5 Alternative 4 Implementation – Education and Public Outreach

Education and public outreach would be discontinued during implementation of Alternative 4. Non-local staff would not be expected to relocate their families, which would limit effects to local enrollment and result in a negligible, adverse, long-term impact to education and public outreach.

4.10.4.6 Alternative 4 Operations – Education and Public Outreach

All education and public outreach programs would cease during operations of Alternative 4. Under Alternative 4, all of the STEM activities and educational visits would be eliminated. While other STEM programs may be available in Otero County and New Mexico, they would not have the unique features of the facilities at the Sacramento Peak Observatory. Therefore, Alternative 4 would result in negligible, adverse, long-term impacts to education and public outreach in the ROI.

4.10.4.7 Alternative 4 Implementation – Tourism

Implementation of Alternative 4 would result in the elimination of tourist activities at the Sacramento Peak Observatory, resulting in the loss of approximately 15,000 visitors annually and would have minor, adverse, long-term impacts to tourism in the Village of Cloudcroft and Otero County.

4.10.4.8 Alternative 4 Operations – Tourism

Under Alternative 4, the Visitor Center would be demolished and tourist activities at Sacramento Peak Observatory would cease, resulting in a permanent annual loss of approximately 15,000 tourists that would be expected to visit the Sacramento Peak Observatory. This reduction in visitation would result in a minor, adverse, long-term impact to tourism in the Village of Cloudcroft and Otero County.

4.10.5 No Action Alternative

Under the No Action Alternative, NSF would continue to fund the Sacramento Peak Observatory at current levels. None of the Proposed Action alternatives would be implemented and there would be no impacts to the socioeconomic conditions of Otero County, City of Alamogordo, or Village of Cloudcroft as a result of activities at the Sacramento Peak Observatory.

4.10.6 Summary of Potential Impacts

Table 4.10-3 provides a summary of the socioeconomic impacts of each of the Alternatives and the No Action Alternative.

TABLE 4.10-3
Summary of Socioeconomic Impacts

	Alternatives				
Impact	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Proposed Action Implementation-Related Population	No impact	No impact	No impact	No impact	No impact
Proposed Action Operations-Related Population	No impact	Negligible, adverse, long-term impact	Negligible, adverse, long-term impact (during mothball period)	Negligible, adverse, long-term impact	No impact
Proposed Action Implementation-Related Housing	No impact	No impact	Negligible, adverse, short-term impact	Negligible, adverse, short-term impact	No impact
Proposed Action Operations-Related Housing	No impact	Negligible, adverse, long-term impact	Negligible, adverse, long-term impact (during mothball period)	Negligible, adverse, long-term impact	No impact
Proposed Action Implementation-Related Economy, Employment and Income	Negligible, beneficial, short-term impact	Negligible, beneficial, short-term impact	Negligible, beneficial, short-term impact	Minor, beneficial, short-term impact	No impact
Proposed Action Operations-Related Economy, Employment and Income	No impact	Negligible, adverse, long-term impact	Negligible, adverse, long-term impact (during mothball period)	Negligible, adverse, long-term impact	No impact
Proposed Action Implementation-Related Education and Outreach	Negligible, adverse, short-term impact	Negligible, adverse, short-term impact	Negligible, adverse, long-term impact	Negligible, adverse, long-term impact	No impact
Proposed Action Operations-Related Education and Outreach	No impact	No impact	Negligible, adverse, long-term impact (during mothball period)	Negligible, adverse, long-term impact	No impact
Proposed Action Implementation-Related Tourism	Negligible, adverse, long-term impact	Negligible, adverse, long-term impact	Minor, adverse, long-term impact	Minor, adverse, long-term impact	No impact
Proposed Action Operations-Related Tourism	No impact	No impact	Minor, adverse, long-term impact (during mothball period)	Minor, adverse, long-term impact	No impact

4.11 Environmental Justice

This section describes the analysis performed to identify potential environmental justice concerns that could result from the Alternatives. Environmental justice is the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (EPA, 2015a). The analysis of environmental justice issues is required under E.O. 12898, "Federal Actions to

Address Environmental Justice in Minority Populations and Low-Income Populations." E.O. 12898 mandates that opportunities be provided to minority and low-income populations to actively participate in the planning process and evaluates whether the project would result in any disproportionately high and adverse effects on individuals in these populations. E.O. 12898 also directs federal agencies to take appropriate and necessary steps to identify and address disproportionately high and adverse effects of federal projects on the health and environment of minority and/or low-income populations to the greatest extent practicable by law (59 *Federal Register* 7629, Feb. 16, 1994).

As the primary federal agency responsible for protecting the environment and monitoring environmental issues, EPA sets policy and standards regarding compliance with E.O. 12898. In 2014, EPA issued new guidance and tools for interpreting E.O. 12898, including Plan EJ 2014 and a web-based tool called EJSCREEN, which is used in the following analysis.

Methodology

The ROI for environmental justice is Otero County compared to the overall State of New Mexico. Consistent with E.O. 12898 and considering recent EPA guidance, this analysis will address the following three factors to determine compliance with E.O. 12898:

Fair Treatment and Meaningful Involvement. E.O. 12898 requires agencies to provide full and fair opportunities for minority and low-income populations to engage in the public participation process. The EPA 2014 guidance provided an additional definition of the terminology used in E.O. 12898 (EPA, 2015a):

- *Fair Treatment* means that no group of people should bear a disproportionate burden of environmental harms and risks, including those resulting from the adverse environmental consequences of industrial, governmental, and commercial operations or programs and policies.
- *Meaningful Involvement* means that: (1) potentially affected populations have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health; (2) the public's contribution can influence the regulatory agency's decision; (3) the concerns of all participants involved will be considered in the decision-making process; and (4) the rule writers and decision makers seek out and facilitate the involvement of those potentially affected.

Minority Demographics. Demographic information is available for the State of New Mexico and Otero County to provide a context for evaluating impacts associated with the Proposed Action.

The term "indigenous peoples" includes "state-recognized tribes; indigenous and tribal community-based organizations; individual members of federally recognized tribes, including those living on a different reservation or living outside Indian country; individual members of state-recognized tribes; Native Hawai'ians; Native Pacific Islanders; and individual Native Americans" (EPA, 2015a).

The percentage of these minority populations in an overall ROI is determined by totaling the number or percent who list their racial status as a race other than white alone and/or list their ethnicity as Hispanic or Latino (EPA, 2015b). The USCB uses the word “alone” to indicate that the person is of a single race, because multiracial individuals are tabulated in another category. The overall intent of identifying minority populations under E.O. 12898 is to determine whether the minority population percentage in the ROI, Otero County, is "meaningfully greater" than that of the general population of New Mexico (EPA, 1998).

Low-Income Demographics. The USCB’s annual poverty measure is the official metric for program planning and analysis by all Executive branch federal agencies; however, it does not have an official or standard definition of what constitutes “low income” (EPA, 2015a). As a result, low-income populations are identified within the ROI by determining the number or percent of the population living in households where the household income is less than or equal to twice the federal “poverty level” (EPA, 2015b). The rationale for using twice the poverty threshold instead of the poverty threshold itself includes considerations such as the effect of income on baseline health; using a calculation that is consistent with previous versions of EPA screening tools; and the conclusion by some analysts that the amount of income actually required for basic living costs without government support is far higher than the current federal poverty thresholds (EPA, 2015b). New Mexico adheres to the Federal Poverty Guidelines, which is set at specific dollar amounts: $11,770 for individuals and $24,250 for a family of four in 2015 (U.S. Department of Health and Human Services, 2015).

These three environmental justice factors are evaluated in the following sections:

- Section 4.11.1, *Public Disclosure and Involvement*, provides a summary of the public disclosure and involvement activities that were part of this NEPA process. These activities were provided to allow minority and low-income populations (in addition to the general public) to engage in the public participation process.
- Section 4.11.2, *Existing Minority Populations*, describes the minority demographics in Otero County compared to New Mexico.
- Section 4.11.3, *Low-Income Populations*, provides poverty data and determines the extent of potential low-income populations in Otero County.
- Section 4.11.4, *Existing Minority and Low-Income Populations near the Sacramento Peak Observatory*, provides a summary of the EJSCREEN tool and the results for a 5-mile buffer around the Sacramento Peak Observatory to better characterize site-specific conditions.
- Section 4.11.5, *Compliance with Executive Order 12988*, provides a conclusion and summary of compliance with E.O. 12898.

4.11.1 Public Disclosure and Involvement

Prior to the public scoping period, NSF notified, contacted, or consulted with multiple agencies, individuals, and organizations. Details of public and agency disclosure and involvement regarding the Proposed Action are included in Appendixes 5A through 5E. These disclosure efforts included scoping notification letters, media announcements, social media announcements, website updates, scientific publications, newspaper public notices, and a public scoping meeting (conducted on July 21, 2016, in Alamogordo, New Mexico). The public was informed of the scoping meeting using *Federal Register* and newspaper notices, as described below, and multiple opportunities were provided for the public to provide input.

4.11.1.1 Public Notices

NSF published an NOI in the *Federal Register* on July 5, 2016. A copy of this NOI is included in Appendix 5A. Newspaper advertisements were published in the *Alamogordo Daily News* (Otero County circulation) on July 10, 2016, and a second advertisement was published on July 12, 2016, in the *Albuquerque Journal* (New Mexico circulation). Copies of the newspaper display ads are provided in Appendix 5B.

4.11.1.2 Public Meetings

NSF conducted a public scoping meeting on July 21, 2016, and introduced the Proposed Action to those who attended. The purpose of the public scoping process was to determine relevant issues that will influence the scope of the environmental analysis. It may identify additional viable alternatives, issues that require greater or lesser levels of analysis, and ultimately influence the overall NEPA process. The public scoping meeting provided an opportunity for the public to comment on the preliminary Alternatives and to identify potential environmental concerns, both positive and negative.

The public scoping meeting was held on July 21, 2016, from 6:00 p.m. to 8:00 p.m., at the New Mexico Museum of Space History (3198 State Route 2001, Alamogordo, New Mexico 88310).

The format for the public scoping meeting included an open house, which allowed the participants to review the meeting informational boards and materials. Copies of these materials are included in Appendix 5C. This open house segment was followed by a brief presentation by NSF staff. The presentation covered the following topics: introductions, background information on the Proposed Action, preliminary Alternatives, resources areas to be studied, the EIS process, and opportunities for public involvement. After the completion of the NSF presentation, the public was invited to provide oral comments. The presentation and the oral comments were transcribed by a court reporter and are included in the official meeting transcript (Appendix 5D). In addition to providing oral comments, the public was encouraged to provide written comments during the meeting and/or via regular mail or email. Display material and comment forms with submittal instructions were provided at the public scoping meeting. The public also was encouraged to submit any comments during the public comment period (July 5, 2016 to

August 5, 2016). Comments made during the scoping process are included in Appendix 5E. Comments received on this DEIS will be considered and reflected in the FEIS. Comments specific to environmental justice were not received during the public scoping period.

Information on the public scoping meeting is provided in Section 5.0, *Notification, Public Involvement, and Consulted Parties*. Additional opportunities for public involvement will be provided during the second public meeting planned for February 2018 after the publication of the DEIS. The intent of this meeting will be to receive comments on the DEIS from agencies and the public.

4.11.2 Existing Minority Populations

The ROI (Otero County) does not meet the federal criteria for a "minority population" and has a lower percentage of minority population than the rest of New Mexico. However, the following analysis is provided as background because low-income populations are present. USCB 2014 estimates of the population by race and ethnicity were used to identify the presence of a unique minority populations for Otero County and the State of New Mexico (see Table 4.11-1). In Otero County, approximately 52 percent is solely racially white, 4 percent is solely black, 6 percent is American Indian and Alaskan Native, 1 percent is solely Asian, and 1.9 percent considers themselves either "some other race" alone or "two or more races." Approximately 36 percent of the population in Otero County considers themselves to be Hispanic or Latino, a term for those of Puerto Rican, Cuban, Mexican, and Central or South American heritage and language, compared to 47 percent of the population in New Mexico (USCB, 2015g). Overall, approximately 40 percent of the population of New Mexico is solely white, 2 percent is solely black, 8.5 percent is solely American Indian and Alaskan Native, 1 percent is solely Asian, and approximately 1.5 percent is either "some other race" or "two or more races." Overall, minority residents represent 48 percent of the total population of Otero County and 60 percent of the State of New Mexico. Because the minority population of Otero County nears the 50 percent threshold, it potentially meets the definition of a minority population under E.O. 12898; however, it is substantially lower than the 60 percent minority population estimated for New Mexico. Therefore, it is unlikely that significant minority populations would be disproportionately affected in Otero County compared to those of the State.

TABLE 4.11-1
Population by Race and Ethnicity

	Otero County		State of New Mexico	
	2014 Estimate	**Percent of Total**	**2014 Estimate**	**Percent of Total**
Total:	**65,415**		**2,080,085**	
Not Hispanic or Latino:	**42,185**	**64.5%**	**1,101,896**	**53.0%**
White alone	33,794	80.1%	824,291	74.8%
Black or African American alone	2,350	5.6%	37,519	3.4%

TABLE 4.11-1
Population by Race and Ethnicity

	Otero County		State of New Mexico	
	2014 Estimate	**Percent of Total**	**2014 Estimate**	**Percent of Total**
American Indian and Alaska Native alone	4,054	9.6%	177,555	16.1%
Asian alone	721	1.7%	26,991	2.4%
Native Hawai'ian alone	24	0.1%	942	0.1%
Some other race alone	73	0.2%	3,718	0.3%
Two or more races	1,169	2.8%	30,880	2.8%
Hispanic or Latino:	23,230	35.5%	978,189	47.0%
White alone	16,663	71.7%	697,585	71.3%%
Black or African American alone	248	1.1%	4,996	0.5%
American Indian and Alaska Native alone	640	2.8%	12,795	1.3%
Asian alone	111	0.5%	1,587	0.2%
Native Hawai'ian alone	35	0.2%	329	0.0%
Some other race alone	4,424	19.0%	226,680	23.2%
Two or more races:	1,109	4.8%	34,217	3.5%

Source: USCB, 2015h.

4.11.3 Low-Income Populations

As noted in Section 4.11.1, *Public Disclosure and Involvement*, families are defined as "low-income" if the family income is less than or equal to twice the federal poverty threshold. This accounts for the effects of low income on baseline health and the potential for basic living costs without government support to be far higher than the current federal poverty thresholds (EPA, 2015b). The USCB calculates the estimated poverty status of a geography over the past 12 months in Table S1701 of the American Community Survey. Table 4.11-2 shows a comparison of poverty statistics for Otero County and New Mexico in 2015. Approximately 21 percent of the population in the New Mexico falls below the poverty level compared to 23 percent in Otero County. Approximately 29 percent of the children (population under age 18 years) fall below the poverty level in New Mexico, whereas in Otero County the estimate is approximately 34 percent. In Otero County, 21 percent of the working age population (ages 18 to 64 years) is at or below the poverty level compared to 20 percent for New Mexico. Additionally, 11.8 percent of the elderly population (age 65 years and older) in Otero County lives at or below the poverty level compared to 12 percent in New Mexico (USCB, 2015h).

TABLE 4.11-2
Estimated 2015 Poverty Status in the Past 12 Months

	Otero County			New Mexico		
	Total	Below Poverty Level	Percent Below Poverty Level	Total	Below Poverty Level	Percent Below Poverty Level
Subject	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Population for whom poverty status is determined	62,342	14,387	23.1%	2,043,677	429,361	21.00%
Age						
Under 18 years	15,741	5,374	34.1%	500,851	147,243	29.4%
18 to 64 years	36,617	7,833	21.4%	1,241,419	246,065	19.8%
65 years and older	9,984	1,180	11.8%	301,407	36,053	12.0%

Source: USCB, 2015g.

4.11.4 Existing Minority and Low-Income Populations near the Sacramento Peak Observatory

In May 2015, EPA issued updated policy guidance and a new EJSCREEN tool to assist in determining the potential impacts to environmental justice communities. EJSCREEN builds on previous tools, providing updated demographic information, environmental indicators, and high resolution maps to generate standardize reports that bring together environmental and demographic data in the form of environmental justice indexes. EPA describes EJSCREEN as a pre-decisional screening tool that should not be used to identify or label an area as an "Environmental Justice (EJ) Community"; instead, the tool is designed as a starting point to identify candidate sites that might warrant further review or outreach.[6]

For the purpose of this analysis, the EJSCREEN tool was used to generate population estimates for an area within 5 geographic miles of the center point of Sacramento Peak Observatory using the 2010–2014 5-year block group data. The EJSCREEN tool compares the population estimates to those of New Mexico to assess potential disproportionate impacts. EPA's EJSCREEN tool was also used to determine whether there were any distinguishing characteristics within 5 miles of the Sacramento Peak Observatory that could further inform the environmental justice analysis.

EJSCREEN found approximately 67 persons within 5 miles of the Sacramento Peak Observatory. This population is primarily concentrated in the small community of Sunspot in the Lincoln National Forest. Approximately 47 housing units are within 5 miles of the Sacramento Peak Observatory, while 30,982

6 "EJSCREEN is not designed to explore the root causes of differences in exposure. The demographic factors included in EJSCREEN are not necessarily causes of a given community's increased exposure or risk. Additional analysis is always needed to explore any underlying reasons for differences in susceptibility, exposure or health." (EPA, 2016b)

total housing units are in Otero County. The area within 5 miles of the site had a per capita income of $23,247, compared to $19,803 for residents of Otero County, and 39 percent of the population could be characterized as low income. This is comparable to the 44 percent low-income percentage observed in Otero County overall and the 42 percent observed in New Mexico in 2014 (EPA, 2016a). EJSCREEN estimated that 7 percent of this small population could be considered minority compared to 48 percent of the total population of Otero County and 60 percent of New Mexico.

Table 4.11-3 summarizes the environmental and demographic indices for the area within 5 miles of the Sacramento Peak Observatory compared to that of the State of New Mexico. The environmental and demographic indices near the Sacramento Peak Observatory are much lower than those for New Mexico for air, water, lead, and other toxic substances measured by EPA. It found that there were no Superfund (National Priorities List), Hazardous Waste Treatment, Storage, and Disposal Facility, or NPDES-permitted facilities within 5 miles. All of the environmental indicators within 5 miles of the Sacramento Peak Observatory were lower than those for the State, which is an important factor in determining whether the area is currently experiencing the effects of disproportionately high and adverse environmental effects.

TABLE 4.11-3
EJSCREEN Report Results

Environmental Indicators	**Area within 5 miles of the Sacramento Peak Observatory**	**State of New Mexico**
National Air Toxics Assessment (NATA) Diesel PM (microgram(s) per cubic meter)	0.0386	0.471
NATA Cancer Risk (lifetime risk per million)	32	32
NATA Respiratory Hazard Index	0.66	1.4
Traffic Proximity and Volume (daily traffic count/distance to road)	0.73	140
Lead Paint Indicator (% Pre-1960 Housing)	0.097	0.2
National Priorities List Proximity (site count/km distance)	0	0.13
Risk Management Plan Proximity (facility count/km distance)	0	0.16
Treatment Storage and Disposal Facility Proximity (facility count/km distance)	0.02	0.091
Water Discharger Proximity (facility count/km distance)	0.028	0.15
Demographic Indicators	**5-mile Buffer (Sacramento Peak Observatory)**	**State of New Mexico**
Demographic Index	23%	52%
Minority Population	7%	60%
Low-Income Population	39%	43%
Linguistically Isolated Population	0%	5%
Population With Less Than High School Education	8%	16%
Population Under 5 years of age	2%	7%
Population over 64 years of age	26%	14%

Source: EPA, 2016b (see Appendix 3E).

Based on minority and income data from USCB shown in Sections 4.11.3, *Low-Income Populations*, and 4.11.4, *Existing Minority and Low-Income Populations near the Sacramento Peak Observatory*, and EPA's EJSCREEN tool (Section 4.11.5, *Compliance with Executive Order 12988*), while the minority population of Otero County nears the 50 percent threshold, it is substantially lower than the 60 percent minority population estimated for New Mexico. Therefore, it is unlikely that significant minority populations would be disproportionately affected in Otero County compared to those of the State.

4.11.5 Compliance with Executive Order 12988

The EJSCREEN results for the area within 5 miles of the Sacramento Peak Observatory show that the Sacramento Peak Observatory is located in an area in which 7 percent of its small population could be considered minority compared to 48 percent of the total population of Otero County and 60 percent of New Mexico (EPA, 2016b). Thirty-nine percent of the population in the 5-mile buffer could be characterized as low income as compared to 43 percent of New Mexico, see Table 4.11-3. The analysis of socioeconomic resources in Section 4.10, *Socioeconomics*, finds that mothballing or demolition could result in negligible, long-term, adverse impacts from the loss of operations-related jobs as well as the loss of education, and tourism opportunities. However, these impacts would not be disproportionately borne by the limited minority and low-income populations in Otero County. Therefore, no environmental justice impacts are anticipated due to potential socioeconomic impacts.

E.O. 12898 calls for federal agencies to provide opportunities for stakeholders to obtain information and provide comments on federal actions. NSF has complied with E.O. 12898 by conducting a public scoping meeting and providing opportunities for the public to provide input to the project. Therefore, impacts from any of the Alternatives would not result in disproportionately high and adverse to minority and low-income populations.

4.12 Traffic and Transportation

This section describes the potential impacts to the transportation infrastructure and traffic operations for each of the Alternatives within the ROI. The ROI for traffic and transportation includes the roadway network leading to the Sacramento Peak Observatory and along the potential route to the demolition materials landfill (see Figure 3.11-1). Current traffic levels on the roadway network are influenced by existing Sacramento Peak Observatory staffing and visitation levels. Predicted changes in traffic patterns resulting from the Alternatives were evaluated against the current roadway network and conditions.

Methodology

The methods used to determine whether the Alternatives would have impacts on traffic and transportation are as follows:

- Evaluate each Alternative to determine its potential for increasing or decreasing traffic as a result of the activities under each Alternative.

- Compare the impacts on traffic under each Alternative with the current traffic conditions along the roadway network leading to the Sacramento Peak Observatory and along the potential route to the demolition materials landfill.

Table 4.12-1 summarizes the impact thresholds for traffic and transportation.

TABLE 4.12-1
Impact Thresholds for Traffic and Transportation

Impact Intensity Description	
Negligible	The Proposed Action would not result in a change in traffic or transportation resources or the change would be so small that it would not be noticeable.
Minor	The Proposed Action would result in a noticeable change in traffic on the roadway network within the ROI; however, the change would not result in traffic delays on the roadway network.
Moderate	The Proposed Action would result in a measurable and consequential change in traffic within the ROI; the change would result in minimal traffic delays.
Major	The Proposed Action would result in a substantial change in traffic on the roadway network within the ROI; the change would result in noticeable traffic delays.

Duration: Short-term – Occurs only during the implementation of the Proposed Action.
Long-term – Continues after the implementation of the Proposed Action.

4.12.1 Alternative 1 – Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding

4.12.1.1 Alternative 1 Implementation – Traffic and Transportation

Alternative 1 would require minimal additional traffic beyond that currently generated by Sacramento Peak Observatory staff and visitors. Additional traffic would be associated with personnel vehicles associated with performing mothballing activities at four facilities (John Evans Facility, Grain Bin Telescope, and two Storage buildings) and demolition personnel, equipment, and haul trucks (Residential House Trailer and Relocatable Housing, which includes the Recreation House). During the implementation of Alternative 1, there would be approximately four mobilization-related trips and 30 haul-truck trips to the Otero-Greentree Regional Landfill as summarized in Table 4.12-2.

TABLE 4.12-2
Estimated Demolition Haul Truck Loads and Volumes - Alternative 1

	Haul Truck Loads	Metric Tons	Cubic Meters
Demolition Debris [a]	18	360	378
Asbestos Abatement	6	120	126
LBP	1	10	11
Universal Waste	1	5	5
Electrical Equipment/Goods [b]	1	5	5
Liquid Waste, Non-Specific	1	5	5
Salvage/Recycle – Non-Ferrous	1	10	11

TABLE 4.12-2
Estimated Demolition Haul Truck Loads and Volumes - Alternative 1

	Haul Truck Loads	Metric Tons	Cubic Meters
Salvage/Recycle – Ferrous	1	10	11
Total [c]	**30**	**525**	**552**

[a] All concrete, masonry and pavement materials would be sized / crushed to 3 inches minus and would be used during restoration (fill and contouring) or available for offsite beneficial reuse.

[b] Petroleum products would be recycled. Household waste, paint, etc., would be landfilled.

[c] Total truck passage is two times the load count.

Throughout the 24-week duration of implementing Alternative 1, it is anticipated that no more than four haul truck round-trips hauling demolition waste would operate on any given 8-hour workday, representing less than a 1 percent increase in traffic volume on the road, with the least traffic volume along the potential route to the Otero-Greentree Regional Landfill (New Mexico Highway 6563). Given the current traffic volume on the potential route to the landfill, this relatively small increase in truck traffic would likely be noticeable but would not result in traffic delays. The following BMPs and mitigation measures would be implemented to further reduce potential for impacts to traffic and transportation:

- A Traffic Management Plan outlining measures to reduce potential traffic-related safety issues and transportation conflicts would be developed in coordination with the USFS.
- Personnel would be notified of all potential height restrictions and overhead obstructions along the roadway network leading to the Sacramento Peak Observatory and along the potential route to the Otero-Greentree Regional Landfill.
- Vehicles used for material transport would be required to comply with local standards for height, width, and length of vehicles, when practicable. If at any time vehicles of excessive size and weight are required on local roads and bridges, permits would be obtained.
- Transport of materials and demolition vehicles would occur during off-peak hours when practicable.
- Further detailed demolition materials landfill routing and concerns would be addressed during the detailed design phase of the Proposed Action, including verification that all bridge crossings on the delivery route do not have load restrictions in place that would preclude using the bridges to move the demolition materials.

With implementation of mitigation measures and BMPs, Alternative 1 would result in a minor, adverse, short-term impact to transportation.

4.12.1.2 Alternative 1 Operations – Traffic and Transportation

Under Alternative 1, staffing and visitation would be comparable to existing conditions, resulting in no anticipated change in traffic along the access routes to the Sacramento Peak Observatory.

4.12.2 Alternative 2 – Transition to Partial Operations by Interested Parties with Reduced NSF Funding

4.12.2.1 Alternative 2 Implementation and Operations – Traffic and Transportation

Traffic impacts associated with mothballing (14 facilities), demolition (Residential House Trailer and Relocatable Housing, including the Recreation House), and operations under Alternative 2 would be similar to those described for Alternative 1. Traffic impacts would be the same as those described for Alternative 1 because the impacts to traffic would be comparable as the same facilities are proposed to be demolished and there are limited traffic impacts associated with mothballing 10 additional facilities. BMPs described for Alternative 1 would also be implemented under Alternative 2.

4.12.3 Alternative 3 – Mothballing of Facilities

4.12.3.1 Alternative 3 Implementation – Traffic and Transportation

Under Alternative 3, traffic associated with Sacramento Peak Observatory staff (20 people) would be reduced and visitor traffic (approximately 15,000 visitors per year) would cease. All traffic during the implementation of Alternative 3 would be associated with mothballing (45 facilities) and demolition (Residential House Trailer and Relocatable Housing [including the Recreation House]) personnel. Demolition would involve disconnecting utilities, demolishing the structures, and transporting the waste materials offsite for disposal at the Otero-Greentree Regional Landfill. The number of mobilization and haul trips to the Otero-Greentree/Lincoln County Regional Landfill and the amount of waste would be comparable to Alternative 1, since the same buildings would be demolished.

Traffic impacts would be the same as those described for Alternative 1 because the impacts to traffic would be comparable as the same facilities are proposed to be demolished and there are limited traffic impacts associated with mothballing the remaining facilities. BMPs described for Alternative 1 would also be implemented under Alternative 3. With implementation of mitigation measures and BMPs, Alternative 3 would result in a minor, adverse, short-term impact to transportation.

4.12.3.2 Alternative 3 Operations – Traffic and Transportation

Under Alternative 3, most staffing and all visitation would cease until the mothball period ends, resulting in a decrease in traffic along the access routes to the Sacramento Peak Observatory during the mothball period. The decrease in operation-related traffic would be expected to result in a minor, beneficial, short-term impact to traffic and transportation.

4.12.4 Alternative 4 – Demolition and Site Restoration

4.12.4.1 Alternative 4 Implementation – Traffic and Transportation

Under Alternative 4, traffic associated with Sacramento Peak Observatory staff (20 people) and visitors (approximately 15,000 visitors per year) would cease, with the exception of limited traffic from USFS or other entity's staff that would maintain and operate select utilities. During the demolition period, traffic accessing the Sacramento Peak Observatory would be related to facility demolition personnel, equipment, and haul trucks. During the implementation of Alternative 4, there would be approximately

12 mobilization-related trips and 302 haul-truck trips to the Otero-Greentree Regional Landfill as summarized in Table 4.12-3.

TABLE 4.12-3
Estimated Demolition Haul Truck Loads and Volumes - Alternative 4

	Haul Truck Loads	Metric Tons	Cubic Meters
Demolition Debris [a]	211	4,220	4,431
Asbestos Abatement	12	240	252
LBP	2	40	42
Universal Waste	2	40	42
Electrical Equipment/Goods [b]	2	40	42
Liquid Waste, Non-Specific	5	100	105
Salvage/Recycle – Non-Ferrous	8	160	168
Salvage/Recycle – Ferrous	60	1,200	1,260
Total [c]	**302**	**6,040**	**6,342**

[a] All concrete, masonry and pavement materials would be sized / crushed to 3 inches minus and would be used during restoration (fill and contouring) or available for offsite beneficial reuse.

[b] Petroleum products would be recycled. Household waste, paint, etc., would be landfilled.

[c] Total truck passage is two times the load count.

Throughout the 43-week duration of implementing Alternative 4, it is anticipated that no more than 12 haul-truck round trips hauling demolition waste would operate on any given 8-hour workday, representing less than a 2 percent increase in traffic volume on the road, with the least traffic volume along the potential route to the Otero-Greentree Regional Landfill (New Mexico Highway 6563). Given the current traffic volume on the potential route to the landfill, this relatively small increase in truck traffic would likely be noticeable but would not result in traffic delays. Additionally, BMPs described for Alternative 1 would also be implemented under Alternative 4. Consequently, Alternative 4 would result in a minor, adverse, short-term impact to transportation.

4.12.4.2 Alternative 4 Operations – Traffic and Transportation

Under Alternative 4, the Sacramento Peak Observatory the majority of structures would be demolished, with the exception of select utilities to be maintained and operated by USFS or other entity. All staffing and visitation would cease, resulting in a decrease in traffic along the access routes to the Sacramento Peak Observatory. The decrease in operation-related traffic would be expected to result in a minor, beneficial, long-term impact to traffic and transportation.

4.12.5 No Action Alternative

Under the No Action Alternative, there would be no change to staffing or visitation to the Sacramento Peak Observatory. Therefore, there would be no change to traffic or transportation conditions within the ROI.

4.12.6 Mitigation Measures

The following is a summary of the BMPs proposed to minimize impacts to traffic and transportation from the Alternatives.

- All Alternatives: A Traffic Management Plan outlining measures to reduce potential traffic-related safety issues and transportation conflicts would be developed in coordination with the USFS.
- All Alternatives: Personnel would be notified of all potential height restrictions and overhead obstructions along the roadway network leading to the Sacramento Peak Observatory and along the potential route to the Otero-Greentree Regional Landfill.
- All Alternatives: Vehicles used for material transport would be required to comply with local standards for height, width, and length of vehicles, when practicable. If at any time vehicles of excessive size and weight are required on local roads and bridges, permits would be obtained.
- All Alternatives: Transport of materials and demolition vehicles would occur during off-peak hours when practicable.
- All Alternatives: Further detailed demolition materials landfill routing and concerns would be addressed during the detailed design phase of the Proposed Action, including verification that all bridge crossings on the delivery route do not have load restrictions in place that would preclude using the bridges to move the demolition materials.

4.12.7 Summary of Impacts

Table 4.12-4 provides a summary of impacts resulting from the Alternatives.

TABLE 4.12-4
Summary of Transportation Impacts

	Alternatives				
Impact	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Proposed Action Implementation-Related Traffic	Minor, adverse, short-term impact	Minor, adverse, short-term impact	Minor, adverse, short-term impact	Minor, adverse, short-term impact	No impact
Proposed Action Operations-Related Traffic	No impact	No impact	Minor, beneficial, short-term impact (during mothball period)	Minor, beneficial, long-term impact	No impact

4.13 Cumulative Impacts

This cumulative impacts analysis follows the requirements of NEPA and CEQ guidance (CEQ, 1997). The CEQ provides the implementing regulations for NEPA, which define a cumulative impact as follows:

> *… the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes the actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time* (40 C.F.R. §1508.7).

The concern is the contribution of an action to the overall impacts in the analysis area. A project may have minor impacts in isolation, but it could have significant impacts when considered collectively with other projects on a regional scale.

Cumulative impacts occur when the incremental effects of the Proposed Action result in an increased impact when added to the environmental effects of past, ongoing, and reasonably foreseeable activities that are related to the Proposed Action in space and time or that are of a similar character that could affect the same environmental resources within the ROI, as defined for each resource. Reasonably foreseeable activities include activities identified by regional or state planning boards or that have an application pending and that would occur in the same time frame as the Proposed Action or close enough in time that the impacts could be additive. Past activities are considered only when their impacts are evident during implementation of the Proposed Action. Cumulative impacts of the Alternatives are based on the impacts analyzed in Sections 4.1 through 4.12, and it is assumed that BMPs described in each resource section would be implemented.

The cumulative impacts analysis for each resource involved the following process:

- Identify the appropriate level of analysis for each resource.
- Define the ROI and time frame for the cumulative impacts analysis for each resource.
- Describe current resource conditions and trends, as applicable.
- Identify the potential impacts of each Alternative that could contribute to the cumulative impacts for each resource.
- Identify past, present, and other reasonably foreseeable actions in the relevant geographic regions that affect each resource.
- Analyze potential cumulative impacts.

The level of cumulative analysis for each resource in this DEIS varies, depending on the sensitivity of the resource to potential cumulative impacts.

4.13.1 Cumulative Activities

This section identifies the cumulative activities that could interact with the Proposed Action to contribute to cumulative impacts. NSF conducted a review of planning and permit programs to identify pending, planned, or recently completed projects in the region of the Proposed Action. The following is a summary of these findings. Review of planning and permit programs have identified no pending, planned, or recently completed commercial or residential projects in the region of the Proposed Action. To date, the Alamogordo Chamber of Commerce, City of Alamogordo Planning and Zoning Department, and the Village of Cloudcroft Chamber of Commerce have not provided information on such developments in the project area.

The USACE Albuquerque District Regulatory Division has not issued any Nationwide Permits, Regional General Permits, or Individual Permits for projects within 10 miles of the Sacramento Peak Observatory or along the potential route to the demolition materials landfill since April 2012.

According to the NMDOT (2017b), the following transportation projects located in the vicinity of the Sacramento Peak Observatory area and along the potential route to the demolition materials landfill are planned or have been recently completed:

- Chip-seal application on U.S. Highway 82 from MM 0 to MM 17 completed in fall 2015.
- Chip-seal application on New Mexico (NM) Route 130 completed in summer 2015.
- Resurfacing of U.S. Highway 54 from MM 55 to MM 64 completed in spring 2016.
- Chip-seal application on NM Route 6563 completed in summer 2016.
- Striping project along U.S. Highway 82, NM Route 130, and NM Route 6563 completed in fall 2016.
- Emergency repair work (excavate, backfill, install drainage pipe, and repave) on U.S. Highway 82, near MM 10, east of High Rolls, completed in February 2017.
- Rock fall mitigation work on U.S. Highway 82 from MM 3 to MM 5, completed in February 2017.
- Tunnel repair work on U.S. Highway 82, completed in October 2017.
- Fog-seal application on NM Route 130 from MM 0 to MM 13 and on NM Route 6563 from MM 0 to MM 16, completed in 2017.
- Drainage and roadway reconstruction on U.S. Highway 82 from MM 16.2 to MM 16.7 in Cloudcroft starting in spring 2020 and estimated to take 3 months to complete. This project may overlap with the implementation of the Proposed Action, depending on when the selected Alternative is initiated.

In coordination with the USFS, the following past, ongoing, and reasonably foreseeable projects were identified as potentially affecting resources common to the Proposed Action:

- Two Goats CE – A USFS watershed restoration project that is using mechanical equipment to reduce overly dense fuel stands, and proposes to scatter smaller-diameter trees to prevent erosion. Logs remain to be hauled and this activity would be expected to be completed by the summer of 2018, prior to implementation of the Proposed Action.
- NM Highway 64 Road Thinning – A USFS project that involves thinning of trees along Highway 64 and would include use of Highway 64 for general project-related travel and as haul routes for timber removal and other project activities. This activity would be expected to be completed prior to implementation of the Proposed Action.
- Otero County Electric Cooperative, Cloudcroft to Sunspot Powerlines – The utility company proposes to bury existing overhead lines along Highway 6563, which is used to access the Observatory. This project would be expected to be conducted in the spring of 2018 and would be complete before implementation of the Proposed Action.
- Holloman AFB Projects – Based on review of the Replacement of QF-4 Full-scale Aerial Targets (FSATs) with QF-16 FSATs at Holloman AFB, New Mexico Final Environmental Assessment (U.S. Air Force, 2015a), and the Environmental Assessment of a Photovoltaic Development for Holloman AFB (U.S. Air Force, 2015b), a wide range of past, present and future actions and resource impacts were identified at Holloman AFB, White Sands Missile Range, and the Fort Bliss Military Reservation. These actions include: energy transmission lines; water wells and desalinization plants; large solar developments; and a variety of improvements to and training exercises at these installations. With the exception of the potential impacts related to noise, all of the resource impacts related to these projects are confined to the boundaries of these installations and would have no cumulative impacts on resources potentially affected by the Proposed Action.
- Jim Lewis Project – A USFS forest restoration project that includes use of Highways 82 and 6563 (Sunspot Scenic Byway) for general project-related travel and as haul routes for timber removal and other project activities. Logging peaks from May to October with some slow down during monsoon season wet weather (July/August), and is slowest during the winter months of December through February. The project is generally expected to yield approximately 200 to 400 loads per year. Some of the log truck traffic may go out via State Routes 130 and 24 through Weed, New Mexico, which is not located along the route to the landfill to be used for the Proposed Action. These logging activities are expected to take place through 2019 and may overlap with the implementation of the Proposed Action, depending on when the selected Alternative is initiated.

- High Altitude Mountain Environment Training Strategy (HAMETS) Helicopter Operations – In 2016, Fort Bliss proposed helicopter flight power management training at up to 18 sites within the Sacramento Ranger District, three of which are within 2 miles of the Observatory. The Army identified a need for training at high altitudes within complex mountainous terrain and variable weather conditions to reduce accident rates resulting in loss of life and equipment. This proposal is under revision and will require environmental review under NEPA. The training activities would be conducted under a long-term agreement with USFS, expected to be 20 years. It is likely that this training, if approved, would coincide with implementation of the Proposed Action. Potential resource conflicts include noise impacts and potential conflicts between Army helicopter operations and demolition activities at the Sacramento Peak Observatory.
- Integrated Non-Native Invasive Plant Management – In June 2016, USFS issued a NOI to prepare an EIS to document and disclose projected effects of its management strategy for treating non-native invasive plants across the Lincoln National Forest. This strategy uses several management tools, including registered herbicides, biological treatments (biological controls and controlled grazing), and manual and/or mechanical methods. The FEIS and decision is expected in January 2019. Implementation of the management strategy for treating non-native invasive plants across the Lincoln National Forest is anticipated to begin in summer 2019. It is possible that management activities conducted as part of this project may overlap with the implementation of the Proposed Action, depending on when the selected Alternative is initiated. All Alternatives under the Proposed Action would result in minor, short-term adverse impacts that are offset by implementation of BMPs designed to minimize incidental impacts to onsite vegetation. Additionally, under Alternative 4, NSF would develop and implement a Vegetation Restoration Management Plan in coordination with the USFS and consistent with the Lincoln National Forest Land and Resources Management Plan. Impacts would be temporary and limited to the developed administrative area, and would not be expected to contribute appreciably to cumulative impacts to regional native or non-native vegetation or any other resources.
- South Sacramento Restoration Project – In April 2017, USFS published a NOI to prepare an EIS to evaluate the environmental effects of its management strategy for restoring forest health on approximately 140,000 acres in the southern Sacramento Mountains, including Sunspot. The restoration strategy would include a variety of management tools including mechanical methods and prescribed fire to achieve forest health and fuel reduction goals. The project will include additional measures to improve wildlife habitat and watershed health and adaptive management options that will allow for treatment flexibility based on site-specific conditions, needs, and objectives. At this time, the alternatives are still under development and no additional information is available. It is unknown if project activities would overlap with implementation of the Proposed Action.

- Lincoln National Forest Plan Revision – USFS is in the process of updating the Forest Plan to provide updated guidance on forest management, use, and protection of the Lincoln National Forest. The project is in its first phase, which consists of outreach, engagement and involvement of the public with the purpose of identifying the existing condition of the Forest. USFS will use comments and issues identified during the assessment phase to develop alternatives to assess in an EIS, scheduled to begin in fall 2017. Alternatives have not been identified at this time and it is unknown if project activities would overlap with implementation of the Proposed Action.

4.13.2 Resources with No Potential for Cumulative Impacts as a Result of the Proposed Action

Resource areas that were not considered in detail in this DEIS due to the lack of potential for noticeable or measurable impacts were not evaluated for cumulative impacts. These resources, described in Section 1.0, *Purpose and Need*, include air quality, climate change, land use, surface waters, and utilities. Additionally, this cumulative impacts analysis does not include resource areas that were evaluated in the DEIS but either have no impacts or the impacts are so slight that the Proposed Action would not meaningfully contribute to cumulative impacts, or the impacts have no potential to interact with the cumulative activities identified and described previously. These resources include biological resources[7], cultural resources, visual resources, geology and soils, groundwater, hazardous materials, solid waste, and socioeconomics.

4.13.3 Resources with Potential for Cumulative Impacts as a Result of the Proposed Action

Based on the analysis provided in this DEIS, some of the past, present, or reasonably foreseeable activities identified have the potential to impact traffic and transportation, noise, and health and safety. Future NMDOT projects and the Jim Lewis Project have the potential to impact traffic and transportation as well as generate an increase in noise associated with the additional traffic along the traffic routes. The increase in traffic has potential to cause an adverse impact on health and safety, particularly public safety. The HAMETS action has potential to affect noise and require special coordination with the installations if blasting is required for the project.

For the purposes of this cumulative impacts analysis, the ROIs for traffic and transportation and health and safety were expanded beyond the area described in Section 3.0, *Environmental Consequences*, to include all alternative routes from the Sacramento Peak Observatory to the Otero-Greentree Regional Landfill, since additional traffic on one road could prompt travelers to use another route. The ROI for noise was also expanded to an area beyond that assessed for environmental consequences, to include

[7] Note that NEPA requires a broader analysis of potential cumulative impacts than the Endangered Species Act. Even with a broader analysis, there was no potential for cumulative impacts to federally listed species.

several known noise "point sources" associated with the HAMETS action. The time frame for the cumulative impacts analysis of these resources will be the duration of the implementation phase of each Alternative, since the activities proposed are not expected to produce any long-term effects on these resources.

4.13.3.1 Traffic and Transportation

The temporary increase in traffic during demolition could interact with planned road construction along the proposed route to the Otero-Greentree Regional Landfill. Lane closures and general disruption of traffic patterns during transportation projects have the potential to adversely impact transportation times as well as redirect traffic to other routes. Temporary travel/weight restrictions placed on roads that have been recently sealed have the potential to prevent haul truck traffic on these roads for several days.

The NMDOT transportation projects that have already been completed or will be completed by the time the Proposed Action is implemented will have minimal potential to contribute to cumulative impacts in conjunction with the Proposed Action.

Implementation of Alternatives 1 and 2 would have a minor, short-term adverse effect on traffic and transportation, and implementation of Alternative 3 would have a short-term beneficial impact on traffic and transportation. As described above, implementation of Alternative 4 would generate an increase in traffic over an estimated 43-week period, which would be noticeable but still minor and short-term. Accordingly, the Proposed Action's impacts to traffic and transportation during the implementation phase are not expected to contribute significantly to cumulative impacts to traffic and transportation.

Operational activities would not contribute to cumulative impacts to traffic and transportation.

4.13.3.2 Health and Safety

Health and safety impacts from the Proposed Action, when combined with potential impacts associated with planned transportation projects, could cause minor cumulative impacts as a result of lane closures and general disruption of traffic. Reduced speeds through work zones has the potential to improve the safety of workers and road users in this area (U.S. Department of Transportation, n.d.). BMPs developed for the Proposed Action and planned transportation projects would further reduce the potential for health and safety risks.

If the HAMETS training is approved, blasting activities under Alternative 4 would be coordinated with USFS and Fort Bliss to ensure that blasting does not coincide with flight operations being conducted near the Sacramento Peak Observatory.

The combined potential impacts to health and safety are not expected to result in an increased cumulative impact to health and safety.

4.13.3.3 Noise

Since noise impacts associated with implementation of Alternatives 1, 2, and 3 are negligible, and noise impacts associated with the operational phase of all Alternatives is negligible, there is no potential to significantly contribute to cumulative impacts to noise in the Proposed Action area. Implementation of Alternative 4 would result in moderate, short-term increases in noise, though the loudest noise would be related to a single blasting event. The discussion below focuses on other sources of noise that could, in combination with noise from implementation of Alternative 4, generate an increase in noise in and around the Sacramento Peak Observatory.

Additional sources of noise identified during this cumulative impacts analysis include: rotary-wing aircraft noise associated with the proposed HAMETS training and noise associated with the increased traffic related to NMDOT projects and the Jim Lewis Project. Of these actions, the proposed HAMETS training has the potential to generate noise impacts that could contribute to cumulative noise impacts. Noise associated with the remaining actions would not be expected to contribute to cumulative impacts to the noise level around the Sacramento Peak Observatory.

As part of the HAMETS training, Army pilots and crews would conduct flight training at high altitudes within the Sacramento Ranger District of the Lincoln National Forest. Due largely to the distance between the Sacramento Peak Observatory and the proposed landing sites, and the forested nature of the intervening land, the effect of noise from the HAMETS training is not expected to be significant, and conversely, the additional impact of noise generated at the Sacramento Peak Observatory during implementation of Alternative 4 to the expanded noise ROI is not expected to be significant. The approach vector associated with use of the landing zones suggests that helicopter traffic over the Sacramento Peak Observatory would be a minimum of 500 feet, and more likely up to 2,000 feet above ground level (Fort Bliss, n.d.).

Noise associated with demolition activities (not including blasting) completed under implementation of all the Alternatives would be moderate and generally confined to the Sacramento Peak Observatory site, though it would also be audible at the Apache Point Observatory. Noise from the single blasting event (Alternative 4) would result in a moderate short-term impact to noise in the project area. To avoid additive effects on noise levels from the Proposed Action and the HAMETS training, blasting activities would be coordinated with USFS and Fort Bliss to ensure that the blasting event does not occur during an active drill. Accordingly, the Proposed Action's impacts to noise during the implementation phase of all Alternatives would not be expected to contribute significantly to the cumulative impacts to noise in the area of the Observatory.

4.13.3.4 Summary of Cumulative Impacts

Cumulative impacts to the resources of concern are listed in Table 4.13-1.

TABLE 4.13-1
Summary of Cumulative Impacts to Resources of Concern

	Alternatives				
Resource	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**No Action**
Traffic and Transportation	No significant adverse impact	No significant adverse impact	No significant adverse impact	No significant adverse impact	No impact
Health and Safety	No significant adverse impact	No significant adverse impact	No significant adverse impact	No significant adverse impact	No impact
Noise	No significant adverse impact	No significant adverse impact	No significant adverse impact	No significant adverse impact	No impact

4.14 Irreversible and Irretrievable Commitment of Resources

Irreversible or irretrievable resource commitments are related to the use of nonrenewable resources and the effects that use or loss of those resources would have on future generations. These effects primarily result from the use or conversion of a specific resource (e.g., energy from hydrocarbons) that cannot be replaced within a reasonable time frame. Irreversible or irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored after implementing a Proposed Action.

The effects would be similar for all four Alternatives. Demolition, paving, and vegetation clearing under all Alternatives would consume electricity, hydrocarbon fuels, and water and would require landfill disposal. Demolition and paving materials would be recycled and reused to the extent practicable; however, some irreversible or irretrievable resource loss would result. Demolition debris would lead to the irreversible or irretrievable resource loss in the reduction of landfill capacity. However, the capacity of the nearest landfill to accept demolition waste is adequate. The hydrocarbon-based energy required to conduct these activities or to procure the finished materials would be permanently lost.

Demolition, paving, and vegetation clearing would result in some loss of vegetated areas under all Alternatives. Many of the areas have been previously disturbed but demolition may affect vegetation or habitat in areas that support biological resources. The loss of vegetation and wildlife habitat from proposed activities could be mostly reversed through landscaping or subsequent restoration. Clearing of vegetation would not result in an irreversible or irretrievable commitment of resources.

Loss of cultural resources would represent an irretrievable action, but any such losses that may result from implementation of the Proposed Action, under any of the Alternatives, would be appropriately mitigated through consultation with the SHPO, interested tribes, and other consulting parties.

4.15 Short-Term Uses of the Environment and Maintenance and Enhancement of Long-Term Productivity

Short-term uses of the environment associated with the Proposed Action, under any of the Alternatives, would result in impacts to certain resources that could affect the maintenance and enhancement of long-term productivity. Increased soil erosion could result from soil disturbance during demolition activities under Alternatives 1, 2, 3, and 4. Air quality could be affected by increased dust and vehicle emissions from demolition activities. Demolition could also generate increased noise. However, the following environmental protection measures would be implemented to lessen these effects:

- Implementation of standard practices to reduce soil erosion, control noise, and improve safety
- Adherence to management plans and programs
- Compliance with federal, state, and local regulations

SECTION 5.0

Notification, Public Involvement, and Consulted Parties

5.1 Agency Notification and Collaboration

NSF began the process of communication with federal and state regulatory agencies, along with elected officials, community groups, and relevant commercial interests, in July 2016 (Table 5.1-1). Involvement activities to date include sending scoping invitation letters to identified stakeholders, a public scoping meeting, and discussions and correspondence with the New Mexico SHPO and USFS. On July 22, 2016, USFS requested to be a cooperating agency for this NEPA process.

TABLE 5.1-1
Agency and Stakeholder Communication

Federal	ACHP USACE USFWS USFS U.S. Department of Agriculture/Natural Resources Conservation Service U.S. Senate, State of New Mexico U.S. House of Representatives, State of New Mexico
New Mexico	Office of Governor of New Mexico New Mexico State Senate New Mexico House of Representatives New Mexico Environment Department New Mexico State Historic Preservation Officer NMDGF New Mexico Surface Water Quality Bureau New Mexico State Forestry Division NMSU
Otero County	Otero County Commission Otero Soil and Water Conservation District
Village of Cloudcroft	Cloudcroft Chamber of Commerce
City of Alamogordo	Mayor of Alamogordo Alamogordo City Commission Alamogordo Chamber of Commerce
Other Public-Private Stakeholder Organizations	Apache Point Observatory American Astronomical Society, Solar Physics Division

Regulatory agency staff provided comments that helped NSF focus on the issues to be considered in the NEPA process. As a result of a review of resources and coordination with regulatory agencies, NSF initiated consultation under Section 106 of the NHPA and Section 7 of the ESA. A summary of these consultation requirements and efforts made to date is included below.

5.1.1 Section 106 Consultation Process

This section describes the Section 106 consultation process and identifies the Section 106 Consulting Parties. As stated in 36 C.F.R. §800.1:

> *Section 106 of the National Historic Preservation Act requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Council [Advisory Council on Historic Preservation (ACHP)] a reasonable opportunity to comment on such undertakings. The procedures in this part define how federal agencies meet these statutory responsibilities. The Section 106 process seeks to accommodate historic preservation concerns with the needs of federal undertakings through consultation among the agency official and other parties with an interest in the effects of the undertaking on historic properties, commencing at the early stages of project planning. The goal of consultation is to identify historic properties potentially affected by the undertaking, assess its effects, and seek ways to avoid, minimize or mitigate any adverse effects on historic properties.*

In compliance with Section 106, NSF engaged parties interested in potentially affected historic properties in accordance with Section 106 of the NHPA.

Table 5.1-2 summarizes the Section 106 consultation to date.

TABLE 5.1-2
Section 106 Consultation Process

Action	Date	Details
Intensive Architectural Survey at the Sacramento Peak Observatory	January 26–27, 2015	Historic built environment resources were evaluated for potential eligibility for listing in the NRHP. The evaluation included all facilities that were more than 45 years old at the time of the survey. A total of 65 architectural resources constructed in or before 1970 (and owned by NSF) were identified as extant within the APE and were evaluated for NRHP-eligibility.
Public Scoping Initiated	July 5, 2016	NOI was published in the *Federal Register*. A copy of the NOI was sent via email to potential stakeholders from federal, tribal, state, and local government agencies, as well as other organizations including universities, elected officials, and other potentially interested parties.
Public Scoping Notice	July 7, 2016	A notice of the public scoping meeting letter was mailed to the SHPO and ACHP.
NEPA Public Scoping Meeting	July 21, 2016	Public meeting held in Alamogordo, New Mexico. NSF provided an opportunity for individuals and organizations to express an interest in participating as Section 106 consulting parties. Three individuals expressed interest.
SHPO Response to the NEPA Public Scoping Letter	July 22, 2016	SHPO stated that the Alternatives have the potential to adversely affect historic properties and that their office did not have a record of a historic building survey being conducted at the Sacramento Peak Observatory. SHPO encouraged NSF to initiate Section 106 as soon as possible and stated an interest in reviewing this DEIS.
Email to Potential Consulting Parties	July 28, 2016	NSF contacted the three individuals who had expressed interest in Section 106 consultation during the NEPA public scoping meetings to provide further details about the Section 106 consultation process and to confirm their consulting party status for the Proposed Action. Parties were given until August 11, 2016, to confirm their interest in consulting party participation. A response

TABLE 5.1-2
Section 106 Consultation Process

Action	Date	Details
		was received from one individual, Mark Klaene of the Apache Point Observatory, who requested to be a Consulting Party.
Response from Potential Consulting Party	August 4, 2016	NSF received a letter from Kevin Reardon of the National Solar Observatory, who expressed interest in the Section 106 process.
Initiated Section 106 Consultation with SHPO, Request Concurrence on APE and Determinations of Eligibility, Transmit Reports	August 24, 2016	NSF requested concurrence with the APE and the determination that there are two telescopes at the Sacramento Peak Observatory that are individually eligible for listing in the NRHP and that the Sacramento Peak Observatory is eligible for the NRHP as a historic district. NSF also requested concurrence that there are no known archaeological sites on the Sacramento Peak Observatory site. The letter initiated formal Section 106 consultation with the New Mexico SHPO. The package included transmittal of two reports: *Cultural Resources Evaluation, National Solar Observatory (Sacramento Peak Observatory), Sunspot, New Mexico* (CH2M, 2015) and the *Archaeological Survey of 36 HA for AURA Inc. at the National Solar Observatory, Sunspot, Otero County, New Mexico, January 1995* (Shields, 1995).
Email from USFS to NSF	September 14, 2016	USFS acknowledged that NSF would serve as the lead federal agency for the proposed undertaking and agreed to serve as a Consulting Party.
Email from SHPO to NSF regarding APE	September 15, 2016	SHPO concurred with the proposed APE and concurred that the Alternatives have the potential to adversely affect historic properties. SHPO requested that Historic Cultural Preservation Inventory (HCPI) forms be completed for the 65 architectural resources built in or before 1970.
Conference Call with SHPO and USFS	September 15, 2016	Discussed the SHPO response received earlier that day. NSF agreed to complete HCPI forms for 65 architectural resources.
Initiate Tribal Consultation	December 2, 2016	Consultation letters were sent to four tribes: Mescalero-Apache Tribe, Hopi Tribe, Pueblo of Zuni, and Fort McDowell Yavapai Nation.
Tribal Consultation	December 12, 2016	The Hopi Tribe provided the following response: “No historic properties significant to the Hopi Tribe affected.”
HCPI Forms Submitted to SHPO	December 20, 2016	Per SHPO’s request, NSF submitted the HCPI forms for 65 architectural resources for review via the New Mexico Cultural Resources Information System on December 19, 2016. The next day, NSF also transmitted hard copies of the completed HCPI Base Forms, including a cover letter requesting concurrence on NSF’s determinations of eligibility.
Conference Call with USFS	January 10, 2017	NSF and USFS discussed the USFS’s comments on cultural resources and determinations of eligibility. USFS requested to be copied on all future correspondence with SHPO and also requested copies of the HCPI forms. NSF provided the USFS with electronic copies of the HCPI forms.
SHPO Letter to NSF regarding a request for additional information	January 18, 2017	SHPO acknowledged receipt of the HCPI forms. Additionally, following a November 2016 site visit and discussions with USFS, SHPO determined that the Sacramento Peak Observatory’s significance is as a historic district and noted that determining individual significance of any features or structures is not recommended. SHPO also noted that certain additional landscape features such as roads, open spaces, playground, wells, retaining walls, and historic archaeological foundations should be considered as elements of the historic district and recommended that NSF document these landscape features on Laboratory of Anthropology Forms and prepare an expanded historical context for the Sacramento Peak Observatory.
Conference Call with USFS	February 14, 2017	NSF discussed the APE and HCPI forms with USFS, in preparation for the conference call with SHPO on February 15, 2017.

TABLE 5.1-2
Section 106 Consultation Process

Action	Date	Details
Conference Call with SHPO regarding APE	February 15, 2017	NSF, USFS, and SHPO participated in a teleconference to discuss the revised proposed APE and path forward for Section 106 consultation. SHPO submitted a letter to NSF, dated March 1, 2017, to summarize the call.
Conference Call Summary from SHPO	March 1, 2017	SHPO stated that no further archaeological survey work would be required but recommended that the APE be the same as the Compound Area defined in the Land Use Agreement. SHPO requested that NSF consult with the USFS regarding revisions to the HCPI forms and documentation for the additional landscape features. SHPO also noted that an MOA will be required to resolve adverse effects.
Continued Tribal Consultation Efforts	March 1, 2017	NSF left a voicemail for the Kiowa tribe to inquire if the tribe has an interest in the Sacramento Peak Observatory area.
Conference Call with USFS	March 24, 2017	NSF discussed the APE and Section 106 consultation approach with USFS.
Conference Call with USFS	March 31, 2017	NSF discussed the HCPI forms and APE with USFS. USFS disagreed with NSF's approach for completing the HCPIs and the associated determinations of eligibility.
Conference Call with USFS	April 10, 2017	NSF discussed USFS's edits to the HCPI forms. USFS agreed that NSF's approach for the determinations of eligibility was sufficient for Section 106 purposes. NSF agreed to add the name of relevant architects to the HCPI forms where appropriate.
Revised HCPI Forms Submitted via NMCRIS	April 27, 2017	Following additional coordination with USFS and SHPO, the HCPI forms were revised to include additional information regarding the primary architects for the site. The revised forms were resubmitted to the SHPO via NMCRIS.
Continued Tribal Consultation Efforts	April 27, 2017	NSF sent an email to the Kiowa tribe to inquire if they have an interest in the Observatory area and if they would like to receive copies of the DEIS and/or be involved during the Section 106 consultation process.
Revised HCPI Forms Submitted to USFS	April 28, 2017	NSF sent electronic versions of the revised HCPI forms to the USFS along with the draft cover letter to SHPO, for reference and review.
NSF Letter to SHPO regarding revised APE and Determination of Eligibility	May 4, 2017	NSF requested SHPO concurrence on the revised APE and the determination that the Sacramento Peak Observatory is eligible for the NRHP as a historic district, containing 63 contributing resources, including two individually eligible telescopes.
Email from NSF to SHPO regarding request for concurrence	May 18, 2017	NSF contacted SHPO by email to confirm that the request for concurrence on the APE and NRHP eligibility was received. SHPO confirmed that the letter was received and that a response would be provided within the allotted 30-day review period.
Continued Tribal Consultation Efforts	May 18, 2017	NSF called the Zuni, Mescalero Apache, and Yavapai tribes to inquire if they were interested in participating in consultation efforts described in the December 2, 2016 consultation letter. Pueblo of Zuni provided email address and requested to be provided any updates. Voicemails were left for the Mescalero Apache and Yavapai tribes.
Concurrence from SHPO on Determinations of Eligibility	May 18, 2017	SHPO concurred that the Sacramento Peak Observatory is eligible for the NRHP as a historic district with 63 contributing resources, including the two telescopes. SHPO requested that heliport landing area should be included as a contributing resource and that a HCPI form should be completed to document the resource. SHPO did not concur with the proposed APE, but recommended that it be defined as the larger Compound Area (also referred to as the overall property limits) identified in the NSF and USFS land use agreement.

TABLE 5.1-2
Section 106 Consultation Process

Action	Date	Details
SHPO Letter to NSF providing concurrence on APE	July 11, 2017	SHPO concurred with NSF's proposed revisions to the APE, the revised historic district boundary, and approach for documenting the helicopter landing area.
Assessment of Effects Submitted to SHPO, USFS, and APO	October 31, 2017	NSF sent email and hard copies of the Assessment of Effects to SHPO, USFS, and APO for review.
SHPO Letter to NSF regarding preparation of a PA	November 21, 2017	SHPO received the NSF's Assessment of Effects report and agrees with NSF's recommendation to pursue a PA. SHPO identified a point of contact.
Notification of Adverse Effect and Invitation to Participate in Section 106 Process	December 5, 2017	ACHP notified of finding of potential Adverse Effect and development of the PA.
Letter to Potential Consulting Party	December 7, 2017	NSF sent an email to Kevin Reardon of the National Solar Observatory to inquire if he would like to be a Consulting Party during the Section 106 process. Mr. Reardon replied on December 8, 2017 to confirm his interest. In response, NSF sent Mr. Reardon a copy of the Assessment of Effects report for review.
ACHP Letter to NSF regarding Section 106 consultation	December 22, 2017	NSF notified of ACHP's intent to participate in the Section 106 consultation process. A point of contact for ACHP was identified.

5.1.1.1 Section 106 Consultation Chronology

Advisory Council on Historic Preservation

The ACHP was notified on July 7, 2016 of the intent by NSF to prepare an EIS for the Sacramento Peak Observatory. NSF notified the ACHP of the undertaking's adverse effect on historic properties on December 5, 2017 and asked if the ACHP wished to participate in the Section 106 consultation process. The ACHP responded in a letter dated December 22, 2017, and indicated ACHP will participate in the Section 106 consultation process.

New Mexico State Historic Preservation Office

The SHPO is the responsible New Mexico entity with which NSF is required, pursuant to the NHPA, to engage in Section 106 consultation regarding the Proposed Action, defined as the undertaking for Section 106. A notice of the public scoping meeting was sent to the SHPO on July 7, 2016. NSF initiated Section 106 consultation with the New Mexico SHPO on August 24, 2016. Consultation continued between NSF and SHPO regarding the APE for the proposed undertaking, until the SHPO requested that the APE be defined as the overall property limits (Compound Area) on March 1, 2017 and May 18, 2017, at which point NSF agreed. On September 15, 2016, SHPO requested that NSF complete HCPI forms for the 65 historic-era buildings and structures that were surveyed in 2015. NSF submitted the forms to SHPO electronically on December 19, 2016, and in hard copy on December 20, 2016. At the request of SHPO,

revised versions of the HCPI forms were re-submitted electronically on April 27, 2017. The SHPO concurred with the determinations of eligibility on May 18, 2017. A cultural resources assessment of effects technical report with an expanded historical context that included additional information about the historic district's development and design was submitted to SHPO on October 31, 2017 (see Appendix 5F).

Identification of Consulting Parties

USFS acknowledged by email on September 14, 2016, that NSF would serve as the lead federal agency in the Section 106 consultation regarding the proposed undertaking. USFS agreed to serve as a Consulting Party during the consultation process.

Individual participants at the public scoping meeting were offered the opportunity to participate as a Consulting Party. The Section 106 process was explained during the NSF public scoping meeting presentation. Additionally, public scoping meeting participants were asked to sign in for each meeting and check a box on the attendance sheet if the meeting participant wished to be considered a Consulting Party as part of the Section 106 process. Three individuals checked the box. NSF sent a confirmation email on July 28, 2016, to these three attendees, and the first individual listed in Table 5.1-3 replied to the email and requested to be a Consulting Party. Additionally, NSF received a letter dated August 4, 2016 from an individual expressing interest in the Section 106 process, and confirmed his interest in becoming a Consulting Party on December 8, 2017; this individual is listed second in Table 5.1-3.

TABLE 5.1-3
Potential Section 106 Consulting Parties

Name	Organization
Mark Klaene	Apache Point Observatory
Kevin Reardon	National Solar Observatory

As part of the Section 106 process, Consulting Parties will be formally invited to participate in the Section 106 process. Letters will be distributed notifying the Consulting Parties of a meeting to discuss a draft PA to resolve potential adverse effects from the Proposed Action.

Tribal Consultation

On December 2, 2016, NSF initiated government-to-government consultation under Section 106 with the following tribes: Mescalero Apache, Hopi, Zuni, and Yavapai. On December 12, 2016, the Hopi Tribe provided the following response: "No historic properties significant to the Hopi Tribe affected." On March 1, 2017, NSF left a voicemail for the Kiowa Tribe to inquire if it had an interest in the Sacramento Peak Observatory area. NSF followed up on April 27, 2017, with an email sent to the Kiowa Tribe to inquire if they would like to be included in the Section 106 process. On May 18, 2017, NSF called the Zuni, Mescalero Apache, and Yavapai tribes to see if they were interested in participating in consultation

efforts described in the December 2, 2016 consultation letter. The Pueblo of Zuni provided an email address and requested that they be provided any updates. No other responses were received.

Public Invitation to Participate

The public will be invited to review the draft PA.

5.1.2 Section 7 Consultation Process

The ESA directs all federal agencies to work to conserve endangered and threatened species. Section 7 of the ESA, called "Interagency Cooperation," is the mechanism by which federal agencies ensure the actions they take do not jeopardize the existence of any listed species. The action agency, which is NSF for this Proposed Action, must first determine which ESA-listed species or designated critical habitat occur in their project area. This information can be obtained from USFWS.

The next step is for the action agency to determine if ESA consultation is required. Consultation is not required if the action agency determines that the proposed project will have "no effect" on listed species or designated critical habitat, either because the species will not be present or the project does not have the potential to affect the species or critical habitat. If listed species or critical habitat may be affected, then consultation is required. If the federal agency, after discussions with USFWS, determines that the proposed action is not likely to adversely affect any listed species in the project area, and if the USFWS concurs, the informal consultation is complete and the proposed project moves ahead. If it appears that the agency's action may affect and is likely to adversely affect a listed species, that agency must enter into formal consultation with USFWS.

5.1.2.1 Section 7 Consultation Chronology

A letter was sent to the New Mexico Ecological Services Field Office on July 7, 2016, to solicit scoping comments from USFWS. No response was received with regard to scoping concerns; however, NSF coordinated with USFWS via email to confirm the correct point of contact and contact information for future coordination on EIS efforts and review of the BA.

NSF generated an official species list using the USFWS IPaC tool on September 12, 2016 in order to prepare the Draft BA. A second species list was generated using the IPaC tool on February 28, 2017 to verify that the listed species were still current prior to finalizing the BA.

Because the Sacramento Peak Observatory is located on National Forest System lands, NSF also coordinated with USFS during preparation of the BA.

NSF provided the BA to USFWS with a request for informal consultation on June 15, 2017. The USFWS agreed with the findings of NSF's BA and concluded consultation under Section 7 in a letter dated July 25, 2017.

Refer to Appendix 5A of the BA for a detailed list of Section 7 coordination efforts between NSF, USFS, and USFWS.

5.2 Public Disclosure and Involvement

NSF notified, contacted, or coordinated with regulatory agencies, individuals, and organizations throughout this NEPA process. Details of public and agency disclosure and involvement regarding the preliminary Alternatives are described in this section. Public notification efforts included sending scoping notification letters to identified stakeholders, media announcements, social media announcements, website updates, notices in scientific publications, newspaper public notices, and a public scoping meeting (conducted on July 21, 2016, in Alamogordo, New Mexico).

5.2.1 Public Notices

NSF published an NOI in the *Federal Register* on July 5, 2016. A copy of this NOI is provided in Appendix 5A. A newspaper announcement was published in the *Alamogordo Daily News* (Otero County circulation) on July 10, 2016, and a newspaper announcement was published on July 12, 2016 in the *Albuquerque Journal* (New Mexico circulation). Copies of the newspaper announcements are provided in Appendix 5B.

5.2.2 Public Scoping Meeting

NSF conducted a public scoping meeting to introduce the preliminary Alternatives to the meeting attendees. The public scoping meeting was held on July 21, 2016, from 6:00 p.m. to 8:00 p.m., at the New Mexico Museum of Space History (3198 State Route 2001, Alamogordo, New Mexico 88310).

The purpose of the public scoping process was to determine the relevant issues that would influence the scope of the environmental analysis, including identification of viable Alternatives, and to provide input into the development of the scope of the EIS. The public scoping meeting provided an opportunity for the public to comment on the preliminary Alternatives and identify potential concerns, both positive and negative.

A public meeting will also occur after the publication of this DEIS in February 2018. The intent of this meeting is to receive comments on this DEIS from agencies and the public.

At the public scoping meeting, individuals were requested to sign an attendance sheet, view and receive information regarding the preliminary Alternatives, and attend a presentation by NSF regarding the environmental compliance process. The public was given the opportunity to provide comments about issues and concerns. Additionally, attendees were invited to indicate whether they wished to be included as a Consulting Party under Section 106 of the NHPA. A court reporter recorded the meeting and the official meeting transcript is provided in Appendix 5D.

Table 5.2-1 lists the number of participants who registered at the meeting and the number who provided oral comments. The number of registered participants is based on the number of individuals who signed

the attendance sheet. The list of the attendees who provided oral comments is included in the official meeting transcript (Appendix 5D).

TABLE 5.2-1
Summary of Scoping Meeting Participants

Meeting Location	Registered Participants	Number of Speakers
Alamogordo, New Mexico	18	3

The public scoping meeting included an open house for the first half-hour, which allowed participants to review the meeting informational boards and handouts. This open house segment was followed by a brief presentation by NSF that covered the following topics:

- Introductions
- Background information on the preliminary Alternatives
- Initial identification of resource areas to be studied
- The EIS, NHPA, and ESA processes and opportunities for public involvement

Copies of the informational boards, handouts, and NSF presentation are provided in Appendix 5C.

After the completion of the NSF presentation, the public was invited to provide oral comments. The presentation and the oral comments were transcribed by the court reporter and are included in the official meeting transcript (Appendix 5D). The public was encouraged to provide written comments during the meeting and/or via regular mail or email. Comment forms with submittal instructions were provided; comments could be mailed to NSF at the following address: Ms. Elizabeth Pentecost, RE: Sacramento Peak Observatory, National Science Foundation, Suite 1045, 4201 Wilson Blvd., Arlington, VA 22230; or emailed to envcomp-AST@nsf.gov, with the subject line “Sacramento Peak Observatory.”

Oral Comments Received at the Public Scoping Meeting

Oral comments received during the public scoping meeting are provided in the official meeting transcript (Appendix 5D) and are summarized as follows.

Demolition Costs: One comment requested cost estimates for proposed demolition and restoration activities.

General: One comment cited potential areas of contamination at the Sacramento Peak Observatory.

Alternatives Considerations: Two commenters noted the importance of considering educational and tourism impacts.

Interested Party Considerations: One commenter requested additional information about the proposed transition of operations to interested parties for solar astronomy research.

Decision Process: One comment requested additional information regarding the EIS schedule and public comment periods.

Written Comments Received at the Public Scoping Meeting

One written comment was submitted at the public scoping meeting. This comment cited potential areas of contamination at the Sacramento Peak Observatory and included a question regarding the continued use of the Visitor Center. The written comment received at the public scoping meeting is included in the matrix of all comments received provided in Appendix 5E.

5.2.3 Scoping Period Comments

The public was encouraged to comment during the scoping public comment period (July 5 through August 5, 2016). Comments received during the scoping comment period were reviewed and evaluated by NSF, and considered during the analysis in this EIS. The following discussion summarizes the comments, and Table 5.2-2 quantifies the comments by category. A matrix of the comments received, including the assigned category, is provided in Appendix 5E.

TABLE 5.2-2
Comments Summarized by Category

Category	Description	Number of Comments
Alternative Considerations	Comment regarding preliminary Alternatives	1
Against Closure	Consideration of historic structures and events	1
Against Closure	Consideration of scientific and historical use	1
Against Closure	Consideration of education, historical use, and socioeconomics	1

The following is a summary of the written comments received during the public scoping comment period.

Alternative Considerations

One comment expressed preference for the No Action Alternative or transition to full operations with interested parties for solar astronomy research (Alternative 1).

Against Closure

Individuals concerned with closure presented the following issues:

- **Cultural:** One comment cited the historical importance of the Sacramento Peak Observatory to scientific research, architectural design, and cultural use.
- **Research:** One comment cited the importance of the Sacramento Peak Observatory for past and current scientific research.
- **Education:** One comment cited the importance of the Sacramento Peak Observatory as an educational resource and tourism destination.

- **Socioeconomics:** One comment cited the significance of the Sacramento Peak Observatory in the economics of Otero County.

SECTION 6.0

List of Preparers

TABLE 6.1-1
List of Preparers

Name	Role	Education	Years of Experience
Andrea Naccarato	Project Manager	B.S. Biology	17
Paul Thies	Senior Technical Reviewer	Ph.D. Civil and Environmental Engineering M.S. Water Resources B.S. Forestry	37
Mark Greenig	Senior Technical Reviewer	M.U.P. Urban Planning B.S. Landscape Architecture	25
Stephen Petron	Senior Technical Reviewer/Quality Assurance	Ph.D. Zoology M.S. Natural and Environmental Resources B.S. Wildlife Management	25
Michelle Rau	NEPA	M.S. Business Administration B.S. Ecology and Evolutionary Biology	19
Sara Jackson	NEPA	B.S. Environmental Studies	17
Richard Reaves	Biology	Ph.D. Wetland and Wildlife Ecology B.S. Wildlife Ecology and Resource Management	23
Matt Jenkins	Biology	M.S. Environmental Science B.S. Botany	13
Lori Price	Cultural Resources / Section 106	M.F.A. Historic Preservation and Architectural History B.A. English and Political Science	21
MaryNell Nolan-Wheatley	Cultural Resources/Section 106/ Visual Resources	M.P.S. Preservation Studies B.A. Anthropology	5
Liz Luecker	Hazardous Waste	B.S. Engineering	36
Larry Sly	Noise	B.S. Finance	22
Tim Nittler	Transportation	B.S. Civil Engineering	26
Joe Thacker	Geology, Groundwater, Cumulative Impacts	M.S. Geology B.S. Geology	24
Heather Dyke	Socioeconomics and Environmental Justice	M.C.P Environmental Planning B.A. Business Administration	22

SECTION 7.0

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SECTION 8.0

Acronyms and Abbreviations

AAAC	Astronomy and Astrophysics Advisory Committee
ACHP	Advisory Council on Historic Preservation
ACM	asbestos-containing material
ACS	American Community Survey
AFB	Air Force Base
amsl	above mean sea level
AO	Adaptive Optics
APE	Area of Potential Effects
AST	Division of Astronomical Sciences
ASTM	ASTM International
ATST	Advanced Technology Solar Telescope
BA	Biological Assessment
bgs	below ground surface
BMP	best management practice
C.F.R.	*Code of Federal Regulations*
CEQ	Council on Environmental Quality
CH2M	CH2M HILL, Inc.
COC	chamber of commerce
dB	decibel(s)
dBA	A-weighted noise sound level
DEIS	Draft Environmental Impact Statement
DKIST	Daniel K. Inouye Solar Telescope
DOE	U.S. Department of Energy
DRECP	Desert Renewable Energy Conservation Plan
DST	Richard B. Dunn Solar Telescope

E.O.	Executive Order
EBS	Environmental Baseline Study
EDR	Environmental Data Resources, Inc.
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
FEIS	Final Environmental Impact Statement
FSAT	Full-scale Aerial Target
GHG	greenhouse gas
HAMETS	High Altitude Mountain Environment Training Strategy
HCPI	Historic Cultural Preservation Inventory
IPaC	Information for Planning and Conservation
JLUS	Joint Land Use Study
km	kilometer(s)
LBP	lead-based paint
Leq	equivalent sound level
Leq(h)	hourly equivalent sound level
LWA	Long Wavelength Array
MBTA	Migratory Bird Treaty Act
MIS	management indicator species
MM	mile marker
MOA	Memorandum of Agreement
MPS	Mathematical and Physical Sciences
MPSAC	Advisory Committee for the Directorate for Mathematical and Physical Sciences
NAAQS	National Ambient Air Quality Standards
NATA	National Air Toxics Assessment
NEPA	National Environmental Policy Act of 1969

NHPA	National Historic Preservation Act of 1966
NM	New Mexico
NMBCA	Neotropical Migratory Bird Conservation Act
NMDGF	New Mexico Department of Game and Fish
NMDOT	New Mexico Department of Transportation
NMDWS	New Mexico Department of Workforce Solutions
NMPED	New Mexico Public Education Department
NMSU	New Mexico State University
NMTD	New Mexico Tourism Department
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRC	National Research Council
NRHP	National Register of Historic Places
NSA	noise-sensitive area
NSO	National Solar Observatory
NSF	National Science Foundation
NTMB	neotropical migratory bird
O&M	operations and maintenance
OCEDC	Otero County Economic Development Council
OSHA	Occupational Health and Safety Act of 1970
PA	Programmatic Agreement
PAC	Protected Activity Center
PCB	polychlorinated biphenyl
PCE	primary constituent element
PCS	petroleum-contaminated soil
PFA	post-fledging family area

PPE	personal protective equipment
PRC	Portfolio Review Committee
REC	recognized environmental condition
RF	Regional Forester
ROD	Record of Decision
ROI	region of influence
SHPO	State Historic Preservation Office or Officer
SMA	Souder, Miller and Associates
SPCC	Spill Prevention Control and Countermeasures
SR	senior report
STEM	Science, Technology, Engineering, and Math
SWPPP	stormwater pollution prevention plan
TCP	traditional cultural property
U.S.	United States
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USCB	U.S. Census Bureau
USDE	U.S. Department of Education
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VLA	Very Large Array

SECTION 9.0

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Appendix 3A

Correspondence

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

DIVISION OF ASTRONOMICAL SCIENCES

July 7, 2016

Ms. Elizabeth Humphrey
District Manager, Lincoln National Forest
U.S. Forest Service
P.O. Box 288
4 Lost Lodge Road
Cloudcroft, NM 88317

Subject: NEPA Analysis for Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, New Mexico

Dear Ms. Humphrey:

In compliance with the National Environmental Policy Act of 1969 (NEPA), as amended, the National Science Foundation (NSF) intends to prepare an Environmental Impact Statement (EIS) to evaluate potential environmental effects of proposed changes to operations at the Sacramento Peak Observatory, in Sunspot, New Mexico. The Notice of Intent for this EIS was published in the Federal Register on July 5, 2016 to initiate the public scoping for the EIS.

At present, alternatives under consideration for inclusion in the EIS include the following:

- Continued NSF investment for science-focused operations (No-Action Alternative)
- Transition to full operations with interested parties for solar astronomy research
- Transition to partial operations with interested parties, and decommissioning or mothballing of facilities not proposed to be used
- Mothballing of facilities limited to basic maintenance
- Deconstruction and site restoration

At this time, NSF is soliciting scoping comments from your agency to determine relevant issues that will influence the scope of the environmental analysis, including identification of viable alternatives, and guide the process for developing the EIS. At present, NSF has identified the following preliminary resource areas for analysis of potential impacts: air quality, biological resources, cultural resources, geological resources, solid waste generation, health and safety, socioeconomics, traffic, and groundwater resources.

NSF will conduct a scoping meeting on Wednesday July 21, 2016 at the location shown below.

New Mexico Museum of Space History
3198 State Route 2001
Alamogordo, New Mexico 88310
575-437-2840

Your agency may provide comments at any time during the development of the EIS. However, if you would like your comments to be considered and included in the Draft EIS that will be provided for public and agency review, please provide your comments by August 5, 2016.

The NSF point of contact for the NEPA analysis is Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, Virginia 22230; telephone: (703) 292–4907; email: epenteco@nsf.gov.

We appreciate your assistance in this matter and look forward to your response. If you require any additional information or documentation, please contact Ms. Pentecost.

Sincerely,

James S Ulvestad

James S. Ulvestad
Division Director
Division of Astronomical Sciences

Cc: Caroline Blanco, NSF/OGC
Elizabeth Pentecost, NSF/AST
Darren Bishop, Ch2M

Enclosure:
Project Location Map

Aerial photo source: Google ©2015, modified by CH2M HILL

North

0 250 500

Approximate scale in feet

ti

Sacramento

ch2m:

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NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

DIVISION OF ASTRONOMICAL SCIENCES

July 7, 2016

Mr. Wally Murphy
Field Supervisor
U.S. Fish and Wildlife Service
New Mexico Ecological Services Field Office
2105 Osuna Road NE
Albuquerque, NM 87113

Subject: NEPA Analysis for Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, New Mexico

Dear Mr. Murphy:

In compliance with the National Environmental Policy Act of 1969 (NEPA), as amended, the National Science Foundation (NSF) intends to prepare an Environmental Impact Statement (EIS) to evaluate potential environmental effects of proposed changes to operations at the Sacramento Peak Observatory, in Sunspot, New Mexico. The Notice of Intent for this EIS was published in the Federal Register on July 5, 2016 to initiate the public scoping for the EIS.

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Sincerely,

James S Ulvestad

James S. Ulvestad
Division Director
Division of Astronomical Sciences

Cc: Caroline Blanco, NSF/OGC
Elizabeth Pentecost, NSF/AST
Darren Bishop, Ch2M

Enclosure:
Project Location Map

Aerial photo source: Google ©2015, modified by CH2M HILL

North

0 250 500

Approximate scale in feet

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Sacramento

ch2m:

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NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

DIVISION OF ASTRONOMICAL SCIENCES

July 7, 2016

Mr. John M. Fowler
Executive Director
Advisory Council on Historic Preservation
401 F Street NW, Suite 308
Washington, DC 20001-2637

Subject: NEPA Analysis for Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, New Mexico

Dear Mr. Fowler:

In compliance with the National Environmental Policy Act of 1969 (NEPA), as amended, the National Science Foundation (NSF) intends to prepare an Environmental Impact Statement (EIS) to evaluate potential environmental effects of proposed changes to operations at the Sacramento Peak Observatory, in Sunspot, New Mexico. The Notice of Intent for this EIS was published in the Federal Register on July 5, 2016 to initiate the public scoping for the EIS.

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Sincerely,

James S. Ulvestad
Division Director
Division of Astronomical Sciences

Cc: Caroline Blanco, NSF/OGC
Elizabeth Pentecost, NSF/AST
Darren Bishop, Ch2M

Enclosure:
Project Location Map

Aerial photo source: Google ©2015, modified by CH2M HILL

North

0 250 500

Approximate scale in feet

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Sacramento

ch2m:

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NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

DIVISION OF ASTRONOMICAL SCIENCES

July 7, 2016

Dr. Jeffrey Pappas
New Mexico State Historic Preservation Officer
New Mexico State Historic Preservation Division
Bataan Memorial Building
407 Galisteo Street, Suite 236
Santa Fe, NM 87501

Subject: NEPA Analysis for Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, New Mexico

Dear Dr. Pappas:

In compliance with the National Environmental Policy Act of 1969 (NEPA), as amended, the National Science Foundation (NSF) intends to prepare an Environmental Impact Statement (EIS) to evaluate potential environmental effects of proposed changes to operations at the Sacramento Peak Observatory, in Sunspot, New Mexico. The Notice of Intent for this EIS was published in the Federal Register on July 5, 2016 to initiate the public scoping for the EIS.

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Your agency may provide comments at any time during the development of the EIS. However, if you would like your comments to be considered and included in the Draft EIS that will be provided for public and agency review, please provide your comments by August 5, 2016.

The NSF point of contact for the NEPA analysis is Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, Virginia 22230; telephone: (703) 292–4907; email: epenteco@nsf.gov.

We appreciate your assistance in this matter and look forward to your response. If you require any additional information or documentation, please contact Ms. Pentecost.

Sincerely,

James S Ulvestad

James S. Ulvestad
Division Director
Division of Astronomical Sciences

Cc: Caroline Blanco, NSF/OGC
Elizabeth Pentecost, NSF/AST
Darren Bishop, Ch2M

Enclosure:
Project Location Map

Aerial photo source: Google ©2015, modified by CH2M HILL

North

0 250 500

Approximate scale in feet

Sacramento

ch2m:

EN0310151054SAC Fig_1-1_proj_loc_map_DCR_07-02-15 dash

Susana Martinez
Governor

STATE OF NEW MEXICO
DEPARTMENT OF CULTURAL AFFAIRS
HISTORIC PRESERVATION DIVISION

BATAAN MEMORIAL BUILDING
407 GALISTEO STREET, SUITE 236
SANTA FE, NEW MEXICO 87501
PHONE (505) 827-6320 FAX (505) 827-6338

July 22, 2016

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

Re: NEPA Analysis for Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, New Mexico

Dear Ms. Pentecost:

I am responding to the above referenced project and public scoping letter received at the New Mexico State Historic Preservation Office (NMSHPO) on July 11, 2016. It appears from the proposed alternatives under consideration that changes in operations have the potential to adversely affect historic properties; however, from a review of our records, it does not appear that a historic building survey has been conducted and the buildings are unevaluated for listing in the National Register of Historic Properties.

We understand that consultation under Section 106 of the National Historic Preservation Act will be initiated. We encourage the National Science Foundation (NSF) to initiate consultation as soon as possible. In the meantime, the NMSHPO is interested in reviewing the draft Environmental Impact Statement (EIS) as it can provide additional background information to supplement documents provided for consultation under Section 106 of the National Historic Preservation Act.

We look forward to receiving the draft EIS and Section 106 consultation on this undertaking. Please do not hesitate to contact me if you have any questions. I can be reached by telephone at (505) 827-4064 or email at michelle.ensey@state.nm.us.

Sincerely,

Michelle M. Ensey
Archaeologist

Log: 103900

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

24 August 2016

Dr. Jeffrey Pappas
Director and State Historic Preservation Officer
New Mexico Department of Cultural Affairs-
Historic Preservation Division
407 Galisteo Street, Suite 236
Santa Fe, NM 87501

RE: Section 106 Consultation for the Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, New Mexico

Dear Dr. Pappas:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences (MPS), Division of Astronomical Sciences (AST) has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. Sacramento Peak Observatory in Sunspot, Otero County, New Mexico, is one of the facilities identified for divestment. The decision regarding the potential changes to Sacramento Peak Observatory operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act (NHPA), NSF will be simultaneously conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed changes to operations.

NSF sent the New Mexico Department of Cultural Affairs (DCA) – Historic Preservation Division a NEPA scoping letter on July 7, 2016 that presented the proposed alternatives under consideration for inclusion in the EIS. NSF received a response letter from the DCA on July 11, 2016 (Log: 103900), noting that the changes in operations at the Sacramento Peak Observatory have the potential to adversely affect historic properties. By this letter, NSF is formally initiating Section 106 consultation under the NHPA and transmitting the *Cultural Resources Evaluation, National Solar Observatory (Sacramento Peak Observatory), Sunspot, New Mexico* (Enclosure 1) and the *Archaeological Survey of 36 HA for AURA Inc. at the National Solar Observatory, Sunspot, Otero County, New Mexico, January 1995* (Enclosure 2) for your review and comment.

Project Location and Background

The Sacramento Peak Observatory is located within the Lincoln National Forest in the Sacramento Mountains. Established by the United States Air Force via a Memorandum of Agreement with the United States Forest Service (USFS) in 1950, the facility was transferred to NSF in 1976. NSF and the USFS executed a land use agreement, signed in 1980, to formalize this transfer and the continued use of the land for the observatory. The flagship facility at the Sacramento Peak

Telephone (703) 292-8060 FAX (703) 292-9242

Observatory is the Richard B. Dunn Solar Telescope (Dunn Solar Telescope), which was completed in 1969 and is a high spatial resolution optical solar telescope, allowing solar astronomers worldwide to obtain information about the sun. In addition to the Dunn Solar Telescope, Sacramento Peak hosts the John W. Evans Solar Facility (1952), the Hilltop Dome (1963, currently decommissioned), the Grain Bin Dome (1950, currently abandoned), and the Patrol Dome, as well as various support structures.

Project Description

NSF's Division of Astronomical Sciences (AST) is the federal steward for ground-based astronomy in the United States, funding research with awards to individual investigators and small research groups, and via cooperative agreements for operation of large telescope facilities. These national and international telescope facilities provide world-leading, one-of-a-kind observational capabilities on a competitive basis to thousands of astronomers per year. These facilities also enable scientific advances by making archived data products available to researchers. Along with funding telescope facilities and research awards, AST supports the development of advanced technologies and instrumentation.

One area of research supported by AST is solar astronomy, which is primarily managed via the National Solar Observatory (NSO). NSO-managed facilities include the Sacramento Peak Observatory.

In 2015, CH2M conducted a Cultural Resources Evaluation for the architectural resources at the Sacramento Peak Observatory. The results of the survey are included below, under "Determinations of Eligibility." The associated technical report, entitled *Cultural Resources Evaluation, National Solar Observatory (Sacramento Peak Observatory), Sunspot, New Mexico*, is attached for reference (Enclosure 1).

A range of preliminary proposed alternatives is being considered for evaluation and include the following:

- **No Action Alternative - Continued NSF Investment for Science-focused Operations:** Under the No Action Alternative, NSF would not divest Sacramento Peak Observatory and NSF would continue funding to operate it based on available appropriations. Operations would be contingent on funding appropriations. None of the proposed alternatives would be implemented, including deconstruction or mothballing of facilities.

- **Alternative 1 - Transition to Full Operations with Interested Parties for Solar Astronomy Research:** Alternative 1 would include full scope of operations of the facility by interested parties for solar astronomy research. Most structures at the site would remain operational while allowing science goals to be pursued; unused structures would either be deconstructed or mothballed.

- **Alternative 2 - Transition to Partial Operations with Interested parties, and Deconstructing or Mothballing of Facilities not proposed to be used:** Alternative 2 would include partial scope of operations with interested parties to use the facilities for scientific purposes. This alternative would also include deconstructing or mothballing of any structures not being used.

- **Alternative 3 - Mothballing of Facilities Limited to Basic Maintenance:** Alternative 3 would involve preservation of essential structures, including buildings, telescopes, and other equipment with periodic basic maintenance. Structures that are not needed would be deconstructed.

- **Alternative 4 - Deconstruction and Site Restoration:** This alternative would include deconstruction of the above-grade structures at the facility.

NSF has determined that the Area of Potential Effects (APE) for the proposed action is defined as the area within the Sacramento Peak Observatory boundary plus two small noncontiguous areas southeast of the facility that include a sewage treatment plant and the water well system. Figure 2-1 included in Enclosure 1 shows the boundaries of the APE. NSF requests your concurrence with this determination.

Public Involvement

A Notice of Intent was published in the Federal Register on July 5, 2016 to initiate the public scoping process for the EIS. A Public Scoping Meeting was conducted on July 21, 2016, in Alamogordo, New Mexico, and the public comment period closed on August 5, 2016. NSF anticipates conducting an additional public meeting during the late fall of 2016, following the publication of the Draft EIS. Section 106 consultation needs will be addressed as part of the public meeting, or during separate consulting party meetings scheduled during the same time period. Follow-up discussions with consulting parties will occur as needed.

Previous Cultural Resources Studies

Previous environmental reviews and archaeological surveys have been conducted at the Sacramento Peak Observatory. During the 1990s, a series of surveys were conducted in preparation for the construction of the Sacramento Peak Observatory Visitor and Education Center (1992 to 1995) and before planned construction of roads and buildings at the Sacramento Peak Observatory (1994 to 1995). The instruments and buildings associated with the Sacramento Peak Observatory have not been previously evaluated for National Register of Historic Places (NRHP) eligibility.

An intensive archaeological survey was conducted at the Sacramento Peak in Observatory 1994. The associated report (dated 1995; provided as Enclosure 2) indicated that no prehistoric or historic sites were identified and that the Sacramento Peak Observatory was "a historically significant complex" (Shields, 1995). An Environmental Assessment conducted in 1995 noted that "the Sacramento Peak Solar Observatory is an historic scientific compound begun in 1947, however, the buildings have not been evaluated for historical significance" (Cartwright, 1995).

Determination of Eligibility

Background research indicated that there are no NRHP-listed structures within the APE. An architectural historian with CH2M conducted an intensive architectural survey at the Sacramento Peak Observatory from January 26 to 27, 2015, following Secretary of the Interior standards and guidelines. The site visit was also used to engage staff in informal interviews and to conduct archival research.

Historic built environment resources at the Sacramento Peak Observatory were evaluated for potential eligibility for listing in the NRHP, both individually and as a potential historic district.

The evaluation included all facilities that were more than 45 years old at the time of the survey. A total of 65 built environment resources that had been constructed in or before 1970 were identified as extant within the APE including 5 telescope structures, 35 residential buildings, 17 administrative buildings, and 8 buildings and structures associated with site infrastructure. Figure 5-1, included in Enclosure 1, shows the location of each evaluated built environment resource.

NSF has determined that there are two telescopes on the property that are individually eligible for listing in the NRHP: the John W. Evans Solar Facility and the Dunn Solar Telescope. Both are eligible under Criterion A for important associations with events that have made a significant contribution to the field of solar astronomy. The Dunn Solar Telescope is also eligible under Criterion C for design and engineering. Both telescopes have undergone minor additions and alterations. However, these changes have not diminished the overall integrity of the telescopes. Additionally, NSF has determined that the Sacramento Peak Observatory is eligible for listing in the NRHP as a historic district for representing an important time in science and military history and for its significant contribution to the advancement of solar astronomy (Criterion A). The Sacramento Peak Observatory is a collection of Cold War-era buildings and structures primarily constructed between 1950 and 1969 that reflects the early history of solar astronomy in the United States. The telescopes and associated facilities have influenced other, more modern solar telescopes and the observations have greatly expanded the understanding of the Sun. There are 63 built resources that are contributing resources to the Sacramento Peak Observatory historic district. Table 1 lists the properties at the Sacramento Peak Observatory that were identified as individually eligible for the NRHP. Attachment A, included in Enclosure 1, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 1. Individually NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Determination
Sacramento Peak Historic District	1950-1969	Collection of solar telescopes, residential buildings, administrative buildings, and site infrastructure facilities associated with NSO and Sacramento Peak.	Eligible (Historic District); 65 contributing resources (see Attachment A in Enclosure 1)
John W. Evans Solar Facility, Building 3000 (housed in the Big Dome)	1952	Dome contains two coronagraphs, the largest in the United States, and a coelostat. Consists of a 30-foot dome on concrete walls.	Individually eligible and contributing to Sacramento Peak Historic District
Richard B. Dunn Solar Telescope, Building 3042 (formerly Vacuum Tower Telescope)	1969	A solar telescope composed of a vacuum tube centered within a concrete tower that extends 136 feet above ground and 228 feet below ground.	Individually eligible and contributing to Sacramento Peak Historic District

Request for Concurrence

As stated earlier, NSF requests your concurrence with NSF's determination of the APE. NSF also requests your concurrence with NSF's determination that there are two telescopes at the Sacramento Peak Observatory that are individually eligible for listing in the NRHP and that the Sacramento Peak Observatory is eligible for the NRHP as a historic district, containing 63 contributing resources. NSF is also requesting concurrence that there are no known archaeological sites on the Sacramento Peak Observatory property.

Initiation of Section 106 Consultation

The Sacramento Peak Observatory is a federally-owned property (the Forest Service owns the land and NSF owns the facilities) that contains potential historic properties. Therefore, the proposed action has the potential to affect historic properties. In compliance with 36 Code of Federal Regulations (CFR) 800.3(c), NSF is initiating consultation with the DCA on the proposed changes to Sacramento Peak Observatory operations. Please respond within 30 days from receipt of this letter to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

NSF is also transmitting the two previous cultural resources reports discussed above: *Cultural Resources Evaluation, National Solar Observatory (Sacramento Peak Observatory), Sunspot, New Mexico* and the *Archaeological Survey of 36 HA for AURA Inc. at the National Solar Observatory, Sunspot, Otero County, New Mexico, January 1995* (attached as Enclosures 1 and 2). If you have any questions, please do not hesitate to contact me by phone at 703-292-4592 or by email at cblanco@nsf.gov. We look forward to further consultation on this proposed undertaking.

Sincerely,

Caroline M. Blanco

EMP Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

Cc: E. Pentecost
D. Bishop, CH2M

Enclosures:

1. Cultural Resources Evaluation, National Solar Observatory (Sacramento Peak Observatory), Sunspot, New Mexico
2. Archaeological Survey of 36 HA for AURA Inc. at the National Solar Observatory, Sunspot, Otero County, New Mexico, January 1995

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 2, 2016

Mr. Leigh Kuwanwisiwma
Director, Hopi Cultural Preservation Office
P.O. Box 123
Kykotsmovi, AZ 86039

RE: Section 106 Consultation for the Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, Otero County, New Mexico

Dear Mr. Kuwanwisiwma:

The National Science Foundation (NSF) has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. Sacramento Peak Observatory in Sunspot, Otero County, New Mexico, is one of the facilities identified for divestment. The proposed decision regarding the potential changes to Sacramento Peak Observatory operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act, NSF will be concurrently conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. NSF initiated Section 106 consultation with the New Mexico State Historic Preservation Officer (SHPO) on August 24, 2016. NSF sent a NEPA scoping letter to the Mescalero-Apache Nation on July 5, 2016, that presented the proposed alternatives under consideration for inclusion in the EIS. Follow-up calls were made on October 19, 2016. No response has been received to date.

The purpose of this letter is to consult with the Mescalero-Apache Tribe under Section 106 regarding the proposed changes to Sacramento Peak Observatory that may affect ancestral lands or properties of religious or cultural significance to the Mescalero-Apache Tribe.

Location and Background of the Proposed Action

The Sacramento Peak Observatory is located within the Lincoln National Forest in the Sacramento Mountains. The facility was established by the United States Air Force via a Memorandum of Agreement with the United States Forest Service (USFS) in 1950 and was transferred to NSF in 1976. NSF and the USFS executed a land use agreement in

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1980 to formalize this transfer and the continued use of the land for the Observatory. The flagship facility at the Sacramento Peak Observatory is the Richard B. Dunn Solar Telescope (Dunn Solar Telescope), which was completed in 1969 and is a high spatial resolution optical solar telescope, allowing solar astronomers worldwide to obtain information about the sun. In addition to the Dunn Solar Telescope, Sacramento Peak hosts the John W. Evans Solar Facility (1952, not in active use), the Hilltop Dome (1963, not in active use), the Grain Bin Dome (1950, not in active use), and the Patrol Dome, as well as various support structures.

Description of the Proposed Action

NSF's Division of Astronomical Sciences (AST) is the federal steward for ground-based astronomy in the United States, funding research with awards to individual investigators and research groups and via cooperative agreements for operation of telescope facilities. These national and international telescope facilities provide observational capabilities on a competitive basis to thousands of astronomers per year. These facilities also enable scientific advances by making archived data products available to researchers. Along with funding telescope facilities and research awards, AST supports the development of advanced technologies and instrumentation.

One area of research supported by AST is solar astronomy, which is primarily managed via the National Solar Observatory (NSO). NSO-managed facilities include the Sacramento Peak Observatory.

A range of preliminary proposed alternatives is being considered for evaluation. These preliminary proposed alternatives, which will be refined through public input, include the following:

- Continued NSF investment for science-focused operations (No Action Alternative).
- Transition to full operations with interested parties for solar astronomy research.
- Transition to partial operations with interested parties, and decommissioning or mothballing of facilities not proposed to be used.
- Mothballing of facilities limited to basic maintenance.
- Deconstruction and site restoration.

These proposed alternatives may be further refined during the early phases of the compliance review and will be informed by the public process.

The Area of Potential Effects (APE) for the proposed action is defined as the area within the Sacramento Peak Observatory boundary plus two small noncontiguous areas southeast of the facility that include a sewage treatment plant and the water well system. Figure 1, included in Enclosure 1, shows the boundaries of the APE.

Public Involvement

A Notice of Intent was published in the Federal Register on July 5, 2016, to initiate the public scoping process for the EIS. A public scoping meeting was conducted on July 21, 2016, in Alamogordo, New Mexico. NSF anticipates conducting an additional public meeting during the winter of 2017, following the publication of the Draft EIS. Section 106 consultation needs will be addressed as part of the public meeting or during a separate consulting party meeting scheduled during the same time period. Follow-up discussions with consulting parties will occur as needed.

Known Cultural Resources

Previous environmental reviews and archaeological surveys have been conducted at the Sacramento Peak Observatory. During the 1990s, a series of surveys was conducted in preparation for the construction of the Sacramento Peak Observatory Visitor and Education Center (1992 to 1995) and before planned construction of roads and buildings at the Sacramento Peak Observatory (1994 to 1995). An intensive archaeological survey was conducted at the Sacramento Peak Observatory in 1994. The associated report concluded that no prehistoric or historic sites were present and that the Sacramento Peak Observatory was "a historically significant complex" (Shields, 1995). An environmental assessment was conducted in 1995 and the associated report stated that "the Sacramento Peak Solar Observatory is an historic scientific compound begun in 1947, however, the buildings have not been evaluated for historical significance" (Cartwright, 1995).

Background research shows that no NRHP-listed structures are located within the APE and that the instruments and buildings associated with the Sacramento Peak Observatory have not been previously evaluated for NRHP eligibility. A Secretary of the Interior-qualified architectural historian with CH2M HILL, Inc. (CH2M) conducted an intensive architectural survey at the Sacramento Peak Observatory from January 26 to 27, 2015. The site visit was also used to engage staff in informal interviews and to conduct archival research. Historic built environment resources at the Sacramento Peak Observatory were evaluated for potential eligibility for listing in the NRHP, both individually and together as a potential historic district. The evaluation included all facilities that were more than 45 years old at the time of the survey. A total of 65 built environment resources that had been constructed before or in 1970 were identified as extant within the APE, including 5 telescope structures, 35 residential buildings, 17 administrative buildings, and 8 buildings and structures associated with site infrastructure. Figure 2, included in Enclosure 2, shows the location of each evaluated built environment resource.

NSF has determined that there are two telescopes on the property that are individually eligible for listing in the NRHP: the John W. Evans Solar Facility and the Dunn Solar Telescope. Both are eligible under Criterion A for important associations with events that have made a significant contribution to the field of solar astronomy. The Dunn Solar Telescope is also eligible under Criterion C for design and engineering. Both telescopes have undergone minor additions and alterations; however, these changes have not

diminished the overall integrity of the telescopes. Additionally, NSF has determined that the Sacramento Peak Observatory is eligible for listing in the NRHP as a historic district for representing an important time in science and military history and for its significant contribution to the advancement of solar astronomy (Criterion A). Sixty-three built environment resources are contributing resources to the Sacramento Peak Observatory historic district. Table 1 lists the properties at the Sacramento Peak Observatory that were identified as individually eligible for listing in the NRHP. Determinations of eligibility for the architectural resources at Sacramento Peak Observatory are pending concurrence from the New Mexico SHPO.

TABLE 1. Individually NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Determination
Sacramento Peak Observatory Historic District	1950–1969	Collection of solar telescopes, residential buildings, administrative buildings, and site infrastructure facilities associated with NSO and Sacramento Peak.	Eligible (Historic District); 63 contributing resources
John W. Evans Solar Facility, Building 3000 (housed in the Big Dome)	1952	Dome contains two coronagraphs, the largest in the United States, and a coelostat. Consists of a 30-foot dome on concrete walls.	Individually eligible and contributing to Sacramento Peak Observatory Historic District
Richard B. Dunn Solar Telescope, Building 3042 (formerly Vacuum Tower Telescope)	1969	A solar telescope composed of a vacuum tube centered within a concrete tower that extends 136 feet above ground and 228 feet below ground.	Individually eligible and contributing to Sacramento Peak Observatory Historic District

Initiation of Section 106 Consultation

In accordance with the National Historic Preservation Act and to ensure the consideration of the effects of the proposed action on properties listed or eligible for listing in the NRHP, NSF is initiating Section 106 consultation pursuant to Title 36 *Code of Federal*

Regulations (CFR) §800.2(c)(2)(ii). Also, based on 36 CFR §800.4(a)(4), we are asking for your assistance in identifying traditional cultural properties, sacred sites, and places that have historic, religious, or cultural significance that you believe may be affected by the proposed action so that we may try to avoid or minimize the effects.

Please notify us within 30 days of any concerns regarding this proposed undertaking and whether you would like to participate in the consultation process for this proposed action. Please direct your correspondence to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

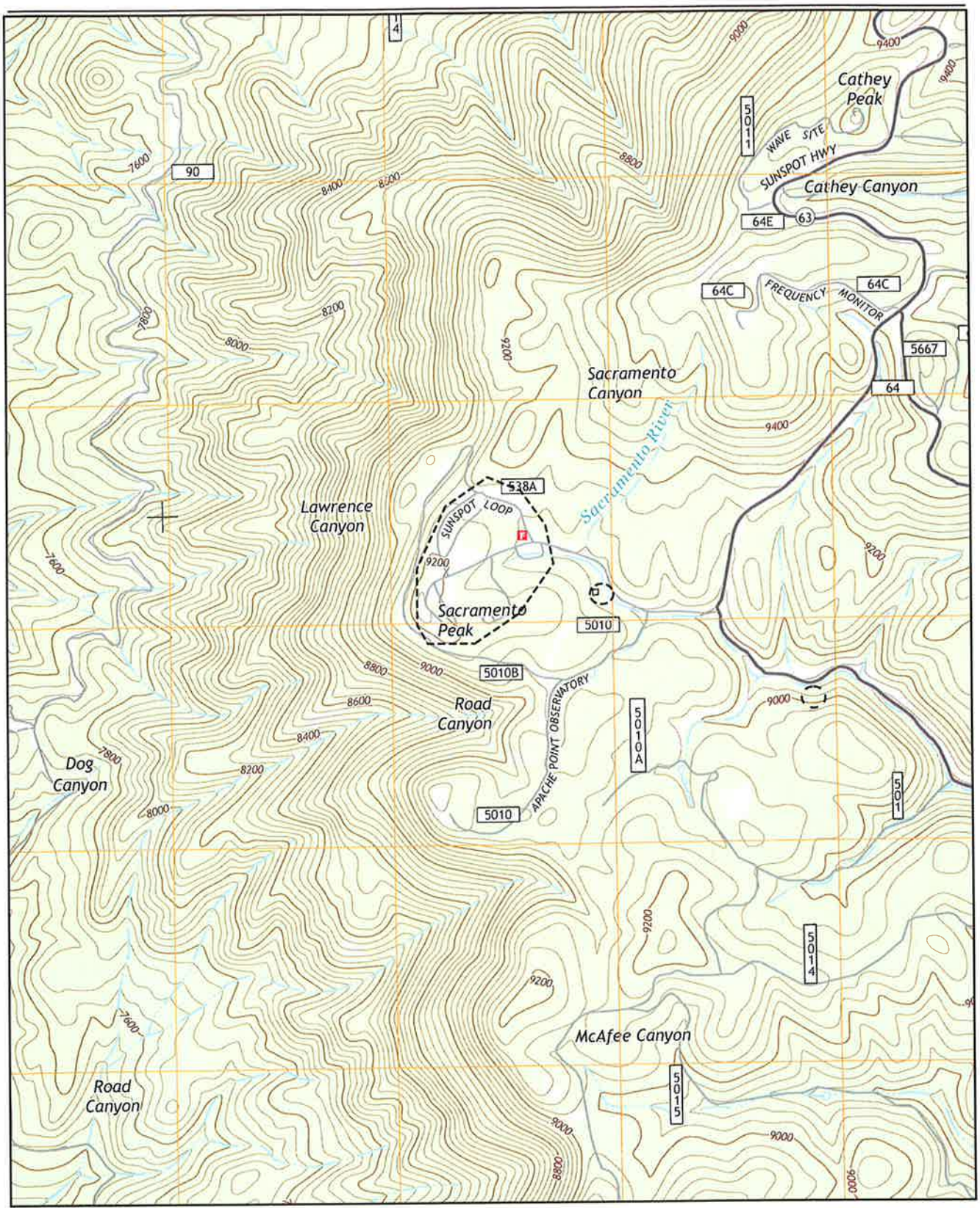
If you have any questions, please contact me by phone at 703-292-4592 or by email at cblanco@nsf.gov. We appreciate your time.

Regards,

Caroline M. Blanco

Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

Enclosures:
1. Figure 1 Area of Potential Effects (APE)
2. Figure 2 Built Environment Resources



Source: USGS Sacramento Peak quadrangle - 2013

North

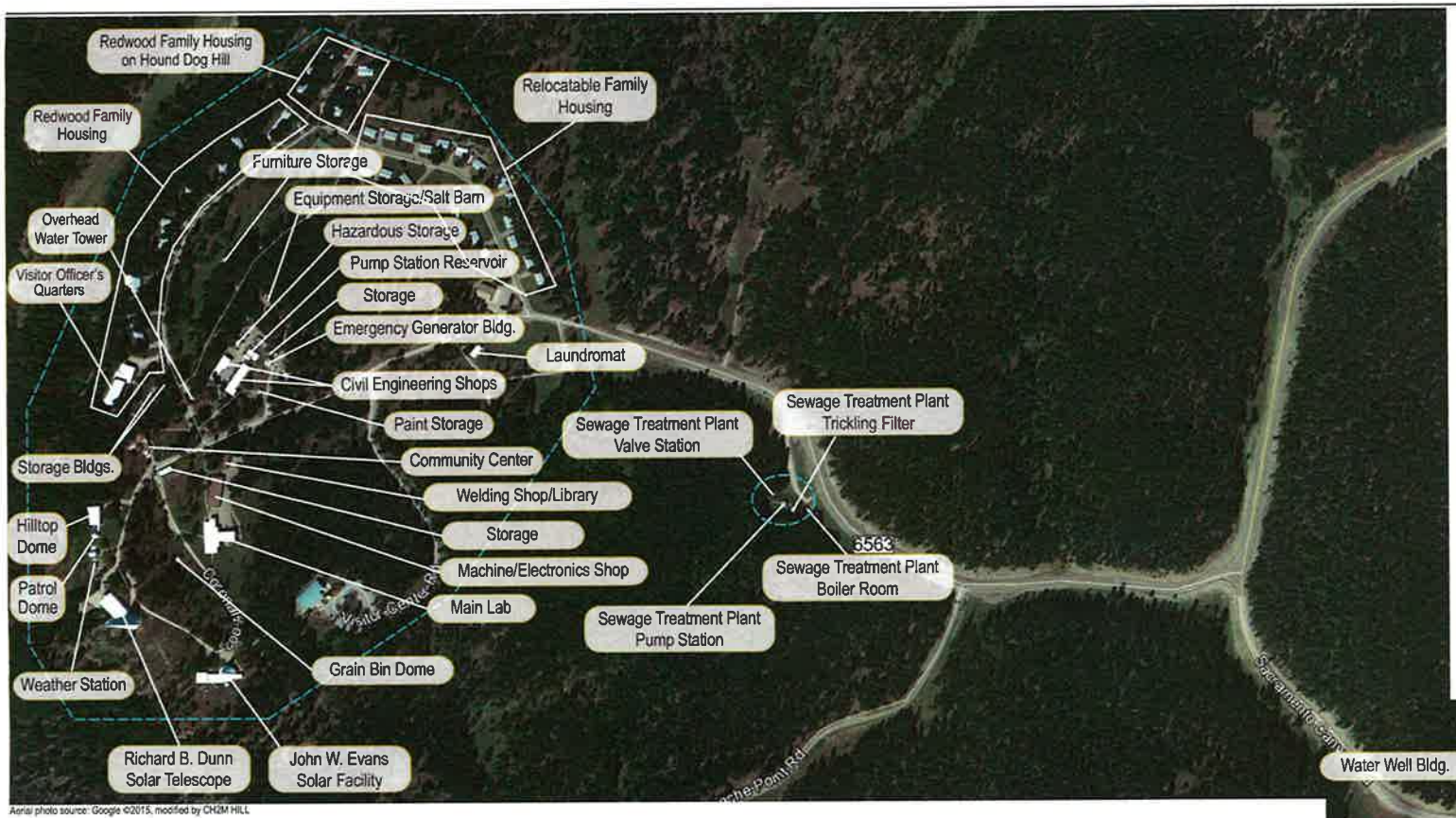
0 1,000 2,000

Approximate scale in feet

LEGEND

Area of Potential Effects (APE)

FIGURE 1
Area of Potential Effects (APE)
Sacramento Peak Observatory
Sunspot, New Mexico



Aerial photo source: Google ©2015, modified by CH2M HILL

Building/Structure Name (Building Number)

ADMINISTRATIVE BUILDINGS
- Main Lab (3004)
- Machine/Electronics Shop (3005)
- Welding Shop/Library (3006)
- Storage (3008)
- Community Center (former Mess Hall) (3010)
- Storage (3011)
- Storage (3012)
- Hazardous Storage (3024)
- Furniture Storage (3029)
- Civil Engineering (CE) Shop (3031)
- CE Shop (3032)
- Paint Storage (3034)
- Equipment Storage/Salt Barn (3036)
- Storage (3037)
- Emergency Generator Building (3038)
- Weather Station (3039)
- Laundromat [formerly public restrooms] (3060)

INFRASTRUCTURE
- Pump Station Reservoir (3033)
- Water Well Building (3050)
- Water Well Building (3051)
- Sewage Treatment Plant - Boiler Room (3053)
- Sewage Treatment Plant - Trickling Filter (3054)
- Sewage Treatment Plant - Valve Station (3055)
- Sewage Treatment Plant - Pump Station (3056)
- Overhead Water Tower (no building number)

Building/Structure Name (Building Number)

TELESCOPES
- Grain Bin Dome (3002)
- John W. Evans Solar Facility [housed in the Big Dome] (3000)
- Patrol Dome (ISOON Building) (3009)
- Hilltop Dome (3040)
- Richard B. Dunn Solar Telescope (formerly Vacuum Tower Telescope) (3042)

HOUSING
- Visitor Officer's Quarters (VOQ) (3013)
- Redwood Family Housing (3014ns)
- Redwood Family Housing [aka Director's House] (3015)
- Redwood Family Housing (3016ns)
- Redwood Family Housing (3017)
- Redwood Family Housing (3018)
- Redwood Family Housing (3019)
- Redwood Family Housing (3020ns)
- Redwood Family Housing on Hound Dog Hill (3044)
- Redwood Family Housing on Hound Dog Hill (3045)
- Redwood Family Housing on Hound Dog Hill (3046)
- Redwood Family Housing on Hound Dog Hill (3047)
- Redwood Family Housing on Hound Dog Hill (3048)
- Redwood Family Housing on Hound Dog Hill (3049)
- Relocatable Family Housing (3061)
- Relocatable Family Housing (3062)
- Relocatable Family Housing (3063)
- Relocatable Family Housing (3064)
- Relocatable Family Housing (3065)
- Relocatable Family Housing (3066)
- Relocatable Family Housing (3067)
- Relocatable Family Housing (3068)
- Relocatable Family Housing (3069)
- Relocatable Family Housing (3070)
- Relocatable Family Housing (3071)
- Relocatable Family Housing (3072)
- Relocatable Family Housing (3073)
- Relocatable Family Housing (3074)
- Relocatable Family Housing (3075)
- Relocatable Family Housing (3076)
- Relocatable Family Housing (3077)
- Relocatable Family Housing (3079)
- Relocatable Family Housing (3081)
- Relocatable Family Housing (3083)
- Relocatable Family Housing (3085)

LEGEND*
- NRHP Contributing
- NRHP Non-Contributing
- NRHP Individually Eligible
- NRHP Not Individually Eligible
- Area of Potential Effects (APE)

* Pending SHPO concurrence

North

0 250 500
Approximate scale in feet

FIGURE 2
Built Environment Resources
Sacramento Peak Observatory
Sunspot, New Mexico

ch2m:

EN030151054SAC Fig_5-1_built_environment_sacramento_peak.ai 07-02-2015 dash

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 2, 2016

Mr. Kurt Dongoske
Tribal Historic Preservation Officer
Pueblo of Zuni
P.O. Box 339
Zuni, NM 87327

RE: Section 106 Consultation for the Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, Otero County, New Mexico

Dear Mr. Dongoske:

The National Science Foundation (NSF) has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. Sacramento Peak Observatory in Sunspot, Otero County, New Mexico, is one of the facilities identified for divestment. The proposed decision regarding the potential changes to Sacramento Peak Observatory operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act, NSF will be concurrently conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. NSF initiated Section 106 consultation with the New Mexico State Historic Preservation Officer (SHPO) on August 24, 2016. NSF sent a NEPA scoping letter to the Mescalero-Apache Nation on July 5, 2016, that presented the proposed alternatives under consideration for inclusion in the EIS. Follow-up calls were made on October 19, 2016. No response has been received to date.

The purpose of this letter is to consult with the Mescalero-Apache Tribe under Section 106 regarding the proposed changes to Sacramento Peak Observatory that may affect ancestral lands or properties of religious or cultural significance to the Mescalero-Apache Tribe.

Location and Background of the Proposed Action

The Sacramento Peak Observatory is located within the Lincoln National Forest in the Sacramento Mountains. The facility was established by the United States Air Force via a Memorandum of Agreement with the United States Forest Service (USFS) in 1950 and

was transferred to NSF in 1976. NSF and the USFS executed a land use agreement in 1980 to formalize this transfer and the continued use of the land for the Observatory. The flagship facility at the Sacramento Peak Observatory is the Richard B. Dunn Solar Telescope (Dunn Solar Telescope), which was completed in 1969 and is a high spatial resolution optical solar telescope, allowing solar astronomers worldwide to obtain information about the sun. In addition to the Dunn Solar Telescope, Sacramento Peak hosts the John W. Evans Solar Facility (1952, not in active use), the Hilltop Dome (1963, not in active use), the Grain Bin Dome (1950, not in active use), and the Patrol Dome, as well as various support structures.

Description of the Proposed Action

NSF's Division of Astronomical Sciences (AST) is the federal steward for ground-based astronomy in the United States, funding research with awards to individual investigators and research groups and via cooperative agreements for operation of telescope facilities. These national and international telescope facilities provide observational capabilities on a competitive basis to thousands of astronomers per year. These facilities also enable scientific advances by making archived data products available to researchers. Along with funding telescope facilities and research awards, AST supports the development of advanced technologies and instrumentation.

One area of research supported by AST is solar astronomy, which is primarily managed via the National Solar Observatory (NSO). NSO-managed facilities include the Sacramento Peak Observatory.

A range of preliminary proposed alternatives is being considered for evaluation. These preliminary proposed alternatives, which will be refined through public input, include the following:

- Continued NSF investment for science-focused operations (No Action Alternative).
- Transition to full operations with interested parties for solar astronomy research.
- Transition to partial operations with interested parties, and decommissioning or mothballing of facilities not proposed to be used.
- Mothballing of facilities limited to basic maintenance.
- Deconstruction and site restoration.

These proposed alternatives may be further refined during the early phases of the compliance review and will be informed by the public process.

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Regulations (CFR) §800.2(c)(2)(ii). Also, based on 36 CFR §800.4(a)(4), we are asking for your assistance in identifying traditional cultural properties, sacred sites, and places that have historic, religious, or cultural significance that you believe may be affected by the proposed action so that we may try to avoid or minimize the effects.

Please notify us within 30 days of any concerns regarding this proposed undertaking and whether you would like to participate in the consultation process for this proposed action. Please direct your correspondence to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

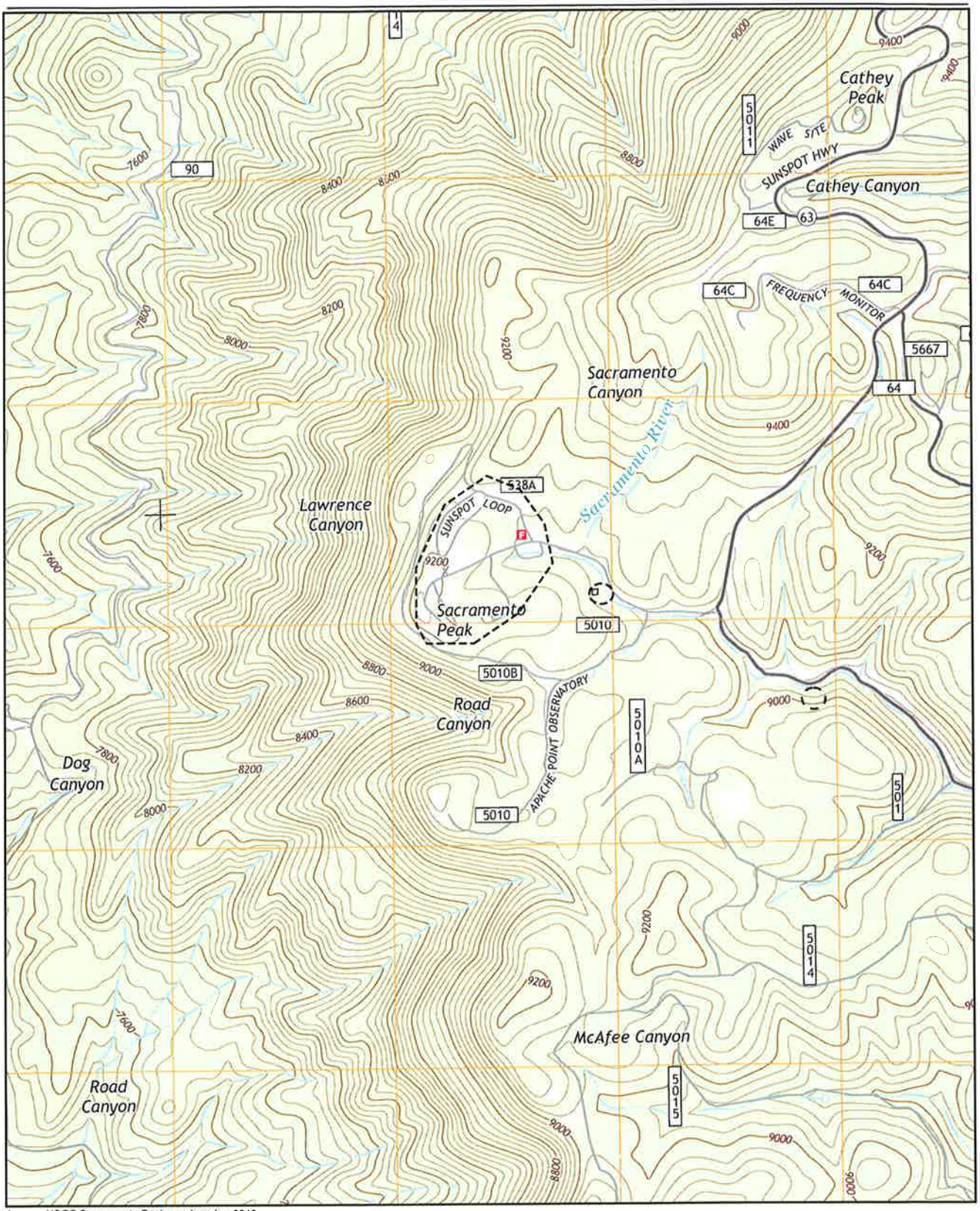
If you have any questions, please contact me by phone at 703-292-4592 or by email at cblanco@nsf.gov. We appreciate your time.

Regards,

Caroline M. Blanco

Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

Enclosures:
1. Figure 1 Area of Potential Effects (APE)
2. Figure 2 Built Environment Resources



Source: USGS Sacramento Peak quadrangle - 2013

North

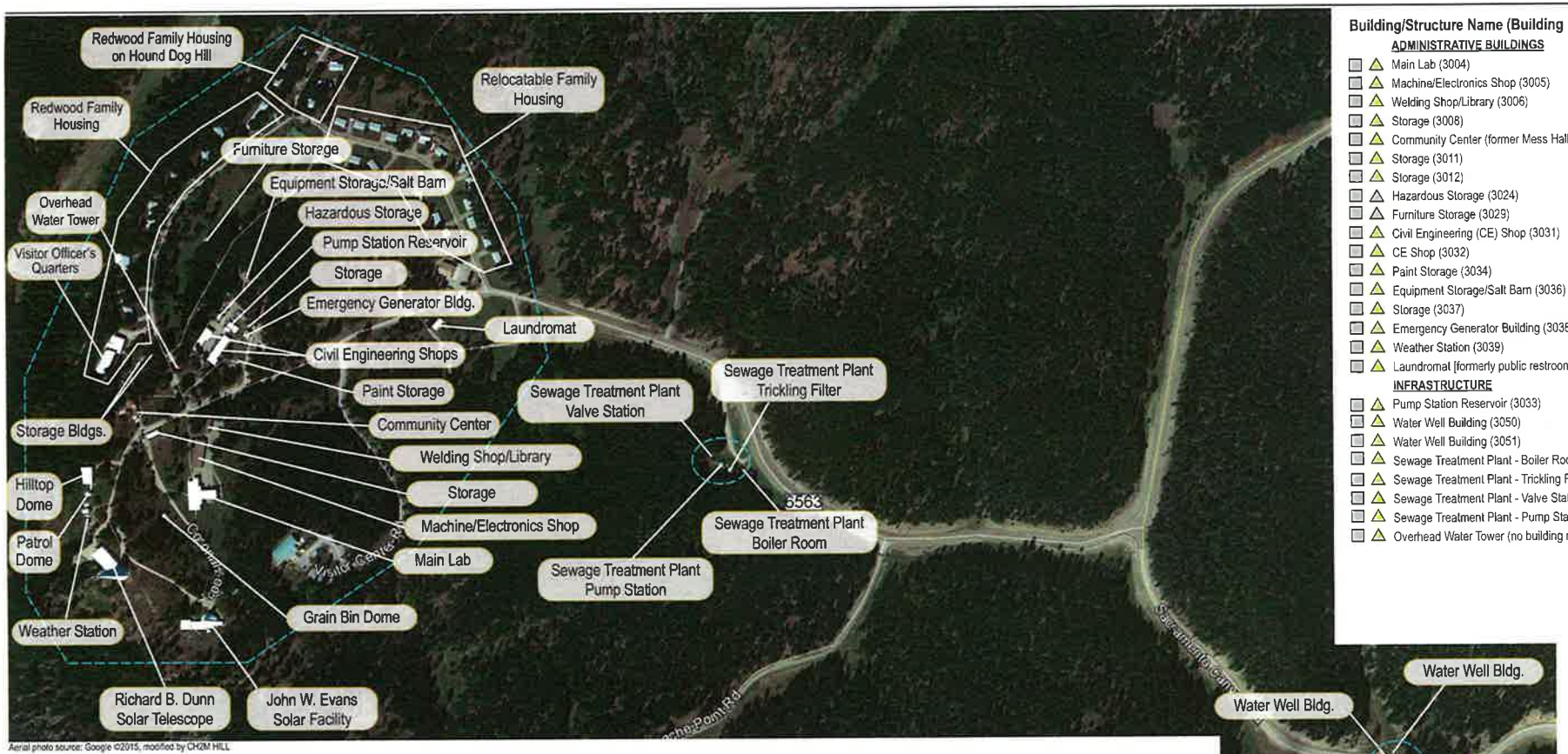
0 1,000 2,000

Approximate scale in feet

LEGEND

Area of Potential Effects (APE)

FIGURE 1
Area of Potential Effects (APE)
Sacramento Peak Observatory
Sunspot, New Mexico



Aerial photo source: Google ©2015, modified by CH2M HILL

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- Storage (3011)
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- Storage (3037)
- Emergency Generator Building (3038)
- Weather Station (3039)
- Laundromat [formerly public restrooms] (3060)

INFRASTRUCTURE
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- Water Well Building (3051)
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- Relocatable Family Housing (3076)
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- Relocatable Family Housing (3081)
- Relocatable Family Housing (3083)
- Relocatable Family Housing (3085)

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North

0 250 500
Approximate scale in feet

FIGURE 2
Built Environment Resources
Sacramento Peak Observatory
Sunspot, New Mexico

ch2m:

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NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 2, 2016

Ms. Holly Houghton
Tribal Historic Preservation Officer
Mescalero-Apache Tribe
P.O. Box 227
Mescalero, NM 88340

RE: Section 106 Consultation for the Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, Otero County, New Mexico

Dear Ms. Houghton:

The National Science Foundation (NSF) has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. Sacramento Peak Observatory in Sunspot, Otero County, New Mexico, is one of the facilities identified for divestment. The proposed decision regarding the potential changes to Sacramento Peak Observatory operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act, NSF will be concurrently conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. NSF initiated Section 106 consultation with the New Mexico State Historic Preservation Officer (SHPO) on August 24, 2016. NSF sent a NEPA scoping letter to the Mescalero-Apache Nation on July 5, 2016, that presented the proposed alternatives under consideration for inclusion in the EIS. Follow-up calls were made on October 19, 2016. No response has been received to date.

The purpose of this letter is to consult with the Mescalero-Apache Tribe under Section 106 regarding the proposed changes to Sacramento Peak Observatory that may affect ancestral lands or properties of religious or cultural significance to the Mescalero-Apache Tribe.

Location and Background of the Proposed Action

The Sacramento Peak Observatory is located within the Lincoln National Forest in the Sacramento Mountains. The facility was established by the United States Air Force via a Memorandum of Agreement with the United States Forest Service (USFS) in 1950 and

Telephone (703) 292-8060 FAX (703) 292-9242

was transferred to NSF in 1976. NSF and the USFS executed a land use agreement in 1980 to formalize this transfer and the continued use of the land for the Observatory. The flagship facility at the Sacramento Peak Observatory is the Richard B. Dunn Solar Telescope (Dunn Solar Telescope), which was completed in 1969 and is a high spatial resolution optical solar telescope, allowing solar astronomers worldwide to obtain information about the sun. In addition to the Dunn Solar Telescope, Sacramento Peak hosts the John W. Evans Solar Facility (1952, not in active use), the Hilltop Dome (1963, not in active use), the Grain Bin Dome (1950, not in active use), and the Patrol Dome, as well as various support structures.

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NSF's Division of Astronomical Sciences (AST) is the federal steward for ground-based astronomy in the United States, funding research with awards to individual investigators and research groups and via cooperative agreements for operation of telescope facilities. These national and international telescope facilities provide observational capabilities on a competitive basis to thousands of astronomers per year. These facilities also enable scientific advances by making archived data products available to researchers. Along with funding telescope facilities and research awards, AST supports the development of advanced technologies and instrumentation.

One area of research supported by AST is solar astronomy, which is primarily managed via the National Solar Observatory (NSO). NSO-managed facilities include the Sacramento Peak Observatory.

A range of preliminary proposed alternatives is being considered for evaluation. These preliminary proposed alternatives, which will be refined through public input, include the following:

- Continued NSF investment for science-focused operations (No Action Alternative).
- Transition to full operations with interested parties for solar astronomy research.
- Transition to partial operations with interested parties, and decommissioning or mothballing of facilities not proposed to be used.
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Regards,

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Federal Preservation Officer
Assistant General Counsel
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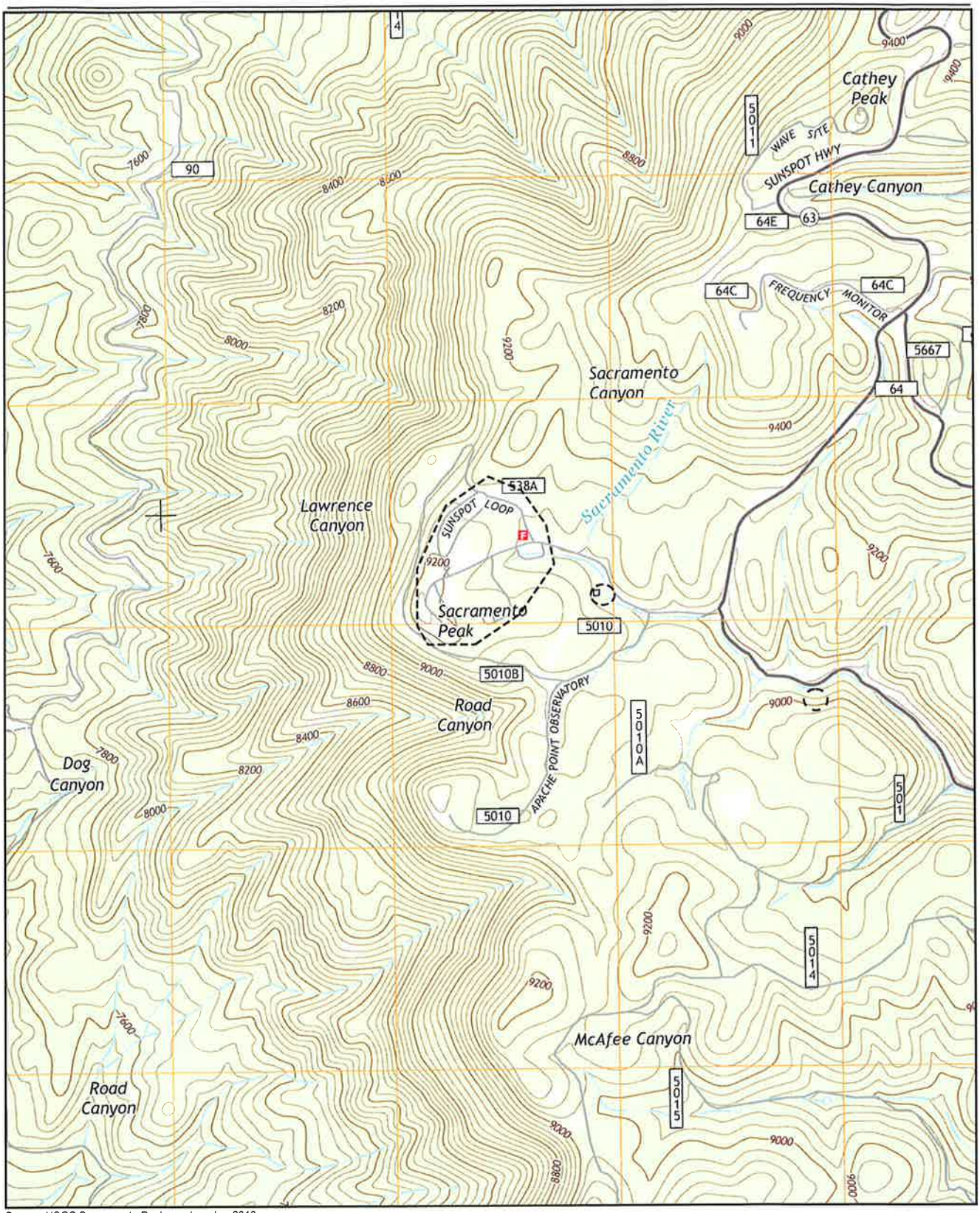

Source: USGS Sacramento Peak quadrangle - 2013

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LEGEND

Area of Potential Effects (APE)

FIGURE 1

Area of Potential Effects (APE)
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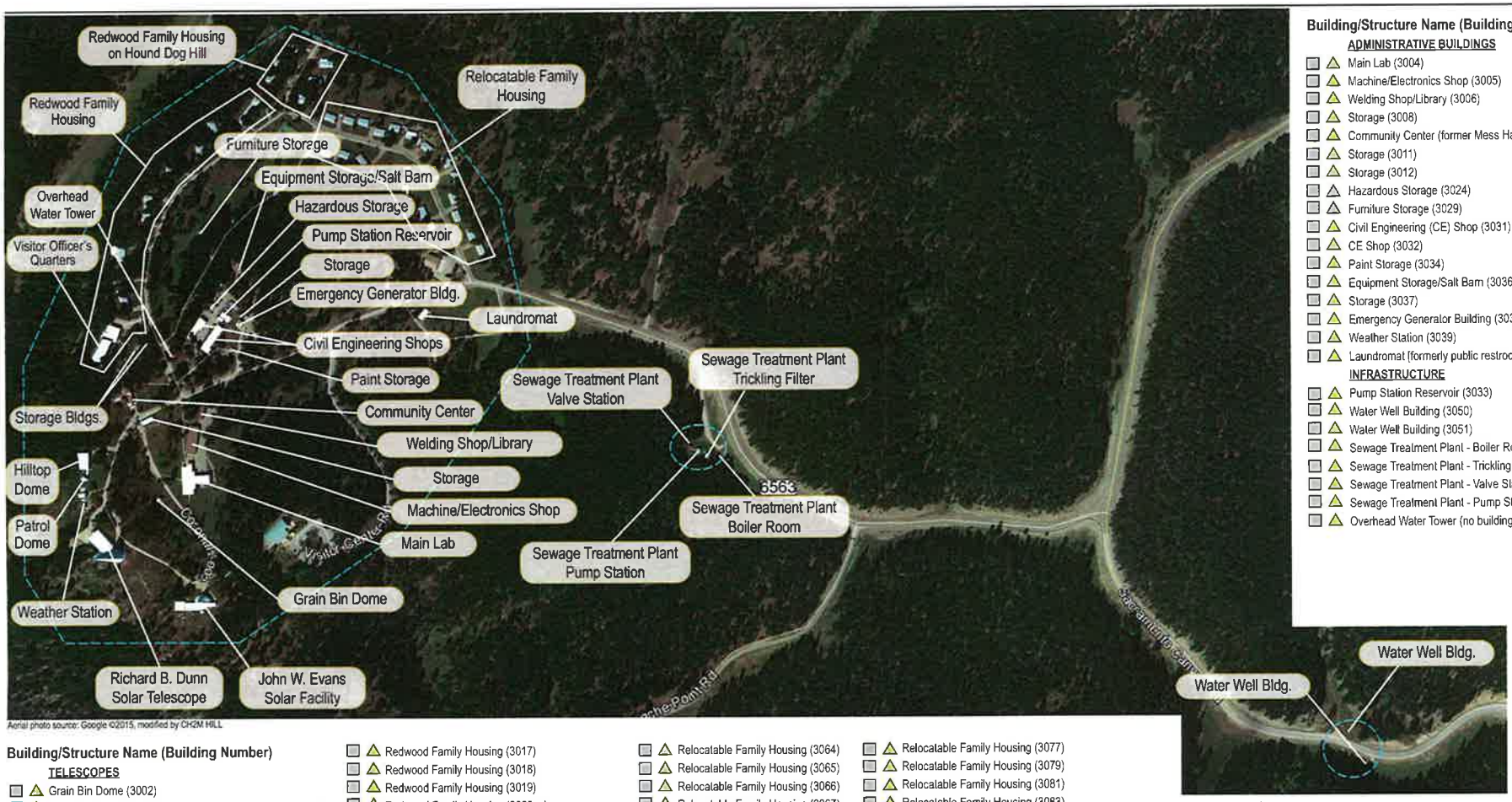

Aerial photo source: Google ©2015, modified by CH2M HILL

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North

0 250 500
Approximate scale in feet

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Built Environment Resources
Sacramento Peak Observatory
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ch2m:

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NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 2, 2016

Ms. Karen Ray
Ft. McDowell Yavapai Nation
P.O. Box 17779
Fountain Hills, AZ 85269

RE: Section 106 Consultation for the Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, Otero County, New Mexico

Dear Ms. Ray:

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John W. Evans Solar Facility, Building 3000 (housed in the Big Dome)	1952	Dome contains two coronagraphs, the largest in the United States, and a coelostat. Consists of a 30-foot dome on concrete walls.	Individually eligible and contributing to Sacramento Peak Observatory Historic District
Richard B. Dunn Solar Telescope, Building 3042 (formerly Vacuum Tower Telescope)	1969	A solar telescope composed of a vacuum tube centered within a concrete tower that extends 136 feet above ground and 228 feet below ground.	Individually eligible and contributing to Sacramento Peak Observatory Historic District

Initiation of Section 106 Consultation

In accordance with the National Historic Preservation Act and to ensure the consideration of the effects of the proposed action on properties listed or eligible for listing in the NRHP, NSF is initiating Section 106 consultation pursuant to Title 36 *Code of Federal*

Regulations (CFR) §800.2(c)(2)(ii). Also, based on 36 CFR §800.4(a)(4), we are asking for your assistance in identifying traditional cultural properties, sacred sites, and places that have historic, religious, or cultural significance that you believe may be affected by the proposed action so that we may try to avoid or minimize the effects.

Please notify us within 30 days of any concerns regarding this proposed undertaking and whether you would like to participate in the consultation process for this proposed action. Please direct your correspondence to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

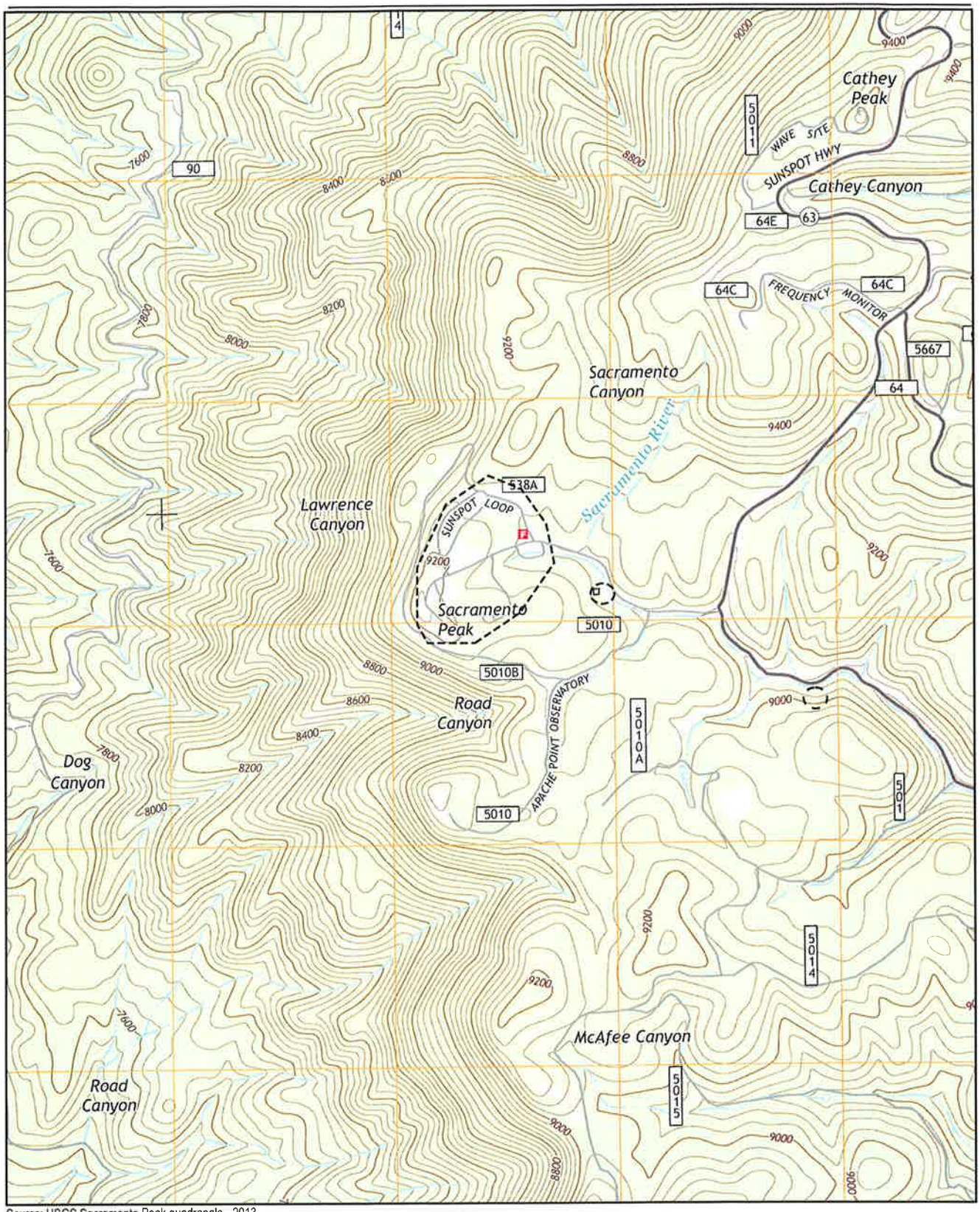
If you have any questions, please contact me by phone at 703-292-4592 or by email at cblanco@nsf.gov. We appreciate your time.

Regards,

Caroline M. Blanco

Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

Enclosures:
1. Figure 1 Area of Potential Effects (APE)
2. Figure 2 Built Environment Resources



Source: USGS Sacramento Peak quadrangle - 2013

North

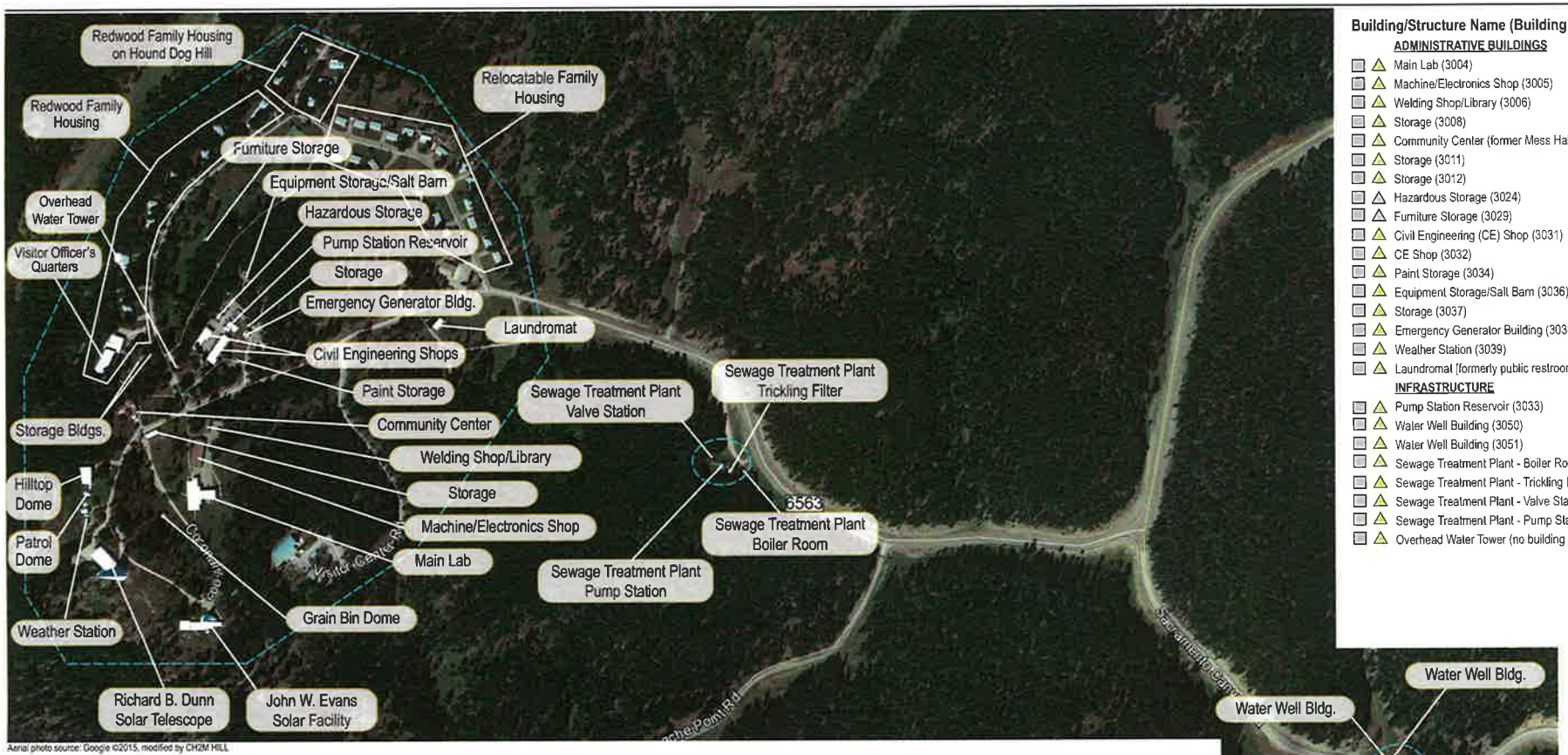
0 1,000 2,000

Approximate scale in feet

LEGEND

Area of Potential Effects (APE)

FIGURE 1
Area of Potential Effects (APE)
Sacramento Peak Observatory
Sunspot, New Mexico



Aerial photo source: Google ©2015, modified by CH2M HILL

Building/Structure Name (Building Number)

ADMINISTRATIVE BUILDINGS
- Main Lab (3004)
- Machine/Electronics Shop (3005)
- Welding Shop/Library (3006)
- Storage (3008)
- Community Center (former Mess Hall) (3010)
- Storage (3011)
- Storage (3012)
- Hazardous Storage (3024)
- Furniture Storage (3029)
- Civil Engineering (CE) Shop (3031)
- CE Shop (3032)
- Paint Storage (3034)
- Equipment Storage/Salt Barn (3036)
- Storage (3037)
- Emergency Generator Building (3038)
- Weather Station (3039)
- Laundromat [formerly public restrooms] (3060)

INFRASTRUCTURE
- Pump Station Reservoir (3033)
- Water Well Building (3050)
- Water Well Building (3051)
- Sewage Treatment Plant - Boiler Room (3053)
- Sewage Treatment Plant - Trickling Filter (3054)
- Sewage Treatment Plant - Valve Station (3055)
- Sewage Treatment Plant - Pump Station (3056)
- Overhead Water Tower (no building number)

Building/Structure Name (Building Number)

TELESCOPES
- Grain Bin Dome (3002)
- John W. Evans Solar Facility [housed in the Big Dome] (3000)
- Patrol Dome (ISOON Building) (3009)
- Hilltop Dome (3040)
- Richard B. Dunn Solar Telescope (formerly Vacuum Tower Telescope) (3042)

HOUSING
- Visitor Officer's Quarters (VOQ) (3013)
- Redwood Family Housing (3014ns)
- Redwood Family Housing [aka Director's House] (3015)
- Redwood Family Housing (3016ns)
- Redwood Family Housing (3017)
- Redwood Family Housing (3018)
- Redwood Family Housing (3019)
- Redwood Family Housing (3020ns)
- Redwood Family Housing on Hound Dog Hill (3044)
- Redwood Family Housing on Hound Dog Hill (3045)
- Redwood Family Housing on Hound Dog Hill (3046)
- Redwood Family Housing on Hound Dog Hill (3047)
- Redwood Family Housing on Hound Dog Hill (3048)
- Redwood Family Housing on Hound Dog Hill (3049)
- Relocatable Family Housing (3061)
- Relocatable Family Housing (3062)
- Relocatable Family Housing (3063)
- Relocatable Family Housing (3064)
- Relocatable Family Housing (3065)
- Relocatable Family Housing (3066)
- Relocatable Family Housing (3067)
- Relocatable Family Housing (3068)
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- Relocatable Family Housing (3075)
- Relocatable Family Housing (3076)
- Relocatable Family Housing (3077)
- Relocatable Family Housing (3079)
- Relocatable Family Housing (3081)
- Relocatable Family Housing (3083)
- Relocatable Family Housing (3085)

LEGEND*
- NRHP Contributing
- NRHP Non-Contributing
- NRHP Individually Eligible
- NRHP Not Individually Eligible
- Area of Potential Effects (APE)

* Pending SHPO concurrence

North

0 250 500
Approximate scale in feet

FIGURE 2
Built Environment Resources
Sacramento Peak Observatory
Sunspot, New Mexico

ch2m:

EN031015104SAC Fig_5-1_built_environment_sacramento_peak.ai 07-02-2015 dash

THE HOPI TRIBE

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Kykotsmovi, Arizona
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DEC 14 2016
BY

Elizabeth Pentecost
NSF Astronomical
4201 Wilson Blvd Ste 1045
Arlington VA 22230

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Regulations (CFR) §800.2(c)(2)(ii). Also, based on 36 CFR §800.4(a)(4), we are asking for your assistance in identifying traditional cultural properties, sacred sites, and places that have historic, religious, or cultural significance that you believe may be affected by the proposed action so that we may try to avoid or minimize the effects.

Please notify us within 30 days of any concerns regarding this proposed undertaking and whether you would like to participate in the consultation process for this proposed action. Please direct your correspondence to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

If you have any questions, please contact me by phone at 703-292-4592 or by email at cblanco@nsf.gov. We appreciate your time.

Regards,

Caroline M. Blanco

Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

no historic properties significant to the Hopi Tribe affected

for

12-12-16

Enclosures:
1. Figure 1 Area of Potential Effects (APE)
2. Figure 2 Built Environment Resources

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

December 2, 2016

Mr. Leigh Kuwanwisiwma
Director, Hopi Cultural Preservation Office
P.O. Box 123
Kykotsmovi, AZ 86039

RE: Section 106 Consultation for the Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, Otero County, New Mexico

Dear Mr. Kuwanwisiwma:

The National Science Foundation (NSF) has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. Sacramento Peak Observatory in Sunspot, Otero County, New Mexico, is one of the facilities identified for divestment. The proposed decision regarding the potential changes to Sacramento Peak Observatory operations is considered a federal undertaking. While engaging in Section 106 consultation under the National Historic Preservation Act, NSF will be concurrently conducting an Environmental Impact Statement (EIS) process under the National Environmental Policy Act (NEPA) to identify potential impacts associated with the proposed operational changes due to funding constraints. NSF initiated Section 106 consultation with the New Mexico State Historic Preservation Officer (SHPO) on August 24, 2016. NSF sent a NEPA scoping letter to the Mescalero-Apache Nation on July 5, 2016, that presented the proposed alternatives under consideration for inclusion in the EIS. Follow-up calls were made on October 19, 2016. No response has been received to date.

The purpose of this letter is to consult with the Mescalero-Apache Tribe under Section 106 regarding the proposed changes to Sacramento Peak Observatory that may affect ancestral lands or properties of religious or cultural significance to the Mescalero-Apache Tribe.

Location and Background of the Proposed Action

The Sacramento Peak Observatory is located within the Lincoln National Forest in the Sacramento Mountains. The facility was established by the United States Air Force via a Memorandum of Agreement with the United States Forest Service (USFS) in 1950 and was transferred to NSF in 1976. NSF and the USFS executed a land use agreement in

Telephone (703) 292-8060 FAX (703) 292-9242

1980 to formalize this transfer and the continued use of the land for the Observatory. The flagship facility at the Sacramento Peak Observatory is the Richard B. Dunn Solar Telescope (Dunn Solar Telescope), which was completed in 1969 and is a high spatial resolution optical solar telescope, allowing solar astronomers worldwide to obtain information about the sun. In addition to the Dunn Solar Telescope, Sacramento Peak hosts the John W. Evans Solar Facility (1952, not in active use), the Hilltop Dome (1963, not in active use), the Grain Bin Dome (1950, not in active use), and the Patrol Dome, as well as various support structures.

Description of the Proposed Action

NSF's Division of Astronomical Sciences (AST) is the federal steward for ground-based astronomy in the United States, funding research with awards to individual investigators and research groups and via cooperative agreements for operation of telescope facilities. These national and international telescope facilities provide observational capabilities on a competitive basis to thousands of astronomers per year. These facilities also enable scientific advances by making archived data products available to researchers. Along with funding telescope facilities and research awards, AST supports the development of advanced technologies and instrumentation.

One area of research supported by AST is solar astronomy, which is primarily managed via the National Solar Observatory (NSO). NSO-managed facilities include the Sacramento Peak Observatory.

A range of preliminary proposed alternatives is being considered for evaluation. These preliminary proposed alternatives, which will be refined through public input, include the following:

- Continued NSF investment for science-focused operations (No Action Alternative).
- Transition to full operations with interested parties for solar astronomy research.
- Transition to partial operations with interested parties, and decommissioning or mothballing of facilities not proposed to be used.
- Mothballing of facilities limited to basic maintenance.
- Deconstruction and site restoration.

These proposed alternatives may be further refined during the early phases of the compliance review and will be informed by the public process.

The Area of Potential Effects (APE) for the proposed action is defined as the area within the Sacramento Peak Observatory boundary plus two small noncontiguous areas southeast of the facility that include a sewage treatment plant and the water well system. Figure 1, included in Enclosure 1, shows the boundaries of the APE.

Public Involvement

A Notice of Intent was published in the Federal Register on July 5, 2016, to initiate the public scoping process for the EIS. A public scoping meeting was conducted on July 21, 2016, in Alamogordo, New Mexico. NSF anticipates conducting an additional public meeting during the winter of 2017, following the publication of the Draft EIS. Section 106 consultation needs will be addressed as part of the public meeting or during a separate consulting party meeting scheduled during the same time period. Follow-up discussions with consulting parties will occur as needed.

Known Cultural Resources

Previous environmental reviews and archaeological surveys have been conducted at the Sacramento Peak Observatory. During the 1990s, a series of surveys was conducted in preparation for the construction of the Sacramento Peak Observatory Visitor and Education Center (1992 to 1995) and before planned construction of roads and buildings at the Sacramento Peak Observatory (1994 to 1995). An intensive archaeological survey was conducted at the Sacramento Peak Observatory in 1994. The associated report concluded that no prehistoric or historic sites were present and that the Sacramento Peak Observatory was "a historically significant complex" (Shields, 1995). An environmental assessment was conducted in 1995 and the associated report stated that "the Sacramento Peak Solar Observatory is an historic scientific compound begun in 1947, however, the buildings have not been evaluated for historical significance" (Cartwright, 1995).

Background research shows that no NRHP-listed structures are located within the APE and that the instruments and buildings associated with the Sacramento Peak Observatory have not been previously evaluated for NRHP eligibility. A Secretary of the Interior-qualified architectural historian with CH2M HILL, Inc. (CH2M) conducted an intensive architectural survey at the Sacramento Peak Observatory from January 26 to 27, 2015. The site visit was also used to engage staff in informal interviews and to conduct archival research. Historic built environment resources at the Sacramento Peak Observatory were evaluated for potential eligibility for listing in the NRHP, both individually and together as a potential historic district. The evaluation included all facilities that were more than 45 years old at the time of the survey. A total of 65 built environment resources that had been constructed before or in 1970 were identified as extant within the APE, including 5 telescope structures, 35 residential buildings, 17 administrative buildings, and 8 buildings and structures associated with site infrastructure. Figure 2, included in Enclosure 2, shows the location of each evaluated built environment resource.

NSF has determined that there are two telescopes on the property that are individually eligible for listing in the NRHP: the John W. Evans Solar Facility and the Dunn Solar Telescope. Both are eligible under Criterion A for important associations with events that have made a significant contribution to the field of solar astronomy. The Dunn Solar Telescope is also eligible under Criterion C for design and engineering. Both telescopes have undergone minor additions and alterations; however, these changes have not

diminished the overall integrity of the telescopes. Additionally, NSF has determined that the Sacramento Peak Observatory is eligible for listing in the NRHP as a historic district for representing an important time in science and military history and for its significant contribution to the advancement of solar astronomy (Criterion A). Sixty-three built environment resources are contributing resources to the Sacramento Peak Observatory historic district. Table 1 lists the properties at the Sacramento Peak Observatory that were identified as individually eligible for listing in the NRHP. Determinations of eligibility for the architectural resources at Sacramento Peak Observatory are pending concurrence from the New Mexico SHPO.

TABLE 1. Individually NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Determination
Sacramento Peak Observatory Historic District	1950–1969	Collection of solar telescopes, residential buildings, administrative buildings, and site infrastructure facilities associated with NSO and Sacramento Peak.	Eligible (Historic District); 63 contributing resources
John W. Evans Solar Facility, Building 3000 (housed in the Big Dome)	1952	Dome contains two coronagraphs, the largest in the United States, and a coelostat. Consists of a 30-foot dome on concrete walls.	Individually eligible and contributing to Sacramento Peak Observatory Historic District
Richard B. Dunn Solar Telescope, Building 3042 (formerly Vacuum Tower Telescope)	1969	A solar telescope composed of a vacuum tube centered within a concrete tower that extends 136 feet above ground and 228 feet below ground.	Individually eligible and contributing to Sacramento Peak Observatory Historic District

Initiation of Section 106 Consultation

In accordance with the National Historic Preservation Act and to ensure the consideration of the effects of the proposed action on properties listed or eligible for listing in the NRHP, NSF is initiating Section 106 consultation pursuant to Title 36 *Code of Federal*

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

20 December 2016

Dr. Jeff Pappas
Director and State Historic Preservation Officer
New Mexico Department of Cultural Affairs –
Historic Preservation Division
407 Galisteo Street, Suite 236
Santa Fe, New Mexico 87501

RE: Transmittal of 65 Historic Cultural Preservation Inventory Base Forms for the Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, Otero County, New Mexico

Dear Dr. Pappas:

The National Science Foundation (NSF) initiated Section 106 consultation with the New Mexico Historic Preservation Division (HPD) on August 24, 2016, regarding the Proposed Changes to Sacramento Peak Observatory Operations in Sunspot, Otero County, New Mexico. Along with the Section 106 consultation letter, NSF transmitted two reports for your review and comment: *Cultural Resources Evaluation, National Solar Observatory (Sacramento Peak Observatory), Sunspot, New Mexico* and the *Archaeological Survey of 36 HA for AURA Inc. at the National Solar Observatory, Sunspot, Otero County, New Mexico, January 1995*. NSF requested concurrence on the project's area of potential effects (APE). In addition, NSF requested concurrence on the determination that there are two telescopes at the Sacramento Peak Observatory that are individually eligible for listing in the National Register of Historic Places (NRHP); that the Sacramento Peak Observatory is eligible for the NRHP as a historic district, containing 63 contributing resources; and that there are no known archaeological sites on the Sacramento Peak Observatory property.

On September 15, 2016, NSF received an email from HPD's Architectural Projects Reviewer (Log number 104236), Barbara Zook, providing concurrence on the proposed project's APE and requesting that Historic Cultural Preservation Inventory (HCPI) Base Forms be completed for the 65 historic-era buildings and structures that were evaluated as part of the 2016 Cultural Resources Evaluation. In response to this request, HCPI Base Forms were completed for the 65 evaluated buildings and structures and submitted to the HPD via the New Mexico Cultural Resources Information System (NCMRIS) on December 19, 2016. With this letter, NSF is transmitting hard copies of the completed HCPI Base Forms (Enclosure 1) and requesting concurrence on the determinations of eligibility.

Determinations of Eligibility

NSF has determined that there are two telescopes on the property that are individually eligible for listing in the NRHP: the John W. Evans Solar Facility and the Dunn Solar Telescope. Both are eligible under Criterion A for important associations with events that have made a significant

contribution to the field of solar astronomy. The Dunn Solar Telescope is also eligible under Criterion C for design and engineering. Additionally, NSF has determined that the Sacramento Peak Observatory is eligible for listing in the NRHP as a historic district for representing an important time in science and military history and for its significant contribution to the advancement of solar astronomy (Criterion A). The Sacramento Peak Observatory is a collection of Cold War-era buildings and structures primarily constructed between 1950 and 1969 that reflects the early history of solar astronomy in the United States. The telescopes and associated facilities have influenced other, more modern solar telescopes and the observations have greatly expanded the understanding of the sun. There are 63 built environment resources that are contributing elements to the Sacramento Peak Observatory historic district. Two buildings were identified as non-contributing resources. Table 1 lists the properties at the Sacramento Peak Observatory that were identified as individually eligible for the NRHP. Table 2, Evaluated Buildings and Structures, included as Enclosure 2, lists the buildings that contribute to the NRHP-eligible historic district.

TABLE 1. Individually NRHP-Eligible Built Environment Resources within the APE

Resource Name	Year Constructed	Description/Significance	NRHP Eligibility Determination
Sacramento Peak Observatory Historic District	1950-1969	Collection of solar telescopes, residential buildings, administrative buildings, and site infrastructure facilities associated with Sacramento Peak Observatory.	Eligible (Historic District); 63 contributing resources (see Enclosure 1)
John W. Evans Solar Facility, Building 3000 (housed in the Big Dome)	1952	Dome contains two coronagraphs, the largest in the United States, and a coelostat. Consists of a 30-foot dome on concrete walls.	Individually eligible and contributing to Sacramento Peak Observatory Historic District
Richard B. Dunn Solar Telescope, Building 3042 (formerly Vacuum Tower Telescope)	1969	A solar telescope composed of a vacuum tube centered within a concrete tower that extends 136 feet above ground and 228 feet below ground.	Individually eligible and contributing to Sacramento Peak Observatory Historic District

Tribal Consultation

On December 2, 2016, NSF initiated Section 106 consultation with the following Native American Tribes:

- Hopi Cultural Preservation Office
- Pueblo of Zuni Tribal Historic Preservation Officer
- Mescalero-Apache Nation
- Fort McDowell Yavapai Nation

The tribal consultation letters provided a description of the proposed action and known cultural resources at Sacramento Peak Observatory, and a request for information regarding traditional

cultural properties, sacred sites, and places that have historic, religious, or cultural significance that could be affected by the proposed action. No responses have been received to date.

Request for Concurrence

NSF requests your concurrence with the determination that there are two telescopes at the Sacramento Peak Observatory that are individually eligible for listing in the NRHP and that the Sacramento Peak Observatory is eligible for the NRHP as a historic district, containing 63 contributing resources. NSF is also requesting concurrence that there are no known archaeological sites on the Sacramento Peak Observatory property, based on the information provided in the archaeological survey report transmitted with the August 24, 2016, Section 106 initiation letter, *Archaeological Survey of 36 HA for AURA Inc. at the National Solar Observatory, Sunspot, Otero County, New Mexico, January 1995*. Please respond within 30 days from receipt of this letter to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

Attached please find 65 HCPI Base Forms for the evaluated historic-era buildings and structures at Sacramento Peak Observatory (Enclosure 1). Table 2 (Enclosure 2) lists all the buildings and structures that were recorded on HCPI Base Forms and identifies those that contribute to the NRHP-eligible historic district. If you have any questions, please do not hesitate to contact me by phone at 703-292-4592 or by email at cblanco@nsf.gov. We look forward to further consultation on this proposed undertaking.

Regards,

Kristen Hamilton

for Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

CC: K. Hamilton
E. Pentecost

Enclosures:
1. Historic Cultural Preservation Inventory (HCPI) Base Forms
2. Table 2: Evaluated Buildings and Structures

Enclosures are not included in this appendix. Enclosures are available upon request.

Susana Martinez
Governor

STATE OF NEW MEXICO
DEPARTMENT OF CULTURAL AFFAIRS
HISTORIC PRESERVATION DIVISION

BATAAN MEMORIAL BUILDING
407 GALISTEO STREET, SUITE 236
SANTA FE, NEW MEXICO 87501
PHONE (505) 827-6320 FAX (505) 827-6338

January 18, 2017

Ms. Elizabeth Pentecost National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd. Suite 1045
Arlington, Virginia 22230
spenteco@nsf.gov

Re: NEPA Analysis for Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, NM

Dear Ms. Pentecost;

The Historic Preservation Division (HPD) is in receipt of the December 20, 216 correspondence including Historic Cultural Properties Inventory Forms (HCPI) for 65 evaluated buildings and structures. NSF requested that HPD concurrence with the determination that two telescopes at Sacramento Peak Observatory are individually eligible for inclusion in the NRHP and that 63 historic of 65 structures comprise a National Register Historic District. NSSF also requested concurrence that there are no known archaeological sites on the Sacramento Peak Observatory property.

HPD Archaeologist Andrew Zink and Architectural Historian Steven Moffson visited the site in November to determine the scope of resources eligible for inclusion in the National Register of Places. Following the site visit, HPD concluded that the significance of the property is as an historic district with a formally design landscape by a major New Mexico architect which includes the two telescopes. Therefore, the resources should be evaluated as a designed landscape comprised of these telescopes, 63 contributing structures, and the roads, open spaces, playgrounds, wells, retaining walls along with other landscape features not yet inventoried or evaluated. Lincoln National Forest is in the process of preparing a National Register Nomination for the historic district. HPD recommends that NSF document the designed landscape features on Laboratory of Anthropology Forms available at:

http://www.nmhistoricpreservation.org/documents/arms-documents.html

In addition, the historic context of the designed landscape should be researched and provided.

Please be advised that determining individual significance of any features or structures is not the recommended approach to the determination of eligibility for this nationally significant property.

While visiting the observatory grounds in November, HPD Archaeologist Andrew Zink observed what appeared to be several isolated foundations without superstructures. Due to time constraints and the visit's focus on the standing buildings, Andrew was not able to identify these features but believes their presence could indicate that historic archaeology within the planned landscape could be present and should be taken into account.

Although no prehistoric archaeology is expected within the observatory grounds, HPD will not be able to comment on whether or not additional archaeological survey is needed until the entirety of the land that is changing management (which HPD recognizes as the Area of Potential Effects (APE) for these types of undertakings) can be compared to what is on record as having been previously surveyed in the New Mexico Cultural Resource Information System (NMCRIS) and Forest Service databases' records. HPD requests that the NSF provide documentation showing the entirety of the land that will be undergoing changes in management.

HPD has been informed that the Forest Service has not received copies of the HCPI forms. It is advisable that the Bill Sapp of the Lincoln National Forest receive copies of all documentation submitted to this office.

We look forward to continued consultation regarding this nationally significant property.

Sincerely,

Barbara Zook, RA
Architectural Projects Reviewer

Cc: Bill Sapp, PhD, Lincoln National Forest, USFS

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

May 4, 2017

Dr. Jeff Pappas, Director and State Historic Preservation Officer
New Mexico Department of Cultural Affairs, Historic Preservation Division
407 Galisteo Street, Suite 236
Santa Fe, New Mexico 87501

RE: Section 106 Consultation for the Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, Otero County, New Mexico—Request for Concurrence on the Revised Area of Potential Effects and Determinations of Eligibility

HPD Log #: 103800; HPD Log #: 104236; HPD Log #: 105254

Dear Dr. Pappas:

The National Science Foundation (NSF) initiated Section 106 consultation with the New Mexico Historic Preservation Division (HPD) on August 24, 2016, regarding the Proposed Changes to Sacramento Peak Observatory Operations in Sunspot, Otero County, New Mexico. Consultation has been ongoing. With this letter, NSF is transmitting a copy of the revised area of potential effects (APE) and notifying the HPD that revised Historic Cultural Preservation Inventory (HCPI) Base Forms have been submitted via the New Mexico Cultural Resources Information System (NMCRIS). Under Section 106 of the National Historic Preservation Act, NSF is seeking comments from your office on the revised APE and concurrence on the determination that the Sacramento Peak Observatory is eligible for listing in the National Register of Historic Places (NRHP) as a historic district with 63 contributing resources, including two telescopes that are individually eligible for the NRHP.

Area of Potential Effects

NSF received concurrence from the HPD on the original APE via email on September 15, 2016. After visiting the grounds of the Observatory in November 2016 and further discussions with the United States Forest Service (USFS), the HPD requested that NSF provide documentation showing what areas of the Sacramento Peak Observatory had been previously surveyed for archaeological resources, to ensure that the entirety of the land that would be undergoing change in management was included within the APE. This information was provided to the HPD and to the USFS via email on February 8, 2017 (Enclosure 1). In a summary of the February 15, 2017 conference call provided by HPD on March 1, 2017, HPD stated that no further archaeological survey would be required.

Several possible boundaries were discussed for the APE during a conference call between the NSF, HPD, and USFS on February 15, 2017, including two areas identified in the Land Use Agreement between USFS and NSF—

context for the Sacramento Peak Observatory, to include discussion of the additional landscape features identified by USFS and the HPD. This approach for documenting the additional features was confirmed with Barbara Zook and Andrew Zink at the HPD on April 24, 2017. This will be submitted to the HPD with a finding of effect for the proposed project alternatives, after the determination of eligibility for the historic district has been resolved.

Request for Concurrence

NSF requests your comments on the revised APE and concurrence on the determination that the Sacramento Peak Observatory is eligible for the NRHP as an historic district, containing 63 contributing resources, including the two individually eligible telescopes. Please respond within 30 days from receipt of this letter to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

If you have any questions, please do not hesitate to contact me by phone at 703-292-4592 or by email at cblanco@nsf.gov. We look forward to your response.

Sincerely,

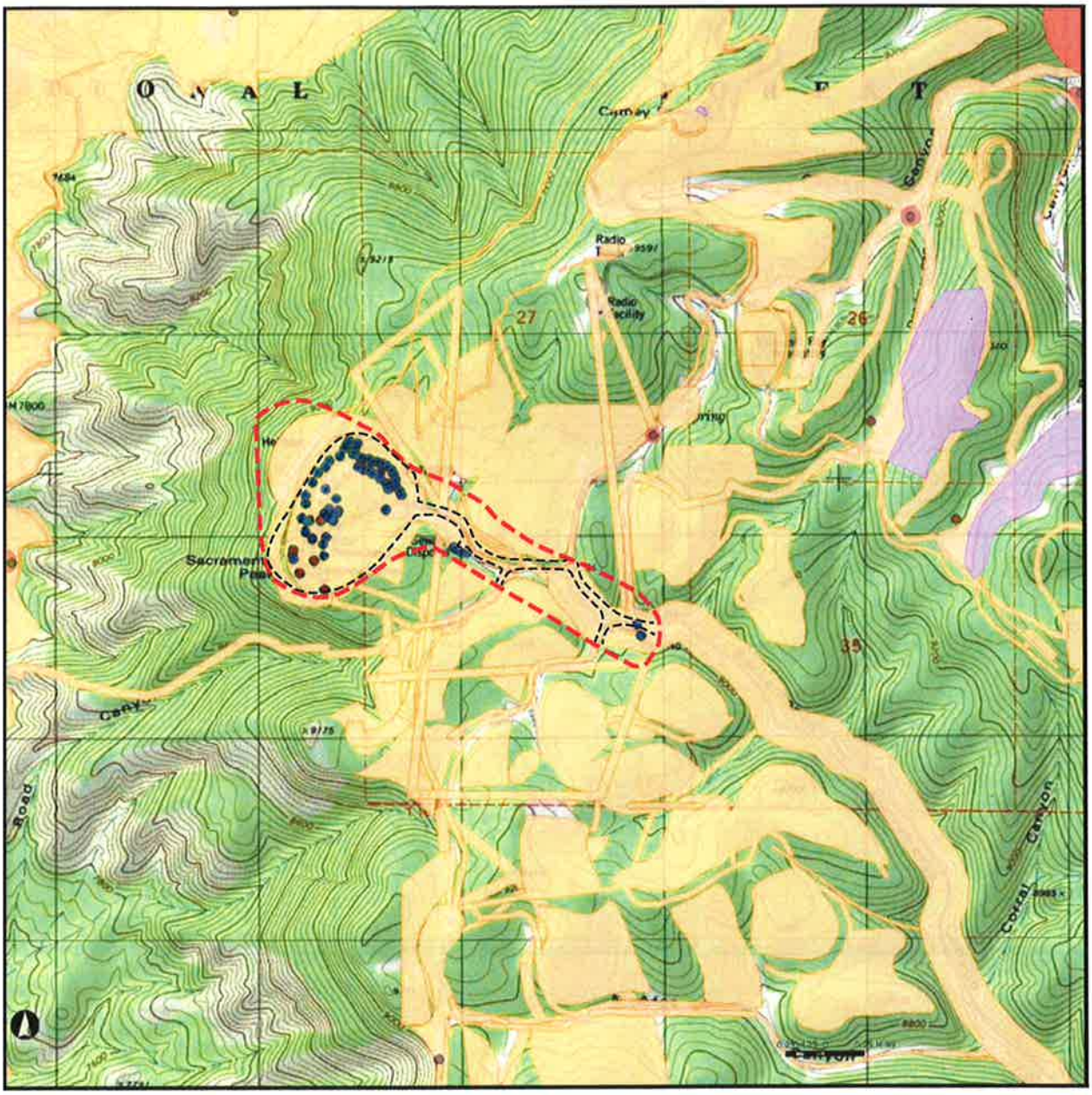
Caroline M. Blanco EMP

Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

Cc: E. Pentecost, NSF
K. Hamilton, NSF
B. Sapp, USFS
M. Gutzman, USFS
A. Naccarato, CH2M
L. Price, CH2M

Enclosures:
1. Map Illustrating Areas of Previously Conducted Archaeological Surveys
2. Area of Potential Effects

Map



Site Labels

Site Boundaries (Edit)

Site Boundaries

- Not Defined
- Proposed
- Approved

Building Labels

Object Labels

Buildings

- Not Defined
- Proposed
- Approved

Objects

- Not Defined
- Proposed
- Approved

Linear Resources

- Not Defined

Archaeological Surveys (Edit)

Archaeological Surveys

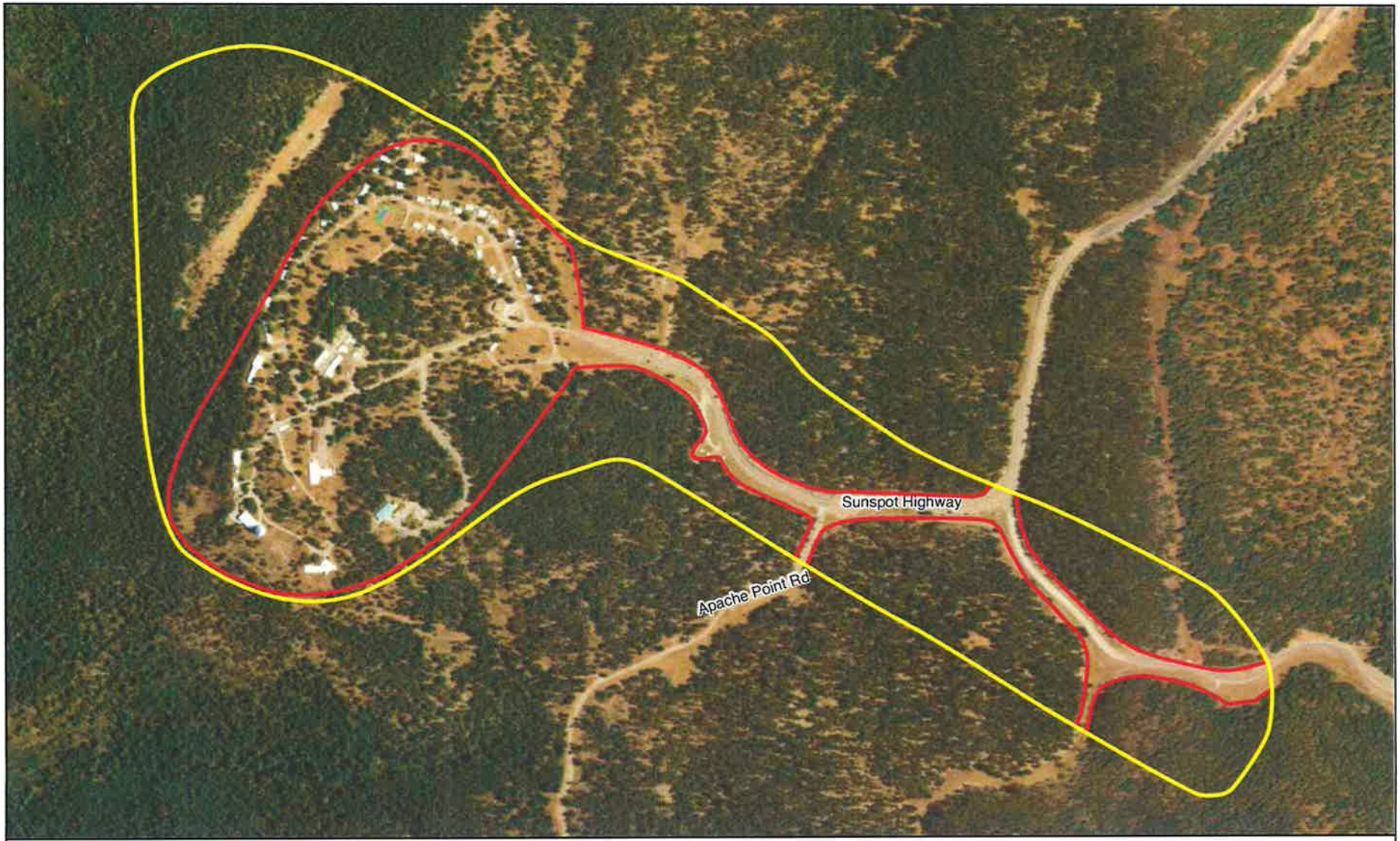
- Not Defined
- Proposed
- Approved

Highways

- Primary Limited Access or Interstate
- Primary US and State Highways
- Secondary State and County

Area of Potential Effects (APE)

Overall Property Limits



Aerial Source: National Agriculture Imagery Program (NAIP), 2016

Legend

- Area of Potential Effects (APE)
- Overall Property Limits

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Sacramento Peak Observatory
Sunspot, New Mexico

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Susana Martinez
Governor

STATE OF NEW MEXICO
DEPARTMENT OF CULTURAL AFFAIRS
HISTORIC PRESERVATION DIVISION

BATAAN MEMORIAL BUILDING
407 GALISTEO STREET, SUITE 236
SANTA FE, NEW MEXICO 87501
PHONE (505) 827-6320 FAX (505) 827-6338

May 18, 2017

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230

Re: Sacramento Peak Observatory Operations, Sunspot, Otero County, NM
Request for Concurrence on the Revised Area of Potential Effects and Determinations of Eligiblity
HPD Log # 103900, 104236, 105254 and 105751

Dear Ms. Pentecost,

The Historic Preservation Division (HPD) is in receipt of the National Science Foundation's May 4, 2017 correspondence requesting concurrence on the Revised Area of Potential Effects (APE) and the Determination of Eligibility for the Sacramento Peak Observatory as a historic district with 63 contributing resources, including two telescopes that are also individually eligible for listing in the National Register of Historic Places

HPD concurs that Sacramento Peak Observatory is eligible for inclusion in the National Register of Historic Places as a historic district with 63 contributing resources, including the two telescopes. As discussed in your correspondence, the historic context under preparation will describe the historic district including historic designed landscape features. The dashed red line on the map showing surveyed areas indicates overall property limits. This is a reasonable boundary for the potential historic district. The boundary should include the heliport landing area which is associated with the rest of the contributing resources. It is advisable to prepare a Historic Cultural Property Inventory Form to document the heliport landing area since it is historically associated with the property.

In our March 2, 2017 correspondence, HPD recommends that the APE and the "Compound Area" identified in the Land Use Agreement should be the same because new discoveries or indirect effects may occur beyond the bounds of the historic district. For clarity, the area of potential effects is defined as "*the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.*" Using the potential historic district boundary as the APE does not take into account the effects of the undertaking on the setting, i.e. the area along the entrance roads or the area around the heliport landing area. It does not provide for cultural resources that may be unknown and potentially affected, which may be located outside the historic district boundaries, such as recreation areas that were used by residents of the historic district. HPD encourages consensus among consulting parties and believes the larger APE boundary will facilitate the ease of consultation on the potential effects of the undertaking.

If you have any questions, you may contact me at (505) 476-0548, or Barbra.zook@state.nm.us

Sincerely,

Barbara Zook, RA

Cc: c. Blanco, FPO - NSF, B. Sapp, M. Gutzman USFS (all via email)

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

June 15, 2017

U.S. Fish and Wildlife Service
New Mexico Ecological Services Field Office
ATTN: Jodie Smithem, Branch Chief
Aquatic and Terrestrial Ecosystem Conservation
2105 Osuna Rd NE
Albuquerque, NM 87113

Subject: Request for Informal Consultation under Section 7 of the Endangered Species Act for proposed changes to operations resulting from funding constraints at the Sacramento Peak Observatory

Dear Ms. Smithem:

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences, prepared a biological assessment (BA) to evaluate the potential effects on federally listed species identified by both the U.S. Fish and Wildlife Service (USFWS) and the U.S. Forest Service (USFS) as having the potential to occur within the Sacramento Peak Observatory and the surrounding Lincoln National Forest (Forest). This analysis includes the potential effects to the federally listed Mexican spotted owl (*Strix occidentalis lucida*), the federally listed Sacramento Mountains thistle (*Cirsium vinaceum*), and the candidate species Peñasco least chipmunk (*Tamias minimus atristriatus*) as a result of the proposed changes in operations because of funding constraints at the Sacramento Peak Observatory under implementation of four proposed Action Alternatives. These Action Alternatives include the following:

1) Transition to full operations with interested parties for solar research
2) Transition to partial operations with interested parties to support science and/or science, technology, engineering, and mathematics education
3) Mothballing of facilities limited to basic maintenance
4) Demolition and site restoration

The NSF requests informal consultation with USFWS under Section 7(a) of the Endangered Species Act. The BA addresses the potential impacts of the considered Action Alternatives, and NSF requests concurrence with the determinations made for the Mexican spotted owl,

Sacramento Mountains thistle, and Peñasco least chipmunk under each of the Action Alternatives. Because the project area is located on National Forest System Lands, USFS has provided extensive input into this BA and will be provided a copy of all correspondence related to Section 7 consultation.

The following table provides a summary of the determinations made for each species under the four proposed Action Alternatives. Project details, mitigation measures, and additional information regarding the rationale supporting NSF's determinations can be found in the accompanying BA.

Summary of Effects Determinations by Action Alternative

Species and Activity/Resource Analyzed	Action Alternative 1 Transition to Full Operations	Action Alternative 2 Transition to Partial Operations	Action Alternative 3 Mothballing of Facilities	Action Alternative 4 Demolition and Site Restoration
Mexican spotted owl (*Strix occidentalis lucida*)				
Implementation	No Effect	No Effect	No Effect	No Effect
Operations	No Effect	No Effect	No Effect	No Effect[a]
Critical Habitat	No Adverse Modification	No Adverse Modification	No Adverse Modification	No Adverse Modification
Sacramento Mountains thistle (*Cirsium vinaceum*)				
Implementation	No Effect	No Effect	No Effect	No Effect
Operations	No Effect	No Effect	No Effect	No Effect[a]
Critical Habitat	N/A[b]	N/A[b]	N/A[b]	N/A[b]
Peñasco least chipmunk (*Tamias minimus atristriatus*)				
Implementation	May Affect, But Not Likely to Adversely Affect	May Affect, But Not Likely to Adversely Affect	May Affect, But Not Likely to Adversely Affect	May Affect, But Not Likely to Adversely Affect
Operations	No Effect	No Effect	No Effect	No Effect[a]
Critical Habitat	N/A[b]	N/A[b]	N/A[b]	N/A[b]

[a] Long-term beneficial impacts would be expected with closure of the Observatory and as natural habitats mature following restoration of the site.

[b] Critical habitat has not been designated for the Peñasco least chipmunk or the Sacramento Mountains thistle.

In addition to the BA, NSF is also preparing an Environmental Impact Statement (EIS), per the National Environmental Policy Act (NEPA), to assess the potential impacts of the proposed changes in operations as a result of funding constraints under the four listed proposed Action Alternatives, as well as a No Action Alternative. A Notice of lntent for the EIS was published in the *Federal Register* on July 5, 2016, to initiate the public scoping process and a letter was sent to Mr. Wally Murphy of your office on July 7, 2016, to solicit scoping comments from USFWS. The NSF intends to incorporate a summary of Section 7 consultation efforts into the EIS, along with agreed-upon mitigation and/or protective measures established during consultation efforts

with USFWS. The NSF will provide a copy of the Draft EIS to USFWS for review and comment.

The Forest is a cooperating agency for the NEPA review and is the National Forest System Land Manager for the base property on which the Sacramento Peak Observatory is located. The Forest has requested to be substantially engaged in any correspondence, discussions, meetings or other communications regarding this consultation. In addition, the Forest requests the opportunity to review and comment on any recommended changes in proposed actions, conservation measures, project design features, proposed mitigation measures, and determination of effects. As the land management agency, the Forest expects to be an active participant in this consultation between the NSF and the USFWS.

The NSF point of contact for the BA is Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Room 1045, 4201 Wilson Blvd., Arlington, VA 22230; telephone: (703) 292-4907; email: epenteco@nsf.gov. The USFS point of contact is Ms. Peggy Luensmann, Lincoln National Forest, Supervisor's Office, 3463 Las Palomas, Alamogordo, NM 88310; telephone: (575) 434-7376; email: psluensmann@fs.fed.us.

We appreciate your assistance in this matter and look forward to working through the consultation process with your office. If you require any additional information or documentation, please contact Ms. Pentecost.

Sincerely,

Edward G. Gyln for R.A.G.

Dr. Ralph Gaume
Acting Division Director, Division of Astronomical Sciences
National Science Foundation

cc: Ms. Peggy Luensmann (via email)

Enclosed: Biological Assessment

Enclosures are not included in this appendix. See Appendix 3B for the Biological Assessment.

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, Virginia 22230

OFFICE OF THE
GENERAL COUNSEL

June 29, 2017

Ms. Barbara Zook, Architectural Projects Reviewer
New Mexico Department of Cultural Affairs, Historic Preservation Division
407 Galisteo Street, Suite 236
Santa Fe, New Mexico 87501

RE: Section 106 Consultation for the Proposed Changes to Operations at the Sacramento Peak Observatory, Sunspot, Otero County, New Mexico – Revised Area of Potential Effects, Revised Historic District Boundary, and Treatment of the Helicopter Landing Area

HPD Log Nos.: 103900, 104236, 105254 and 105751

Dear Ms. Zook:

The National Science Foundation (NSF) initiated Section 106 consultation with the New Mexico Historic Preservation Division (HPD) on August 24, 2016, regarding the proposed changes to operations at the Sacramento Peak Observatory in Sunspot, Otero County, New Mexico. Consultation has been ongoing to determine the area of potential effects (APE) and the level of documentation required. With this letter, NSF is transmitting a copy of the revised APE and a revised Sacramento Peak Observatory historic district boundary based on the HPD's comments. NSF requests agreement from your office on the revised APE, the revised historic district boundary, and the suggested treatment for documenting the helicopter landing area.

In response to the HPD's letter dated May 18, 2017, NSF has agreed to use the "Compound Area" boundary, also referred to as the overall property limits, as the APE. In the same letter, the HPD stated that the historic district boundary should include the helicopter landing area associated with the Sacramento Peak Observatory. NSF has redrawn the historic district boundary to include the footprint of the former helicopter landing area. Also per HPD's request, the "Compound Area" (or overall property limits), which is now defined as the APE, is larger than the historic district to account for the effects of the undertaking on the larger setting. The figure showing the revised APE is enclosed (Enclosure 1).

The HPD also advised NSF to prepare a Historic Cultural Property Inventory Form to document the helicopter landing area. Further investigation by NSF determined that the helicopter landing area, which was constructed in 1955, is a cleared strip of land covered with grass; no pavement or other structures remain extant. Given that no built environment elements remain, the resource is more akin to a historic archaeological site than a built environment resource. As stated in NSF's letter to the HPD on May 4, 2017, and as agreed by HPD during a phone conversation with you and Andrew Zink on April 27, 2017, no additional survey work or survey forms need to be completed at this phase of the consultation process; historic archaeological sites will be discussed in an expanded historical context. As you requested during the April phone conversation, photographs of historic archaeological sites,

such as the helicopter landing area and assorted building foundations in the main Observatory area, will be included with the expanded historical context if they are available, but no further field work or surveys will be conducted at this time.

After the revised APE and historic district boundaries are approved, an assessment of effects that addresses the expanded historical context will be drafted and submitted to the HPD. The assessment of effects will contain a description of the historic context and the historic district, including any design, landscape, or historic archaeology features, and a finding of effect for the proposed project Alternative.

NSF requests your agreement with the revised APE, the revised Sacramento Peak Observatory historic district boundary, and the approach for documenting the helicopter landing area. Please respond within 30 days from receipt of this letter to:

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230
epenteco@nsf.gov

If you have any questions, please do not hesitate to contact me by phone at 703-292-4592 or by email at cblanco@nsf.gov. We look forward to your response.

Sincerely,

Kristen Hamilton

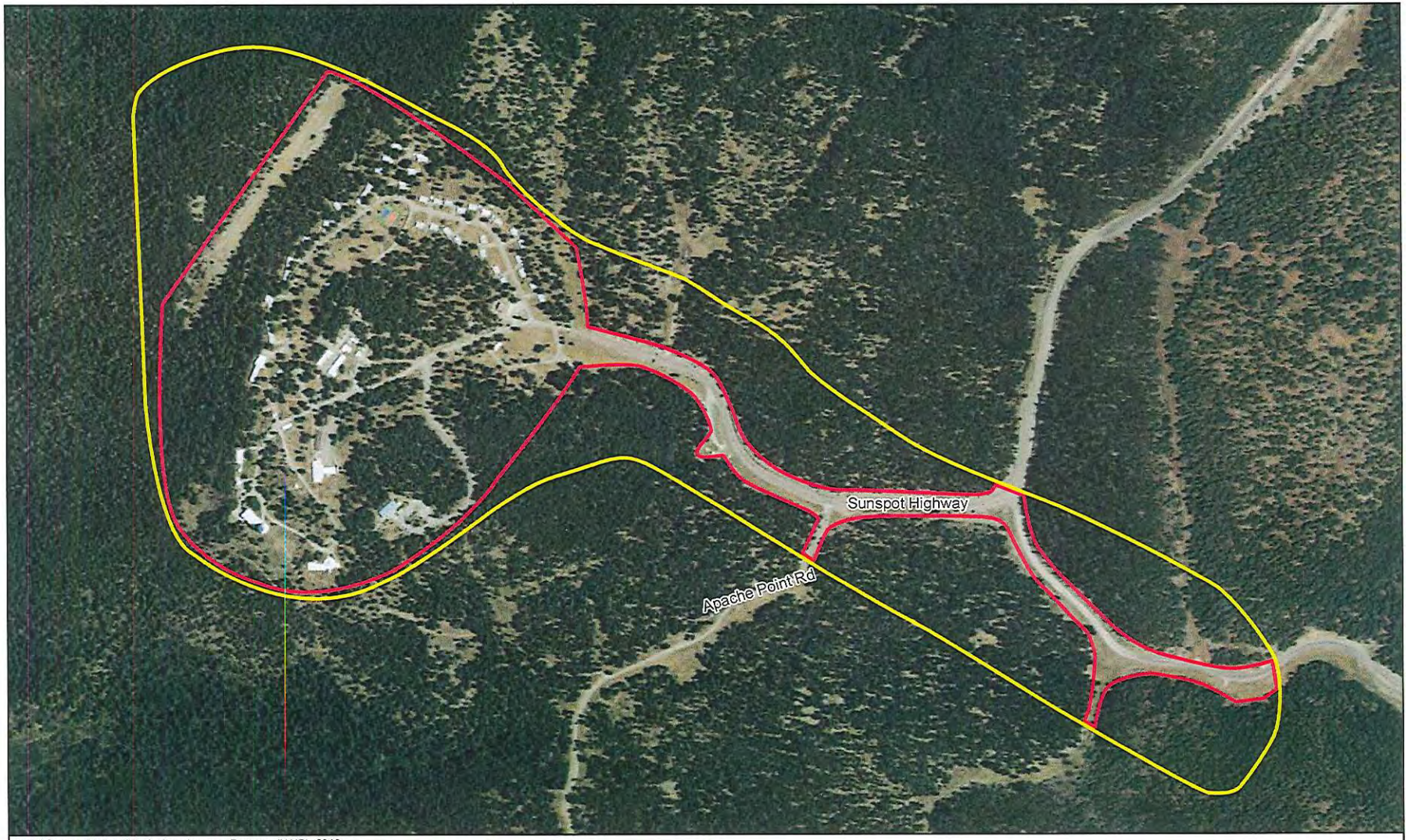
for Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

Cc: B. Sapp, USFS
M. Gutzman, USFS

Enclosure:
1. Revised APE and Historic District Boundary

Enclosure 1

Revised APE and Historic District Boundary



Aerial Source: National Agriculture Imagery Program (NAIP), 2016

Legend

- Sacramento Peak Observatory Historic District Boundary
- Area of Potential Effects (APE)

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Sacramento Peak Observatory
Sunspot, New Mexico

EN0310151054SAC APE_site_boundary_v3.ai 06-16-17 dash

Susana Martinez
Governor

STATE OF NEW MEXICO
DEPARTMENT OF CULTURAL AFFAIRS
HISTORIC PRESERVATION DIVISION

BATAAN MEMORIAL BUILDING
407 GALISTEO STREET, SUITE 236
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July 11, 2017

Ms. Elizabeth Pentecost
National Science Foundation
Division of Astronomical Sciences
4201 Wilson Blvd, Suite 1045
Arlington, Virginia 22230

Re: Sacramento Peak Observatory Operations, Sunspot, Otero County, NM
Request for Concurrence on the Revised Area of Potential Effects (APE)
HPD Log # 103900, 104236, 105254, 105751 and 106029

Dear Ms. Pentecost,

The Historic Preservation Division (HPD) is in receipt of the National Science Foundation's June 29, 2017 correspondence requesting concurrence on the revised Area of Potential Effects (APE), the revised Sacramento Peak Observatory historic district boundary, and the approach for documenting the helicopter landing area

HPD concurs with the revised APE and the approach for documenting the helicopter landing area. It is understood that the helicopter landing area and assorted building foundations in the main Observatory area will be included with the expanded historical context and that no further fieldwork will be required.

The Forest Service is in the process of preparing a National Register Nomination and the boundary that is under consideration for this nomination is still being determined in consultation with HPD. However, this will not affect the APE as shown on your plan. An assessment of effect can proceed and the work on the expanded historical context can commence.

Sincerely,

Andrew Zink, Archaeologist
Archaeological Project Reviewer

Barbara Zook, RA
Architectural Projects Reviewer

Cc: Blanco, FPO - NSF, B. Sapp, M. Gutzman USFS (all via email)

Received 7/25/17

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New Mexico Ecological Services Field Office
2105 Osuna Road NE
Albuquerque, New Mexico 87113
Telephone 505-346-2525 Fax 505-346-2542
www.fws.gov/southwest/es/newmexico/

July 25, 2017

Cons. # 02ENNM00-2017-I-0745

Dr. Ralph Gaume, Acting Division Director
National Science Foundation, Division of Astronomical Sciences
4201 Wilson Blvd.
Arlington, VA 22230

Dear Dr. Gaume:

Thank you for your June 15, 2017, letter requesting informal consultation with the U.S. Fish and Wildlife Service (Service) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.), as amended, for proposed changes to operations at Sacramento Peak Observatory. Your Biological Assessment (BA), dated June 2017, is hereby incorporated by reference. The BA analyzed the effects of implementing proposed changes in operations for the 37 facilities and/or utilities present at the Sacramento Peak Observatory due to funding constraints under four proposed action alternatives. These alternatives include: [1] transition to full operations with interested parties for solar research, including mothballing (i.e., temporary decommissioning) and demolition of facilities when necessary; [2] transition to partial operations with interested parties to support science and/or science technology, engineering, and mathematics education, including mothballing and demolition of facilities when necessary; [3] mothballing of all facilities limited to basic maintenance, including demolition of facilities when necessary; or [4] demolition of all facilities and site restoration. You concluded that implementation of any selected alternative "is not likely to jeopardize" the candidate Penasco least chipmunk (*Tamias minimus atristriatus*), will have "no effect" for the threatened Mexican spotted owl (*Strix occidentalis lucid*a) and its critical habitat, and will have "no effect" for the threatened Sacramento Mountains thistle (*Cirsium vinaceum*).

The National Science Foundation (NSF) has defined four alternatives for changes to operations that would enable NSF to significantly decrease or eliminate its funding of the Sacramento Peak Observatory. Alternative 1 would involve the mothballing of 4 facilities and the demolition of 3 facilities. All other facilities would remain in operation, constituting the least amount of change

to the operations of the current facility. Alternative 2 would involve the mothballing of 11 facilities and the demolition of 3 facilities. All other facilities would remain in operation, with activities for this alternative being comparable in type to, but slightly reduced compared to, current operations. Alternative 3 would consist of the mothballing of all facilities, except for the 3 facilities to be demolished. A maintenance program would be established to protect the facilities from deterioration, vandalism, and other damage. Alternative 4 would involve the removal of all structures to a maximum of 4 feet below existing ground surface grade. All mothballing activities proposed under all alternatives would involve maintenance activities which are expected to be similar with regard to impacts to biological resources as maintenance under current operations. All demolition activities proposed under all alternatives would adhere to seasonal restrictions and occur during daylight hours to avoid effects on nocturnal foraging by Mexican spotted owl and would occur in areas which do not constitute suitable habitat for the Mexican spotted owl. In addition, the noise levels produced by demolition activities are expected to be below recommended levels (i.e., 69 dBA).

Penasco least chipmunk

The Penasco least chipmunk is currently a candidate species and therefore provided no protections under the Endangered Species Act of 1973, thus consultation is not required. However, we appreciate your consideration of the impacts of this project to the Penasco least chipmunk. The conservation measures described in the BA, including the implementation of pre-demolition surveys and measures to relocate affected individuals are adequate to limit any adverse effects to the species. Should the Penasco least chipmunk be listed in the future, please re-initiate consultation for this species.

Mexican spotted owl and Sacramento Mountains thistle

While consultation is not required for “no effect” determinations, we appreciate your consideration of the impacts of this project to the Mexican spotted owl and the Sacramento Mountains thistle and the implementation of relevant conservation measures for this project.

Conclusion

This concludes informal section 7 consultation with the U.S. Fish and Wildlife Service for implementation of proposed changes to operations at the Sacramento Peak Observatory. Please contact the Service if: 1) new information reveals effects to the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, 2) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not previously considered, or 3) a new species is listed or critical habitat designated that may be affected by the action.

Thank you for your concern for endangered species and New Mexico's wildlife habitats. If you have any questions, please contact Susan Pruitt of my staff at the letterhead address, by phone at (505)761-4707, or by electronic mail at mary_pruitt@fws.gov

Sincerely,

for Susan S. Millsap
Field Supervisor

cc (electronic):

Acting Division Director, Division of Astronomical Science, National Science Foundation, Arlington, VA
Project Administrator, Division of Astronomical Science, National Science Foundation, Arlington, VA
Forest Environmental Coordinator, Supervisor's Office, Lincoln National Forest, Alamogordo, NM
Director, New Mexico Department of Game & Fish, Santa Fe, NM
Director, New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division, Santa Fe, NM

NATIONAL SCIENCE FOUNDATION
2415 Eisenhower Avenue
Alexandria, Virginia 22314

Ms. Barbara Zook, Architectural Projects Reviewer
New Mexico Department of Cultural Affairs, Historic Preservation Division
407 Galisteo Street, Suite 236
Santa Fe, New Mexico 87501

October 31, 2017

RE: Section 106 Assessment of Effects for the Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, Otero County, New Mexico
HPD Log Nos.: 103900, 104236, 105254 and 105751

Dear Ms. Zook,

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on key science of the present decade and beyond. The Sacramento Peak Observatory in Sunspot, Otero County, New Mexico, is one of the facilities identified for divestment.

The decision regarding the potential changes to the Sacramento Peak Observatory is considered a federal undertaking and triggers compliance with Section 106 of the National Historic Preservation Act (NHPA). While engaging in Section 106 consultation under the NHPA, NSF is simultaneously producing an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA) to identify potential environmental impacts associated with the proposed changes to operations.

NSF formally initiated Section 106 consultation with your office on August 24, 2016. The consultation letter included information regarding the location, background, and proposed Alternatives. Section 106 consultation is ongoing, and NSF has worked closely with your office to come to an agreement regarding the Area of Potential Effects (APE) and the historic district boundaries for the Observatory property. NSF is also coordinating closely with the US Forest Service staff, since the Observatory is located on is located on National Forest System lands.

The Sacramento Peak Observatory is eligible for listing in the National Register of Historic Places (NRHP) as a historic district with 63 contributing resources. Under proposed Alternatives 1, 2, 3, and 4, historic properties that contribute to the NRHP-eligible historic district could be demolished. Therefore, NSF has determined that any of the proposed Alternatives for this undertaking would result in a finding of adverse effect under Section 106. The proposed Alternatives are summarized as follows:

Proposed Action Alternatives
Alternative 1 – Continued Science and Education-focused Operations by Interested Parties with Reduced NSF Funding
Alternative 2 – Transition to Partial Operations by Interested Parties with Reduced NSF Funding
Alternative 3 – Mothballing of Facilities
Alternative 4 – Demolition and Site Restoration

With this letter, NSF is enclosing the *Proposed Changes to Sacramento Peak Observatory Operations: Historic Properties Assessment of Effects* (CH2M HILL, 2017) for your review and comment. We will also provide a copy of this report to the single consulting party that has been identified for this undertaking.

In compliance with Title 36 *Code of Federal Regulations* (CFR) Part 800.6(a), NSF invites you to continue consultation to avoid, minimize, or mitigate the adverse effect to historic properties through development of a Programmatic Agreement. NSF recommends a Programmatic Agreement under 36 CFR 800.14(b)(1)(ii) because the effects on historic properties cannot be fully determined prior to approval of the undertaking on the proposed changes to Sacramento Peak Observatory operations.

We respectfully request your review and comments on the Assessment of Effects report within 30 calendar days of your receipt of this letter. If you have any questions, please contact Ms. Elizabeth Pentecost by phone at 703-292-4907, email at epenteco@nsf.gov, or U.S. Postal Service to NSF, Division of Astronomical Sciences, 2415 Eisenhower Avenue, Alexandria, Virginia, 22314.

We look forward to further consultation with you on this undertaking.

Regards,

Caroline M. Blanco

Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
National Science Foundation

Cc: William Sapp, U.S. Forest Service (via email)
Mark Klaene, Apache Point Observatory

Enclosure:
Proposed Changes to Sacramento Peak Observatory Operations: Historic Properties Assessment of Effects

Enclosure:
Proposed Changes to Sacramento Peak Observatory Operations: Historic Properties Assessment of Effects

Enclosures are not included in this appendix. See Appendix 5F for the Assessment of Effects.

NATIONAL SCIENCE FOUNDATION
2415 Eisenhower Avenue
Alexandria, Virginia 22314

Mark Klaene
Site Operations Manager
Apache Point Observatory
P.O. Box 59
Sunspot, New Mexico 88349

October 31, 2017

RE: Section 106 Assessment of Effects for the Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, Otero County, New Mexico

Dear Mr. Klaene,

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on key science of the present decade and beyond. The Sacramento Peak Observatory in Sunspot, Otero County, New Mexico, is one of the facilities identified for divestment.

The decision regarding the potential changes to the Sacramento Peak Observatory is considered a federal undertaking and triggers compliance with Section 106 of the National Historic Preservation Act (NHPA). While engaging in Section 106 consultation under the NHPA, NSF is simultaneously producing an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA) to identify potential environmental impacts associated with the proposed changes to operations.

On August 24, 2016, NSF formally initiated Section 106 consultation with the New Mexico Department of Cultural Affairs, Historic Preservation Division, which serves as New Mexico's State Historic Preservation Office (SHPO). You have requested consulting party status for the proposed undertaking as part of the Section 106 process. With this letter, NSF is enclosing the *Proposed Changes to Sacramento Peak Observatory Operations: Historic Properties Assessment of Effects* (CH2M HILL, 2017) for your information and review.

The Sacramento Peak Observatory is eligible for listing in the National Register of Historic Places (NRHP) as a historic district with 63 contributing resources. Under proposed Alternatives 1, 2, 3, and 4, historic properties that contribute to the NRHP-eligible historic district could be demolished. Therefore, NSF has determined that any of the proposed Alternatives for this undertaking would result in a finding of adverse effect under Section 106. The proposed Alternatives are summarized as follows:

Proposed Action Alternatives
Alternative 1 – Continued Science and Education-focused Operations by Interested Parties with Reduced NSF Funding
Alternative 2 – Transition to Partial Operations by Interested Parties with Reduced NSF Funding
Alternative 3 – Mothballing of Facilities
Alternative 4 – Demolition and Site Restoration

NSF will invite you to attend a Section 106 consulting parties meeting that will be scheduled in the future. The Section 106 meeting will provide an overview of the Section 106 process, review the proposed Alternatives and their anticipated effects on the historic Sacramento Peak Observatory, and discuss potential mitigation measures.

We look forward to working with you on the proposed undertaking. If you have any questions, please contact Elizabeth Pentecost at (703) 292-4907.

Regards,

Caroline M. Blanco

Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

Enclosure:
Proposed Changes to Sacramento Peak Observatory Operations: Historic Properties Assessment of Effects

Enclosures are not included in this appendix. See Appendix 5F for the Assessment of Effects.

Susana Martinez
Governor

STATE OF NEW MEXICO
DEPARTMENT OF CULTURAL AFFAIRS
HISTORIC PRESERVATION DIVISION

BATAAN MEMORIAL BUILDING
407 GALISTEO STREET, SUITE 236
SANTA FE, NEW MEXICO 87501
PHONE (505) 827-6320 FAX (505) 827-6338

November 21, 2017

Caroline M. Blanco
Federal Preservation Officer
Assistant general Counsel
National Science Foundation
2415 Eisenhower Avenue
Alexandria, Virginia 22314

Re: Section 106 Assessment of Effects for the Proposed Changes to Sacramento Peak Report Observatory Operations, Sunspot, Otero County, New Mexico
HPD Log Nos. 103900, 104236, 15254, 105751, and 106786

Dear Ms. Blanco,

The New Mexico State Historic Preservation Office (NMSHPO) received the above cited final report on November 6, 2017. The final report reflects earlier comments made by NMSHPO and the area of potential effect (APE) is consistent with earlier discussions. NMSHPO agrees with NSF's recommendation to continue consultation and to commence with the preparation of a Programmatic Agreement (PA).

If you have not yet initiated consultation with other consulting parties or Native American tribes, we recommend that you begin that process as soon as possible A list of tribes with interests in Otero County can be found on our web site, along with contact information. Our website address is www,nmhistoricpreservation.org.

Please submit the draft PA to Preservation Planning Manager, Pilar Cannizzaro, who can be reached at pilar.cannizzaro@state.nm.us or 505 827-4054. Ms. Cannizzaro will be HPD's primary contact for further communications on this important undertaking.

Sincerely,

Barbara Zook Architect

Cc: William Sapp, U.S. Forest Service (via email)
Mark Klaene, Apache Point Observatory (via email)

NATIONAL SCIENCE FOUNDATION
2415 Eisenhower Avenue
Alexandria, Virginia 222314

Mr. John M. Fowler, Director
401 F Street NW, Suite 308
Washington DC 20001-2637

December 5, 2017

RE: Section 106 Consultation for the Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, New Mexico, Invitation to Participate

Dear Mr. Fowler,

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. Sacramento Peak Observatory, in Sunspot, New Mexico, is one of those facilities. NSF has identified four Action Alternatives, one of which includes potential deconstruction of the facility. The decision regarding the potential changes to operations of the Arecibo Observatory in Puerto Rico is considered a federal undertaking and triggers compliance with Section 106 of the National Historic Preservation Act (NHPA). While engaging in Section 106 consultation under NHPA, NSF is simultaneously proceeding with its environmental review under the National Environmental Policy Act (NEPA) to identify potential environmental impacts associated with the proposed changes to operations. NSF is currently preparing a Draft Environmental Impact Statement (EIS) that evaluates potential environmental impacts of the following alternatives:

- **Alternative 1** – Continued science- and education-focused operations by interested parties with reduced NSF funding
- **Alternative 2** – Transition to partial operations by interested parties with reduced NSF funding
- **Alternative 3** – Mothballing of Facilities
- **Alternative 4** – Demolition and site restoration
- **No-Action Alternative** – Continued NSF investment for science- and education-focused operations

Documents and meeting materials related to the NEPA and NHPA process are posted at www.nsf.gov/AST as they become available (click on "AST Facilities- Environmental Reviews").

The Section 106 consultation thus far has included the following communications:

Action	Date	Details
Intensive Architectural Survey at the Sacramento Peak Observatory	January 26–27, 2015	Historic built environment resources were evaluated for potential eligibility for listing in the NRHP, both individually and as a potential historic district. The evaluation included all facilities that were more than 45 years old at the time of the survey. A total of 65 architectural resources constructed in or before 1970 (and owned by NSF) were identified as extant within the APE and were evaluated for NRHP-eligibility.
Public Scoping Initiated	July 5, 2016	NOI was published in the *Federal Register*. A copy of the NOI was sent via email to potential stakeholders from federal, tribal, state, and local government agencies, as well as other organizations including universities, elected officials, and other potentially interested parties.
Public Scoping Notice	July 7, 2016	A notice of the public scoping meeting letter was mailed to the SHPO and ACHP.
NEPA Public Scoping Meeting	July 21, 2016	Public meeting held in Alamogordo, New Mexico. NSF provided an opportunity for individuals and organizations to express an interest in participating as Section 106 consulting parties. Three individuals expressed interest.
SHPO Response to the NEPA Public Scoping Letter	July 22, 2016	SHPO stated that the Alternatives have the potential to adversely affect historic

		properties and that their office did not have a record of a historic building survey being conducted at the Sacramento Peak Observatory. SHPO encouraged NSF to initiate Section 106 as soon as possible and stated an interest in reviewing the DEIS.
Email to Potential Consulting Parties	July 28, 2016	NSF contacted the three individuals who had expressed interest in Section 106 consultation during the NEPA public scoping meetings to provide further details about the Section 106 consultation process and to confirm their consulting party status for the Proposed Action. Parties were given until August 11, 2016, to confirm their interest in consulting party participation. A response was received from one individual, Mark Klaene of the Apache Point Observatory, who requested to be a Consulting Party.
Initiated Section 106 Consultation with SHPO, Request Concurrence on APE and Determinations of Eligibility, Transmit Reports	August 24, 2016	NSF requested concurrence with the APE and the determination that there are two telescopes at the Sacramento Peak Observatory that are individually eligible for listing in the NRHP and that the Sacramento Peak Observatory is eligible for the NRHP as a historic district. NSF also requested concurrence that there are no known archaeological sites on the Sacramento Peak Observatory site. The letter initiated formal Section 106 consultation with the New Mexico SHPO. The package included transmittal of two reports: *Cultural Resources*

		Evaluation, National Solar Observatory (Sacramento Peak Observatory), Sunspot, New Mexico (CH2M, 2015) and the *Archaeological Survey of 36 HA for AURA Inc. at the National Solar Observatory, Sunspot, Otero County, New Mexico, January 1995* (Shields, 1995).
Email from USFS to NSF	September 14, 2016	USFS acknowledged that NSF would serve as the lead federal agency for the proposed undertaking and agreed to serve as a Consulting Party.
Email from SHPO to NSF regarding APE	September 15, 2016	SHPO concurred with the proposed APE and concurred that the Alternatives have the potential to adversely affect historic properties. SHPO requested that Historic Cultural Preservation Inventory (HCPI) forms be completed for the 65 architectural resources built in or before 1970.
Conference Call with SHPO and USFS	September 15, 2016	Discussed the SHPO response received earlier that day. NSF agreed to complete HCPI forms for 65 architectural resources.
Initiate Tribal Consultation	December 2, 2016	Consultation letters were sent to four tribes: Mescalero-Apache Tribe, Hopi Tribe, Pueblo of Zuni, and Nation Fort McDowell Yavapai.
Tribal Consultation	December 12, 2016	The Hopi Tribe provided the following response: "No historic properties significant to the Hopi Tribe affected."
HCPI Forms Submitted to SHPO	December 20, 2016	Per SHPO's request, NSF submitted the HCPI forms for 65 architectural resources for review via the New Mexico Cultural Resources

		Information System on December 19, 2016. The next day, NSF also transmitted hard copies of the completed HCPI Base Forms, including a cover letter requesting concurrence on NSF's determinations of eligibility.
Conference Call with USFS	January 10, 2017	NSF and USFS discussed the USFS's comments on cultural resources and determinations of eligibility. USFS requested to be copied on all future correspondence with SHPO and also requested copies of the HCPI forms. NSF provided the USFS with electronic copies of the HCPI forms.
SHPO Letter to NSF regarding a request for additional information	January 18, 2017	SHPO acknowledged receipt of the HCPI forms. Additionally, following a November 2016 site visit and discussions with USFS, SHPO determined that the Observatory's significance is as a historic district and noted that determining individual significance of any features or structures is not recommended. SHPO also noted that certain additional landscape features such as roads, open spaces, playground, wells, retaining walls, and historic archaeological foundations should be considered as elements of the historic district and recommended that NSF document these landscape features on Laboratory of Anthropology Forms and prepare an expanded historical context for the Observatory.
Conference Call with USFS	February 14, 2017	NSF discussed the APE and

		HCPI forms with USFS, in preparation for the conference call with SHPO on February 15, 2017.
Conference Call with SHPO regarding APE	February 15, 2017	NSF, USFS, and SHPO participated in a teleconference to discuss the revised proposed APE and path forward for Section 106 consultation. SHPO submitted a letter to NSF, dated March 1, 2017, to summarize the call.
Conference Call Summary from SHPO	March 1, 2017	SHPO stated that no further archaeological survey work would be required but recommended that the APE be the same as the Compound Area defined in the Land Use Agreement. SHPO requested that NSF consult with the USFS regarding revisions to the HCPI forms and documentation for the additional landscape features. SHPO also noted that an MOA will be required to resolve adverse effects.
Continued Tribal Consultation Efforts	March 1, 2017	NSF left a voicemail for the Kiowa tribe to inquire if the tribe has an interest in the Sacramento Peak Observatory area.
Conference Call with USFS	March 24, 2017	NSF discussed the APE and Section 106 consultation approach with USFS.
Conference Call with USFS	March 31, 2017	NSF discussed the HCPI forms and APE with USFS. USFS disagreed with NSF's approach for completing the HCPIs and the associated determinations of eligibility.
Conference Call with USFS	April 10, 2017	NSF discussed USFS's edits to the HCPI forms. USFS agreed that NSF's approach for the determinations of

		eligibility was sufficient for Section 106 purposes. NSF agreed to add the name of relevant architects to the HCPI forms where appropriate.
Revised HCPI Forms Submitted via NMCRIS	April 27, 2017	Following additional coordination with USFS and SHPO, the HCPI forms were revised to include additional information regarding the primary architects for the site. The revised forms were resubmitted to the SHPO via NMCRIS.
Continued Tribal Consultation Efforts	April 27, 2017	NSF sent an email to the Kiowa tribe to inquire if they have an interest in the Observatory area and if they would like to receive copies of the DEIS and/or be involved during the Section 106 consultation process.
Revised HCPI Forms Submitted to USFS	April 28, 2017	NSF sent electronic versions of the revised HCPI forms to the USFS along with the draft cover letter to SHPO, for reference and review.
NSF Letter to SHPO regarding revised APE and Determination of Eligibility	June 29, 2017	NSF requested SHPO concurrence on the revised APE and the determination that the Sacramento Peak Observatory is eligible for the NRHP as a historic district, containing 63 contributing resources, including two individually eligible telescopes.
Email from NSF to SHPO regarding request for concurrence	June 29, 2017	NSF contacted SHPO by email to confirm that the request for concurrence on the APE and NRHP eligibility was received.
Continued Tribal Consultation Efforts	May 18, 2017	NSF called the Zuni, Mescalero Apache, and Yavapai tribes to inquire if

		they were interested in participating in consultation efforts described in the December 2, 2016 consultation letter. Pueblo of Zuni provided email address and requested to be provided any updates. Voicemails were left for the Mescalero Apache and Yavapai tribes.
Concurrence from SHPO on Determinations of Eligibility	July 11, 2017	SHPO concurred that the Sacramento Peak Observatory is eligible for the NRHP as a historic district with 63 contributing resources, including two individually eligible telescopes. SHPO requested that heliport landing area should be included as a contributing resource and that a HCPI form should be completed to document the resource. SHPO did not concur with the proposed APE, but recommended that it be defined as the larger Compound Area (also referred to as the overall property limits) identified in the NSF and USFS land use agreement.
Assessment of Effects Submitted to SHPO, USFS, and APO	October 31, 2017	NSF sent email and hard copies of the Assessment of Effects to SHPO, USFS, and APO for review.

We are attaching, in Enclosure 2, copies of the above correspondence. Also note that SHPO letters and the Assessment of Effects are posted on the NSF public website referenced above.

Per 36 CFR 800.11, we would like to formally invite your participation in this Section 106 process and invite your early review of the enclosed preliminary draft PA. The regulations also specify documentation requirements, which we believe are fully addressed in the enclosed

Proposed Changes to Sacramento Peak Observatory Operations: Historic Properties Assessment of Effects (Assessment of Effects), as described below:

1. Description of undertaking - please see *Section 1.1, Definition of Proposed Undertaking*, *Section 1.2, Proposed Alternatives Background*, and *Section 1.3, Proposed Alternatives Description* in the enclosed Assessment of Effects, with the APE described in *Section 1.4*
2. Description of steps taken to identify historic properties - please see *Section 1.4, Area of Potential Effects*, and *Section 1.5, Methodology* in the enclosed Assessment of Effects
3. Description of historic properties - please see *Section 2, Identified Historic Properties*, in the enclosed Assessment of Effects
4. Undertakings effect on historic properties (adverse) - please see *Section 3, Assessment of Effects*, in the enclosed Assessment of Effects
5. Explanation of why the effects are adverse - please see *Section 3, Assessment of Effects*, in the enclosed Assessment of Effects
6. Copies or summaries of views provided by the public and consulting parties - please see Enclosure 2 for SHPO letters and Enclosure 3 for comments relating to cultural resources that were submitted during the scoping period (one comment was submitted), as well as any responses from tribes.

I will follow up with your office shortly to discuss your anticipated participation. If you have any questions, please contact me by phone at 703-292-4592 or by email at cblanco@nsf.gov. We look forward to further consultation with you on this proposed undertaking.

Regards,

Caroline M. Blanco

Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

Cc (via email): Ms. Charlene Vaughn, ACHP
Ms. Susan M. Pierce, Deputy West Virginia SHPO

Enclosures:

(1) Proposed Changes to Sacramento Peak Observatory Operations: Historic Properties Assessment of Effects
(2) Consultation record
(3) Scoping comments relating to cultural resources (1) and correspondence with tribes

Enclosures are not included in this appendix. See Appendix 5F for the Assessment of Effects. All other enclosures are available by request.

NATIONAL SCIENCE FOUNDATION
2415 Eisenhower Avenue
Alexandria, Virginia 22314

OFFICE OF THE
GENERAL COUNSEL

December 12, 2017

Dr. Kevin Reardon
Associate Astronomer
National Solar Observatory
3665 Discovery Drive
Boulder, CO 80303

RE: Section 106 Assessment of Effects for the Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, Otero County, New Mexico

Dear Dr. Reardon,

The National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on key science of the present decade and beyond. The Sacramento Peak Observatory in Sunspot, Otero County, New Mexico, is one of the facilities identified for divestment.

The decision regarding the potential changes to the Sacramento Peak Observatory is considered a federal undertaking and triggers compliance with Section 106 of the National Historic Preservation Act (NHPA). While engaging in Section 106 consultation under the NHPA, NSF is simultaneously producing an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA) to identify potential environmental impacts associated with the proposed changes to operations.

NSF formally initiated Section 106 consultation with the New Mexico Department of Cultural Affairs, Historic Preservation Division, which serves as New Mexico's State Historic Preservation Office (SHPO). You have requested consulting party status for the proposed undertaking as part of the Section 106 process. With this letter, NSF is enclosing the *Proposed Changes to Sacramento Peak Observatory Operations: Historic Properties Assessment of Effects* (CH2M Hill, 2017) for your information and review.

The Sacramento Peak Observatory is eligible for listing in the National Register of Historic Places (NRHP) as a historic district with 63 contributing resources. Under proposed Alternatives 1, 2, 3, and 4, historic properties that contribute to the NRHP-eligible historic district could be demolished. Therefore, NSF has determined that any of the proposed Alternatives for this undertaking would result in a finding of adverse effect under Section 106. The proposed Alternatives are summarized as follows:

Proposed Action Alternatives
Alternative 1 – Continued Science and Education-focused Operations by Interested Parties with Reduced NSF Funding
Alternative 2 – Transition to Partial Operations by Interested Parties with Reduced NSF Funding
Alternative 3 – Mothballing of Facilities
Alternative 4 – Demolition and Site Restoration

NSF will invite you to attend a Section 106 consulting parties meeting that will be scheduled in the future. The Section 106 meeting will provide an overview of the Section 106 process, review the proposed Alternatives and their anticipated effects on the historic Sacramento Peak Observatory, and discuss potential measures to avoid, minimize, and/or mitigate any adverse effects.

We look forward to working with you on the proposed undertaking. If you have questions, please contact Elizabeth Pentecost at (703) 292-4907 or **envcomp-AST-sacpeak@nsf.gov**.

Regards,

Caroline M. Blanco

Caroline M. Blanco
Federal Preservation Officer
Assistant General Counsel
Office of the General Counsel

Enclosure:
Proposed Changes to Sacramento Peak Observatory Operations: Historic Properties Assessment of Effects

Enclosures are not included in this appendix. See Appendix 5F for the Assessment of Effects.

Milford Wayne Donaldson, FAIA
Chairman

Leonard A. Forsman
Vice Chairman

John M. Fowler
Executive Director

Preserving America's Heritage

December 22, 2017

The Honorable France Córdova
Director
National Science Foundation
2415 Eisenhower Avenue
Alexandria, VA 22314

Ref: *Proposed Changes to Sacramento Peak Observatory Operations*
Sunspot, New Mexico

Dear Ms. Córdova:

In response to a notification by the National Science Foundation, the Advisory Council on Historic Preservation (ACHP) will participate in consultation for the referenced undertaking. Our decision to participate in this consultation is based on the *Criteria for Council Involvement in Reviewing Individual Section 106 Cases*, contained within our regulations. The criteria are met because the proposed undertaking could have substantial impacts to historic properties.

Section 800.6(a)(1)(iii) of our regulations requires that we notify you, as the head of the agency, of our decision to participate in consultation. By copy of this letter, we are also notifying Ms. Caroline Blanco, Federal Preservation Officer, of this decision.

Our participation in this consultation will be handled by Ms. Charlene Dwin Vaughn, AICP, who can be reached at (202) 517-0207 or via e-mail at cvaughn@achp.gov. We look forward to working with your agency and other consulting parties to consider alternatives to this undertaking that could avoid, minimize, or mitigate potential adverse effects on historic properties and to reach an Agreement.

Sincerely,

For
John M. Fowler
Executive Director

Appendix 3B

Biological Assessment

Biological Assessment

National Science Foundation's Proposed Changes to Operations at Sacramento Peak Observatory

Sunspot, New Mexico

Prepared for

National Science Foundation

June 2017

Biological Assessment
for
Sacramento Peak Observatory
Sunspot, New Mexico

Prepared by: _____ Date 15 June 2017

Richard Reaves, Ph.D.
Endangered Species Biologist
CH2M

Reviewed by: _____ Date 15 June 2017

Kristen Hamilton
Environmental Compliance Officer
National Science Foundation

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Acronyms and Abbreviations

ACM	asbestos-containing material
BA	biological assessment
BMP	best management practice
dBA	A-weighted decibel
DKIST	Daniel K. Inouye Solar Telescope
DST	Richard B. Dunn Solar Telescope
EIS	environmental impact statement
IPaC	Information for Planning and Conservation
LBP	lead-based paint
NMDGF	New Mexico Department of Game and Fish
NSF	National Science Foundation
NSO	National Solar Observatory
PAC	Protected Activity Center
PCE	Primary Constituent Element
SWPPP	stormwater pollution prevention plan
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service

SECTION 1.0

Summary of Determinations

The National Science Foundation (NSF) is currently evaluating the potential environmental effects of proposed changes to operations as a result of funding constraints at the Sacramento Peak Observatory in Sunspot, New Mexico. This biological assessment (BA) contains a determination regarding the potential effects on species identified by both the U.S. Fish and Wildlife Service (USFWS) and the U.S. Forest Service (USFS) with the potential to occur within the Sacramento Peak Observatory and the surrounding Lincoln National Forest. This analysis includes the federally listed Mexican spotted owl (*Strix occidentalis lucida*) and Sacramento Mountains thistle (*Cirsium vinaceum*), and the candidate species Peñasco least chipmunk (*Tamias minimus atristriatus*), as well as the exclusion of 12 federally listed species potentially found within the region (Appendix A) that have no potential to be impacted by the proposed Alternatives. The BA analyzes the potential effects from implementation of the following proposed Alternatives:

- Alternative 1: Transition to full operations with interested parties for solar astronomy research. Alternative 1 would involve the transition of site operations of the Sacramento Peak Observatory to interested parties for continued solar astronomy research. NSF would reduce funding of the Sacramento Peak Observatory and the interested parties would be responsible for future maintenance and any future upgrades. Alternative 1 would involve the least change to the current facility and the majority of the telescopes and related research and support facilities would be kept and maintained. Depending on the needs of the interested parties, NSF would mothball or demolish facilities that are not needed. Table 1 provides a list of the facilities that would likely remain in operation, as well as those that could be mothballed or demolished. Existing utilities would be maintained. No new construction would occur.
- Alternative 2: Transition to partial operations with interested parties to support science and/or science, technology, engineering, and mathematics (STEM) education. Alternative 2 would involve the transition of partial operations of the Sacramento Peak Observatory to interested parties. Operations would continue to focus on scientific research and/or STEM education. NSF would reduce funding of the Sacramento Peak Observatory and the additional interested parties would be responsible for future maintenance and any future upgrades. Facilities not needed to meet the anticipated operational goals of the interested parties would be mothballed or demolished, if funding is available. Depending on the needs of the interested parties, NSF would mothball or demolish facilities that are not needed. Table 1 provides a list of the facilities that would likely remain in operation, as well as those that could be mothballed or demolished. Existing utilities would be maintained. No new construction would occur.
- Alternative 3: Mothballing of facilities limited to basic maintenance. Alternative 3 would involve mothballing facilities for the purpose of maintaining operational readiness in the event a new operator is identified. This includes mothballing all buildings, with the exception of the Residential House Trailer, Relocatable Housing, and Recreation House, which would be demolished. Mothballing activities involve removing a facility or structure from daily use while maintaining the general condition of equipment and structures. The intent is to preserve the equipment and structures so that operations could be restarted at some future date without requiring significant repairs. If no viable options are identified for operations to be transferred to a new operator, NSF would consider other methods of disposition. At this time, it is not known what type of operations would be implemented after the mothball period ends. Mothballing is practical to reduce costs when operating a facility is more expensive than not using the facility. A maintenance program would be required to protect the facilities from deterioration, vandalism, and other damage. Select utilities (see Table 1) may be maintained for use by the adjacent Apache Point Observatory and maintenance activities for these utilities would be performed by others.

- Alternative 4: Demolition and site restoration. Alternative 4 would involve the removal of all structures to a maximum of 4 feet (1.2 meters) below existing ground surface grade only to enable the restoration of the ground surface topography without limiting future surface operations or activities. All above-grade structures would be removed and demolished, with below-grade structures and foundations stabilized, filled, and abandoned in place. Safe demolition of the aboveground portion of the Richard B. Dunn Solar Telescope (DST) would be accomplished using explosives (in the form of shaped charges) and conventional demolition equipment. If USFS identifies a need to retain any of the buildings, NSF would transfer title and all future maintenance responsibilities for those buildings to USFS. Select utilities may be kept and maintained for use by the adjacent Apache Point Observatory (see Table 1) and maintenance activities for these utilities would be performed by others.

The following project design features would be implemented under all proposed Alternatives to minimize or avoid impacts to listed or candidate species:

- Implement seasonal restrictions to avoid demolition during the Mexican spotted owl breeding period; do not conduct demolition-related work between March 1 and August 31.
- Idle restrictions on heavy equipment will be enforced to reduce noise during demolition.
- Develop and implement a site-specific stormwater pollution prevention plan (SWPPP) that would specify stormwater control best management practices (BMPs) and proper maintenance of those BMPs to control runoff from precipitation events and minimize the potential for offsite scour and sedimentation.
- No clearing of wooded/forested areas would occur.
- Perform proposed demolition work during daylight hours to avoid effects on nocturnal foraging by Mexican spotted owl.
- Implement landscaping or revegetation as appropriate:
  - Under proposed Alternatives 1 through 3: Re-landscape disturbed areas consistent with the other maintained grounds, as necessary.
  - Under proposed Alternative 4: Develop and implement a Vegetation Restoration Management Plan consistent with the Lincoln National Forest Land and Resources Management Plan to delineate boundaries for restoration, identify measures to stabilize soil and reestablish vegetation onsite, designate plant species to be used, and establish a monitoring plan that includes target goals and evaluation metrics.
- If the Peñasco least chipmunk becomes federally listed prior to implementation of the selected Alternative, pre-demolition surveys would be performed using cameras or live traps to identify/collect individuals before the start of proposed work. Species collected at buildings proposed for demolition would be relocated to a previously identified habitat area outside of proposed activities. Surveys, capture efforts, and relocation would be performed in accordance with appropriate USFWS, USFS, and New Mexico Department of Game and Fish (NMDGF) protocols and collection permits. Relocation sites would be approved by USFWS, USFS, and NMDGF.

The Mexican spotted owl, Peñasco least chipmunk, and Sacramento Mountains thistle are known to occur in the general area and there is potential suitable habitat for these species within or near the Sacramento Peak Observatory. These species may occur within the Observatory, but no surveys for these species have been conducted. In addition, designated critical habitat for the Mexican spotted owl has been identified within large portions of the Lincoln National Forest, which encompasses the Sacramento Peak Observatory, and the Observatory property is classified as recovery habitat. Protected Activity Centers (PACs) for the Mexican spotted owl have been identified in areas surrounding the Sacramento Peak Observatory; however, the Observatory does not occur within an identified PAC. The nearest PAC is located 3,700 feet southeast of the Sacramento Peak Observatory and is bisected by Sacramento Canyon Road. Eight additional PACs have been identified in the area surrounding the Observatory, ranging in distance from approximately 4,800 feet to 13,800 feet.

Potential impacts to these species could result from demolition activities under each proposed Alternative or during subsequent operation of the facility. Each proposed Alternative was considered based on the magnitude and intensity of impacts that would occur if that proposed Alternative were implemented. Consideration was given to direct and indirect impacts.

Under all of the proposed Alternatives, site-specific protective measures would be implemented during demolition activities and during subsequent operations, as applicable. Each proposed Alternative would include implementation of stormwater management measures during demolition to minimize the potential for offsite movement of stormwater runoff.

NSF requests USFWS concurrence with the following determinations of this analysis regarding the proposed Alternatives under consideration to reduce funding to the Sacramento Peak Observatory.

- Alternative 1: Implementation under Alternative 1 would have **no effect** on the Mexican spotted owl. Proposed demolition activities would occur outside the breeding season for the Mexican spotted owl and would not be within an identified PAC. With implementation of the site-specific project design features to minimize the potential for impacts, no adverse modification of critical habitat for this species would occur.

  With implementation of the site-specific project design features to minimize the potential for impacts, the demolition activities that would be implemented under Alternative 1 **may affect**, but are **not likely to adversely affect**, the Peñasco least chipmunk.

  With implementation of the site-specific project design features to minimize the potential for impacts, Alternative 1 would have **no effect** on the Sacramento Mountains thistle.

  Operations under Alternative 1 would have **no effect** on the Mexican spotted owl, Peñasco least chipmunk, or Sacramento Mountains thistle.

- Alternative 2: Implementation under Alternative 2 would have **no effect** on the Mexican spotted owl. Proposed demolition activities would occur outside the breeding season for the Mexican spotted owl and would not be within an identified PAC. With implementation of the site-specific project design features to minimize the potential for impacts, no adverse modification of critical habitat for this species would occur.

  With implementation of the site-specific project design features to minimize the potential for impacts, the demolition activities that would be implemented under Alternative 2 **may affect**, but are **not likely to adversely affect**, the Peñasco least chipmunk.

  With implementation of the site-specific project design features to minimize the potential for impacts, Alternative 2 would have **no effect** on the Sacramento Mountains thistle.

  Operations under Alternative 2 would have **no effect** on the Mexican spotted owl, Peñasco least chipmunk, or Sacramento Mountains thistle.

- Alternative 3: Implementation under Alternative 3 would have **no effect** on the Mexican spotted owl. Proposed demolition activities would occur outside the breeding season for the Mexican spotted owl and would not be within an identified PAC. With implementation of the site-specific project design features to minimize the potential for impacts, no adverse modification of critical habitat for this species would occur.

  With implementation of the site-specific project design features to minimize the potential for impacts, the demolition activities that would be implemented under Alternative 3 **may affect**, but are **not likely to adversely affect**, the Peñasco least chipmunk.

  With implementation of the site-specific project design features to minimize the potential for impacts, Alternative 3 would have **no effect** on the Sacramento Mountains thistle.

  Operations under Alternative 3 would have **no effect** on the Mexican spotted owl, Peñasco least chipmunk, or Sacramento Mountains thistle.

- Alternative 4: Implementation under Alternative 4 would have **no effect** on the Mexican spotted owl. Proposed demolition activities would occur outside the breeding season for the Mexican spotted owl and would not be within an identified PAC. With implementation of the site-specific project design features to minimize the potential for impacts, no adverse modification of critical habitat for this species would occur.

  With implementation of the site-specific project design features to minimize the potential for impacts, the demolition activities that would be implemented under Alternative 4 **may affect**, but are **not likely to adversely affect**, the Peñasco least chipmunk.

  With implementation of the site-specific project design features to minimize the potential for impacts, Alternative 4 would have **no effect** on the Sacramento Mountains thistle.

  Operations under Alternative 4 would have **no effect** on the Mexican spotted owl, Peñasco least chipmunk, or Sacramento Mountains thistle.

  Long-term beneficial impacts would be expected because of the reduced levels of human activity with closure of the Observatory and as natural habitats mature following restoration of the site.

Implementation of any of the proposed Alternatives would not threaten the continued existence of protected species known to occur or with potential to occur on the Sacramento Peak Observatory.

Critical habitat has not been designated for the Peñasco least chipmunk or the Sacramento Mountains thistle. Therefore, there would be no potential for adverse modification of critical habitat for these species.

Designated critical habitat for the Mexican spotted owl exists adjacent to the Sacramento Peak Observatory and the Observatory is within designated recovery habitat; however, NSF has determined that there would be **no adverse modification** of designated critical habitat due to the proposed demolition activities associated with any of the proposed Alternatives. None of the primary constituent elements (PCEs) of critical habitat would be modified. No tree clearing would occur and demolition activities would occur only within previously disturbed and landscaped areas that do not provide suitable habitat for this species. Implementation of the Proposed Action under any of the proposed Alternatives would not negatively affect the ability of the identified recovery habitat to be restored and/or enhanced so that it could be developed into habitat that would support the MSO in the future. Additionally, demolition-related work would not be scheduled between March 1 and August 31 to avoid the owl breeding season.

SECTION 2.0

Introduction

This document is being submitted to fulfill NSF's requirements under Section 7 of the Endangered Species Act. This BA by NSF addresses potential impacts to protected species associated with the proposed Alternatives under consideration for proposed changes to operations as a result of funding constraints for the Sacramento Peak Observatory in Sunspot, New Mexico. Because the project area is located on National Forest System lands, USFS has provided extensive input into this BA, as described below, and will be provided a copy of all correspondence related to Section 7 consultation.

At present, the Sacramento Peak Observatory serves the solar physics community as the only high-resolution solar facility with extensive spectroscopic capabilities open for community access in the United States and as a development test bed for the high-order Adaptive Optics capability needed for the Daniel K. Inouye Solar Telescope (DKIST). However, in a funding-constrained environment, NSF needs to maintain a balanced research portfolio with the largest science return for the taxpayer dollar.

The Sacramento Peak Observatory is located in Sunspot, New Mexico, within the Lincoln National Forest in the Sacramento Mountains, and is approximately 10 miles southeast of Alamogordo, New Mexico. The project area included for this BA is approximately 100 acres and corresponds to the area of the Observatory that could be impacted by the proposed Alternatives (Figure 1). Established by the U.S. Air Force via a memorandum of agreement with the USFS in 1950, the facility was transferred to NSF in 1976. NSF and the USFS executed a land use agreement, signed in 1980, to formalize this transfer and the continued use of the land for the Sacramento Peak Observatory. All real property and facilities at Sacramento Peak Observatory are NSF-owned. The flagship facility at the Sacramento Peak Observatory is the DST, which is currently managed by the National Solar Observatory (NSO) and operated by the Association of Universities for Research in Astronomy under a cooperative agreement with NSF. The DST is a high-spatial resolution optical solar telescope that allows solar astronomers worldwide to obtain information about the Sun. Support structures include approximately 35 residential housing units, an instrument development lab, a main lab with scientist offices, a community center, facilities and maintenance shops, and a water tower and treatment/distribution structures. The site also hosts the Sunspot Astronomy and Visitors Center and a U.S. Post Office. Approximately 20 individuals are currently employed at the Sacramento Peak Observatory. The Sacramento Peak Observatory hosts approximately 15,000 visitors per year, primarily at the Sunspot Astronomy and Visitors Center.

The 4-meter DKIST is currently under construction on Haleakala in Maui, Hawaii, and is planned to replace the function of the DST for NSO. NSO plans to end operations in 2017 and has planned an overlap period of 2 years to transfer operations and staff from the DST to the DKIST.

As part of the process of developing an environmental impact statement (EIS) to evaluate the potential environmental effects of proposed changes to operations at the Sacramento Peak Observatory, the NSF solicited scoping comments from the USFWS and USFS. Information gathered during this scoping period and subsequent correspondence also was used in developing this BA. Scoping comments were requested from the USFWS in July 2016 to determine relevant issues that would influence the scope of the environmental analysis. Additionally, the NSF solicited input from the USFS during an in-person meeting on July 21, 2016, and in September 2016, requested GIS data layers and reports that pertain to surveys for or the presence of rare, threatened, or endangered species and any land management plans that pertain to the vicinity of the Sacramento Peak Observatory. Subsequent correspondence included the submission of a Draft BA to USFS for review on January 13, 2017. NSF coordinated with USFS to address their comments and provided the revised BA and determination of effects to USFS for final review on May 31, 2017.

NSF generated a species list using USFWS's Information for Planning and Conservation (IPaC) online tool to identify species to be addressed in the EIS for this Proposed Action. The IPaC report identified eleven protected species with the potential to occur in the Municipality of Sunspot; however, evaluation

of habitat on the Observatory site and coordination with Lincoln National Forest narrowed the list to three species with the potential to occur in the project area.

The Mexican spotted owl, Peñasco least chipmunk, and Sacramento Mountains thistle are known to occur in the general area and there is potentially suitable habitat for these species within the Sacramento Peak Observatory. These species may occur within or near the Observatory, but no surveys for these species have been conducted. The Peñasco least chipmunk is a federal candidate species and currently receives no legal protection. However, because of the potential for up to 2 years to pass between the completion of the Section 7 consultation and the full implementation of the selected proposed Alternative, there is a possibility that the species could be listed prior to implementation. NSF is addressing the species in this BA and developing appropriate measures to be protective of the species should it be listed during this time frame. NSF will review the most current USFWS species list prior to the implementation of the chosen proposed Alternative to determine if these developed protective measures require implementation. In addition, designated critical habitat for the Mexican spotted owl has been identified within large portions of the Lincoln National Forest, which encompasses the Sacramento Peak Observatory, and the Observatory property is classified as recovery habitat. PACs for the Mexican spotted owl have been identified in areas surrounding the Sacramento Peak Observatory; however, the Observatory does not occur within an identified PAC. The nearest PAC is located 3,700 feet southeast of the Sacramento Peak Observatory and is bisected by Sacramento Canyon Road. Eight additional PACs have been identified in the area surrounding the Observatory, ranging in distance from approximately 4,800 feet to 13,800 feet. No critical habitat has been designated for the Peñasco least chipmunk or the Sacramento Mountains thistle.

SECTION 3.0

Proposed Action

NSF has defined options for changes to operations that would enable NSF to significantly decrease or eliminate its funding of the Observatory. The proposed Alternatives were developed based on viable concepts of operations from the scientific community and on comments received in response to the Notice of Intent published in the *Federal Register* on July 5, 2016. The proposed Alternatives under consideration in the EIS are described below.

3.1 Alternative 1 – Transition to operations with interested parties for solar astronomy research

Alternative 1 would involve the transition of site operations of the Sacramento Peak Observatory for solar research to interested parties for continued solar astronomy research. NSF would reduce funding of the Sacramento Peak Observatory and the interested parties would be responsible for future maintenance and any future upgrades. Alternative 1 would involve the least change to the current facility and the majority of the telescopes and related research and support facilities would be kept and maintained. This proposed Alternative includes mothballing the John Evans Facility, Grain Bin Telescope, Hazardous Storage, and Storage facilities and demolishing the Residential House Trailer, Relocatable Housing (20 units), and Recreation House. Table 1 provides a list of the facilities that would remain in operation or that could be mothballed or demolished for this and the other Alternatives considered. Existing utilities would be maintained. The demolition and mothballing activities identified in Table 1 are meant to describe the most inclusive and conservative (in terms of environmental impacts) scenario, but none of these activities, or a subset of these activities, may ultimately be chosen based on the needs of the interested parties, should this Alternative be selected.

The anticipated activities to implement Alternative 1 include the following:

- Finalize interested parties' operational agreements and maintenance plans.
- Ready designated buildings and structures to be mothballed and turn off nonessential utilities.
- Conduct hazardous materials assessment for asbestos-containing material (ACM), lead-based paint (LBP), and other conditions of concern for structures to be demolished. Remediate as necessary.
- Demolish the Residential House Trailer, Relocatable Housing, and Recreation House to a maximum of 4 feet (1.2 meters) below existing ground surface grade.
- Re-landscape disturbed areas consistent with the other maintained grounds, as necessary.

Demolition and mothballing activities would occur at the specified buildings, which are within landscaped and maintained areas, and would occur during daylight hours to avoid effects on nocturnal foraging by Mexican spotted owl. Typical equipment used for demolition may include tracked excavators equipped with hydraulic shears, grapplers and hoe rams, hydraulic cranes, rubber tired and tracked loaders, and miscellaneous support equipment. No wooded/forested areas or natural grassland would be cleared or disturbed.

Operations and maintenance activities for Alternative 1 would be comparable to current operations. Under Alternative 1, some onsite staff could potentially be retained by interested parties.

Under Alternative 1, NSF would retain title to the facilities, but operations would be conducted by the interested parties.

It is anticipated that implementation of Alternative 1 would take approximately 24 weeks to complete. Because of funding constraints, activities under this Alternative may have to occur over a longer time period.

3.2 Alternative 2 – Transition to partial operations with interested parties to support science and/or STEM education

Alternative 2 would involve transition of partial operations of the Sacramento Peak Observatory to interested parties. Operations would continue to focus on scientific research and/or STEM education. NSF would reduce funding of the Sacramento Peak Observatory and the additional interested parties would be responsible for future maintenance and any future upgrades. Facilities not needed to meet the anticipated operational goals of the interested parties would be mothballed or demolished. This proposed Alternative includes mothballing the John Evans Facility, Grain Bin Telescope, Hilltop Dome, ISOON Patrol Dome, Main Lab, Storage/Quonset Huts, Hazardous Storage, Storage facilities, Machine/ Electronics Shop, Welding Shop/Library, Community Center, and Recreation Court; it also includes demolishing the Residential House Trailer, Relocatable Housing (20 units), and Recreation House. Table 1 provides a detailed list of the facilities that would remain in operation or would be mothballed or demolished. Existing utilities would be maintained. Demolition and mothballing activities identified in Table 1 are meant to describe the most inclusive and conservative (in terms of environmental impacts) scenario, but none of these activities, or a subset of these activities, may ultimately be chosen based on the needs of the interested parties, should this Alternative be selected.

The anticipated activities to implement Alternative 2 include the following:

- Finalize interested parties' operational agreements and maintenance plans.
- Ready buildings and structures to be mothballed and turn off nonessential utilities.
- Conduct hazardous materials assessment for ACM, LBP, and other conditions of concern for structures to be demolished. Remediate as necessary.
- Demolish the Residential House Trailer, Relocatable Housing, and Recreation House to a maximum of 4 feet (1.2 meters) below existing ground surface grade.
- Re-landscape disturbed areas consistent with the other maintained grounds, as necessary.

Demolition and mothballing activities would occur at the specified buildings, which are within landscaped and maintained areas, and would occur during daylight hours to avoid effects on nocturnal foraging by Mexican spotted owl. Typical equipment used for demolition may include tracked excavators equipped with hydraulic shears, grapplers and hoe rams, hydraulic cranes, rubber tired and tracked loaders, and miscellaneous support equipment. No wooded/forested areas or natural grassland would be cleared or disturbed.

Operations and maintenance activities for Alternative 2 would be less than Alternative 1 but would generally be comparable to current operations with regard to the types of activities carried out (i.e., scientific research). Under Alternative 2, some onsite staff could potentially be retained by interested parties.

Under Alternative 2, NSF would retain title to the facilities, but operations would be conducted by interested parties.

It is anticipated that implementation of Alternative 2 would take approximately 24 weeks. Because of funding constraints, activities under this Alternative may have to occur over a longer time period.

3.3 Alternative 3 – Mothballing of facilities limited to basic maintenance

Alternative 3 would involve mothballing facilities for the purpose of maintaining operational readiness in the event a new operator is identified. This includes mothballing all buildings, with the exception of the Residential House Trailer, Relocatable Housing, and Recreation House, which would be demolished under this proposed Alternative. Mothballing activities involve removing a facility or structure from daily

use while maintaining the general condition of equipment and structures. The intent is to preserve the equipment and structures such that operations could be restarted at some future date without requiring significant repairs. If no viable options are identified for operations to be transferred to a new operator, NSF would consider other methods of disposition. At this time, it is not known what type of operations would be implemented after the mothball period ends, but it is assumed that operations would be similar to the scientific research and educational activities currently occurring at the Observatory, with no major change in land use. Mothballing is practical to reduce costs when operating a facility is more expensive than not using the facility. Table 1 provides a detailed list of the facilities that would remain in operation (e.g., utilities) or that would be mothballed or demolished. To avoid the costs of mothballing and maintenance for those facilities that would likely not be needed for future operations, this Alternative includes demolition of the Residential House Trailer, Relocatable Housing (20 units), and Recreation House.

A maintenance program would be required to protect the facilities from deterioration, vandalism, and other damage. Regular security patrols would be performed to monitor the site. Common mothballing measures, such as providing proper ventilation, keeping roofs and gutters cleaned of debris, and performing ground maintenance and pest control, would be implemented. All items not needed for periodic maintenance would be removed from the site. Equipment, tools, machinery, furniture, and ancillary items that are no longer needed for operations and that have salvage value would be disposed of in accordance with federal law, transported to another NSF facility, made available as surplus items for other Federal agencies, or donated. Select utilities (see Table 1) may be maintained for use by the adjacent Apache Point Observatory and maintenance activities for these utilities would be performed by others.

The anticipated activities to implement Alternative 3 include the following:

- Prepare buildings and structures to be mothballed and turn off nonessential utilities.
- Conduct hazardous materials assessment for ACM, LBP, and other conditions of concern for structures to be demolished. Remediate as necessary.
- Demolish the Residential House Trailer, Relocatable Housing, and Recreation House to a maximum of 4 feet (1.2 meters) below existing ground surface grade.
- Establish site security and conduct periodic maintenance of mothballed buildings and structures.
- Re-landscape disturbed areas consistent with the other maintained grounds, as necessary.

Demolition and mothballing activities would occur at the specified buildings, which are within landscaped and maintained areas, and would occur during daylight hours to avoid effects on nocturnal foraging by Mexican spotted owl. Typical equipment used for demolition may include tracked excavators equipped with hydraulic shears, grapplers and hoe rams, hydraulic cranes, rubber tired and tracked loaders, and miscellaneous support equipment. No wooded/forested areas or natural grassland would be cleared or disturbed.

Operational activities for Alternative 3 would be suspended during the period of time that the facilities are mothballed. It is anticipated that technical staff responsible for operating the facilities would not be retained. Some onsite staff responsible for facility maintenance could be retained during the mothball period to keep equipment from deteriorating.

Under Alternative 3, NSF would retain title to all facilities during the mothball period.

Implementation of Alternative 3 is expected to last approximately 33 weeks. Because of funding constraints, activities under this Alternative may have to occur over a longer time period.

3.4 Alternative 4 – Demolition and site restoration

Alternative 4 would involve the removal of all structures to a maximum of 4 feet (1.2 meters) below existing ground surface grade to enable the restoration of the ground surface topography without limiting future surface operations or activities. All above-grade structures would be removed and demolished, with below-grade structures and foundations stabilized, filled, and abandoned in place. Safe demolition of the

aboveground portion of the DST would be accomplished using explosives (in the form of shaped charges, single detonation event) and conventional demolition equipment. If USFS identifies a need to retain any of the buildings, NSF would transfer title and all future maintenance responsibilities for those buildings to USFS.

Select utilities may be kept and maintained for use by the adjacent Apache Point Observatory (see Table 1) and maintenance activities for these utilities would be performed by others. Limited site restoration, including removal of debris, re-grading, and replanting, would be necessary. Existing utilities not to be used by the adjacent Apache Point Observatory or retained by USFS would be air gapped and capped at the property line and abandoned in place. Equipment, furniture, supplies, and building materials would be disposed of offsite or recycled for beneficial reuse.

The anticipated activities to implement Alternative 4 include the following:

- Turn off and cap utilities not to be used by the adjacent Apache Point Observatory at the property line or source.
- Conduct hazardous materials assessment for ACM, LBP, and other conditions of concern for structures to be demolished. Remediate as necessary.
- Develop and implement a Mercury Management Plan to address the handling, removal, transportation, storage, and disposal/recycling of mercury used in the DST.
- Develop and implement a Blast Management Plan to identify and control safety and environmental risks associated with blasting.
- Demolish and remove structures to a maximum of 4 feet (1.2 meters) below existing ground surface grade.
- Conduct site restoration work: Re-grade affected areas to desired elevations and contours; use available concrete rubble as necessary; and bring in fill as needed to establish grade.
- Segregate waste, load, and transport to appropriate offsite landfills and recycling.
- Develop and implement a Vegetation Restoration Management Plan consistent with the Lincoln National Forest Land and Resources Management Plan to delineate boundaries for restoration, identify measures to stabilize soil and re-establish vegetation onsite, designate plant species to be used, and establish a monitoring plan that includes target goals and evaluation metrics.

Demolition activities would occur at the specified buildings, which are within landscaped and maintained areas, and would occur during daylight hours to avoid effects on nocturnal foraging by Mexican spotted owl. Typical equipment used for demolition may include tracked excavators equipped with hydraulic shears, grapplers and hoe rams, hydraulic cranes, rubber tired and tracked loaders, and miscellaneous support equipment. No wooded/forested areas or natural grassland would be cleared or disturbed.

Operations at the Sacramento Peak Observatory would be discontinued. It is anticipated that staff positions would no longer be needed.

Upon completion of all activities under this Alternative, NSF would be fully divested of any interest in the site.

Implementation of Alternative 4 is expected to last approximately 43 weeks. Because of funding constraints, activities under this Alternative may have to occur over a longer time period. In addition, vegetation restoration activities may be implemented over a longer time period if required by the Vegetation Restoration Management Plan.

SECTION 4.0

Location and Setting Description

4.1 Location

The Sacramento Peak Observatory is located in the Sacramento Mountains in the northern part of Otero County, Sunspot, New Mexico. The project area included for this BA is approximately 100 acres and corresponds to the area of the Observatory that could be impacted by the proposed Alternatives (Figure 1).

4.2 Setting Description

The Sacramento Peak Observatory is within the Lincoln National Forest on the western ridgeline of the Sacramento Mountains. Elevations within the Lincoln National Forest range from approximately 4,000 feet to approximately 11,500 feet above mean sea level. These elevations include five different life zones, ranging from the Chihuahuan Desert life zone at the lower elevations to the sub-alpine forest life zone at the highest elevations. The Sacramento Peak Observatory is located between the coniferous forest zone and subalpine forest zone at approximately 9,200 feet. The diversity of vegetation systems provides habitat for numerous plants and animals, some of which are rare or have limited distributions (USFS, 2016a).

Biotic communities within the Lincoln National Forest and surrounding Sacramento Mountains are distributed in response to elevation and moisture gradients. The upper elevations of the Sacramento Mountains (above 7,200 feet), where the Sacramento Peak Observatory is situated, are covered with mixed conifer forests, dominated by white fir (*Abies concolor*) or Douglas-fir (*Pseudotsuga menziesii*), mixed with ponderosa pine (*Pinus ponderosa*), southwestern white pine (*Pinus strobiformis*), quaking aspen (*Populus tremuloides*), and small areas of blue spruce (*Picea pungens*) and Engelmann spruce (*Picea engelmannii*). Perennial waterbodies and riparian vegetation are sparse within the Sacramento Mountains. Tree species, including cottonwood (*Populus angustifolia*), willow (*Salix* sp.), and Arizona walnut (*Juglans major*), occur in low elevation canyons, while shallow canyons at higher elevations are typically dominated by grass and forb species. Forest structure within this region is commonly shaped by insect outbreaks and fire (USFS, 1998).

The flagship facility at the Sacramento Peak Observatory is the DST, which is currently managed by the NSO. In addition to DST, the Evans Solar Facility; the Hilltop Dome; the Grain Bin Telescope; and the ISOON Patrol Dome are located at the Sacramento Peak Observatory. Fifty-seven support buildings are also at the facility and include a visitor center, fire station, residential housing, and various utility structures. The areas surrounding the facility buildings include regularly maintained lawns and a small amount of landscape vegetation. Approximately 20 individuals are employed at the Sacramento Peak Observatory. The Sacramento Peak Observatory hosts approximately 15,000 visitors per year, primarily at the Visitor Center.

SECTION 5.0

Species Descriptions

5.1 *Strix occidentalis lucida* (Mexican Spotted Owl)

The federally threatened Mexican spotted owl is known to occur within ponderosa pine-gambel oak, mixed-conifer, and riparian forests. Nesting and roosting habitat typically occurs in well-structured forests with high canopy cover, large trees, and other late seral characteristics. Steep and narrow rocky canyons formed by parallel cliffs with numerous caves and ledges also provide suitable habitat for this species. The primary threats to habitat and population of this species have transitioned more recently from timber harvest to increasing risk of stand-replacing wildland fire (USFWS, 2012a). Preliminary prey base data collected within the Lincoln National Forest suggest that the owl uses three main food sources, which are wood rats, deer mice, and voles. PCEs related to the maintenance of adequate prey species (USFWS, 2004; USFWS, 2012a) associated with Mexican spotted owl occupancy are as follows:

- High volumes of fallen trees and other woody debris.
- Wide range of tree and plant species, including hardwoods.
- Adequate levels of residual plant cover to maintain fruits and seeds and allow plant regeneration.

Current conditions at the Sacramento Peak Observatory do not provide any of the defined PCEs related to maintaining a prey base because of the lack of woody debris; the limited species diversity across all strata, including tree species; and the absence of residual plant cover as a result of maintained landscaping.

Forest meadow habitat is not identified as a PCE or as a contributing element to PCEs, but this habitat can support voles (USFWS, 2004), which are one of the main food sources for Mexican spotted owls. There are no forest meadows within proposed work areas. The grassed areas around buildings that may be demolished are maintained at a low height through regular mowing and provide very poor habitat for voles, which prefer taller grasses (USFWS, 2012a). Grasslands along the road on the eastern portion of the property may support voles, but these areas are heavily grazed by cattle, which is not conducive to providing good habitat for voles (USFWS, 2004). The grassed helicopter landing area at the northwestern corner of the Observatory property and forest openings to the northwest of the Observatory would not be impacted, either directly or indirectly, under any of the proposed Alternatives due to the intervening topography and spatial separation from the work areas.

Because of the existing level of human activity from both tourists and operational staff, managed vegetation, and the extensive cattle activity such as grazing immediately surrounding the site, the overall foraging and roosting habitat for the Mexican spotted owl is considered to be of low quality.

PACs for the Mexican spotted owl have been identified in areas surrounding the Observatory (Figure 2). PACs are areas that encompass a minimum of 600 acres surrounding known owl nests or roost sites (USFWS, 2012a). One PAC is located approximately 3,700 feet southeast of the Observatory and is bisected by Sacramento Canyon Road (identified in January 1987). Eight additional PACs have been identified in the area surrounding the Observatory ranging in distance from approximately 4,800 to 13,800 feet (identified between January 1987 and October 2003). The Sacramento Peak Observatory is not within an identified PAC for the Mexican spotted owl (USFS, 2016b). The prey habitat conditions are largely limited at the facility due to the regular maintenance of surrounding buildings and roadsides. Areas with mixed conifer or ponderosa pine and oak species are present at the Observatory and may be a component of what is considered suitable or capable habitat for nesting and roosting. Field reconnaissance was performed in September 2016 solely to assess habitat conditions at the Observatory. Suitable habitat for the Mexican spotted owl was absent from the proposed work areas, identified on Figure 3 as the project area, as well as from the vicinity of the air strip that is located outside, and just to the northwest, of the project area. Additionally, no evidence of activity or individuals of Mexican spotted owl was observed.

Critical habitat for this species has been designated within large portions of the Lincoln National Forest, which encompasses the Sacramento Peak Observatory. Figure 3, which depicts recovery habitat within this larger swath of critical habitat, was developed based on information from USFS that the Sunspot Administrative area, which includes the Observatory, is considered restricted [recovery] habitat for the Mexican spotted owl. Although the boundary shown on Figure 3 may not show the full extent of recovery habitat in the area, it shows the recovery habitat that NSF has investigated for the Alternatives under consideration. Only that portion of the recovery habitat is considered in this evaluation. Recovery habitat is defined as areas in forest types and in rocky canyons used by owls for roosting, foraging, dispersal, and other life history needs but outside PACs. Recovery habitat is intended to: 1) provide protection for areas that may be used by owls; 2) foster the creation of roost and/or nest habitat (noted in the 2012 plan as the "primary intent"); 3) simultaneously provide managers with greater management flexibility than is allowed in PACs; and, 4) facilitate development and testing of management strategies that could be applied in PACs (USFWS, 2012a). However, as previously discussed, foraging and roosting habitat within the Observatory site is considered to be of low quality because of the existing level of human activity, vegetation maintenance, and extensive cattle grazing immediately surrounding the site.

Additional detailed information regarding the Mexican spotted owl's life history, habitat, PACs, distribution and abundance, and threats can be found in the USFWS's Biological Opinion (BO) for the USFS's continued implementation of the Land and Resource Management Plan for Lincoln National Forest, issued in March 2012, which is hereby incorporated by reference (USFWS, 2012b).

5.2 *Cirsium vinaceum* (Sacramento Mountains Thistle)

The Sacramento Mountains thistle is a threatened species restricted to the Sacramento Mountains of south-central New Mexico. Populations occur mostly on the Lincoln National Forest in mixed conifer/mountain meadow associations. The species always occurs in wetlands or saturated soils areas associated with springs, streams, and seeps (USFWS, 1987; USFWS, 1993). No wetlands or saturated soil conditions exist within or adjacent to proposed work sites under any of the proposed Alternatives. The nearest potentially suitable habitat is along the road at the eastern end of the Observatory, where a drainage parallels the road on its northern side. This area is actively grazed by cattle with open access to the drainage. Cattle grazing and associated trampling is considered a major threat to the Sacramento Mountains thistle (USFWS, 2010), and the level of cattle grazing along the road leading east from the Observatory makes it unlikely that the Sacramento Mountains thistle would occur in this area. The Sacramento Mountains thistle is not known to occur on the Observatory, but according to the Lincoln National Forest, its occurrence has been documented within approximately 0.5 miles of the Observatory. This known population is downslope from the Observatory and may be subject to indirect impacts during demolition activities.

No critical habitat has been designated for the Sacramento Mountains thistle.

Additional detailed information regarding the Sacramento Mountains thistle's life history, habitat, distribution and abundance, and threats can be found in the USFWS's BO for the USFS's continued implementation of the Land and Resource Management Plan for Lincoln National Forest (USFWS, 2012b).

5.3 *Tamias minimus atristriatus* (Peñasco Least Chipmunk)

The Peñasco least chipmunk is a candidate species found only in the Sacramento and White Mountains, which are contiguous mountain ranges in southern New Mexico. Because of the potential for up to 2 years to pass between the completion of the Section 7 consultation and the implementation of the selected proposed Alternative, there is a possibility that the species could be listed. Therefore, NSF is addressing the species as part of this BA. This species tends to occupy non-forested habitats such as those dominated by shrubs, rocks, or dense herbaceous vegetation, or in forested habitats dominated by trees that do not have limbs close to the ground (quaking aspen, ponderosa pine). The seeds of shrubs and forbs are their main food source, and they also feed on arthropods, leaves, fruits, flowers, and fungi (USFWS, 2011).

Given the regularly maintained nature of the Sacramento Peak Observatory, which includes trees without limbs close to the ground and surrounding habitat of dense herbaceous vegetation outside of the facility footprint, there is potential for this species to occur within the property and the Peñasco least chipmunk could occur around some of the buildings proposed for demolition.

No critical habitat has been designated for the Peñasco least chipmunk.

5.4 Species Excluded from Detailed Analysis

Through NSF's consultation with the USFS, 12 federally listed species with the potential to occur in the general area were excluded from detailed analysis and are not discussed in this BA because of the lack of presence in the geographical area, unsuitable habitat conditions, and/or lack a "high probability of occurrence" in the Sacramento Ranger District (Appendix A). Although they may occur elsewhere in the Lincoln National Forest, species that are not known to occur in or near the Sacramento Ranger District will not be affected by the Proposed Action (Appendix A) (USFS, 2016c). For this reason, these species will not be included in a detailed analysis. These species include Lee's pincushion cactus (*Escobaria sneedii* var. *leei* (formerly *Coryphantha sneedii* var. *leei*) and Sneed's pincushion cactus (*Escobaria sneedii* var. *sneedii* (formerly *Coryphantha sneedii* var. *sneedii*). Although they may occur elsewhere in the Sacramento Ranger District, species that are not known to occur in, or have habitat in, the project area will not be affected by the Proposed Action. These species include Todsen's pennyroyal (*Hedeoma todsenii*), Kuenzler's hedgehog cactus (*Echinocereus fendleri* var. *kuenzleri*), Sacramento prickly poppy (*Argemone pleiacantha* spp. *pinnatisecta*), Wright's marsh thistle (*Cirsium wrightii*), New Mexico meadow jumping mouse (*Zapus hudsonicus luteus*), least tern (*Sterna antillarum*), Northern Aplomado falcon (*Falco femoralis septentrionalis*), yellow-billed cuckoo (*Coccyzus americanus*), mountain plover (*Charadrius montanus*), and Rio Grande chub (*Gila Pandora*).

SECTION 6.0

Effects of Proposed Action Implementation

Two federally protected species and one species that is a candidate for listing were identified as having potential to occur within the Sacramento Peak Observatory. Based on known occurrences and current environmental conditions, NSF has determined that the Mexican spotted owl, Peñasco least chipmunk, and Sacramento Mountains thistle have the potential to occur within or adjacent to the Sacramento Peak Observatory.

The activities described under the Proposed Action have the potential to affect the two federally protected and one candidate species that may occur within the Sacramento Peak Observatory. The effects analysis in this document focuses on the elements associated with each proposed Alternative and the potential impacts to these species. The following discussion of potential impacts addresses each proposed Alternative. It is necessary for NSF to evaluate all Alternatives because it is unknown at this time what Alternative will ultimately be selected.

Critical habitat has not been designated for the Peñasco least chipmunk or the Sacramento Mountains thistle. Designated critical habitat for the Mexican spotted owl has been identified within large portions of the Lincoln National Forest, which encompasses the Sacramento Peak Observatory. The Observatory itself is designated recovery habitat for this species. The effects analysis in this document also focuses on the potential of each proposed Alternative to impact critical and recovery habitat for this species. Because the proposed work is not within critical habitat and because it would not cause any adverse modification to elements that would contribute to PCEs for critical habitat, there is no potential for adverse modification of critical habitat for these species under any of the proposed Alternatives considered.

6.1 Alternative 1 – Transition to Full Operations with Interested Parties

6.1.1 Direct Impacts

6.1.1.1 Implementation

There would be little potential for adverse impacts to listed or candidate species during demolition activities under Alternative 1. Demolition activities would be limited to the previously disturbed areas around the 22 structures identified for removal. No work would occur in undisturbed areas within the Sacramento Peak Observatory. Following demolition activities, disturbed areas would be re-landscaped consistent with other maintained areas on the Observatory and the use of pesticides for routine grounds maintenance would be permitted only through a plan coordinated and approved by USFS.

Demolition under Alternative 1 would have **no effect** on Mexican spotted owl. The disturbed and landscaped areas within the project site do not provide potentially suitable habitat for Mexican spotted owl. Due to the vegetation being maintained through regular mowing, these areas do not provide appreciable habitat for voles or other prey items for the Mexican spotted owl. The areas where demolition would occur is within designated Mexican spotted owl recovery habitat. The demolition activities would not affect the amount and distribution of nesting and roosting habitat or key foraging habitat (all key elements of recovery habitat), as no tree clearing would occur and demolition activities would occur only within previously disturbed and landscaped areas that do not provide suitable habitat for this species. No direct impacts to this species from demolition activities would occur.

Additionally, implementation of Alternative 1 would not negatively affect the ability of the identified recovery habitat to be restored and/or enhanced so that it could be developed into habitat that would support the MSO in the future. As previously discussed, the proposed work areas do not contain elements that would contribute to PCEs for critical habitat. Because the proposed work is not within critical habitat and because it would not cause any adverse modification to elements that would contribute to PCEs for critical habitat, there is no potential for adverse modification of critical habitat for this species under this proposed Alternative.

During the demolition period, noise and vibration will occur. Sound levels of 80 to 90 A-weighted decibels (dBA) at 50 feet would be expected based on the equipment used during demolition. These levels would not be continuous and would attenuate as sound travels from the work areas because of the increase in distance, terrain, and well-developed forest vegetation surrounding the Sacramento Peak Observatory. As noted in studies conducted by D.K. Delaney et al., while infrequent, noise-producing activities have relatively little long-term impact on spotted owls, the owls will react to noise disturbances by changing behavior and/or flushing from their perches, which may alter nesting and roosting activities. The distance to and frequency of a noise disturbance, habitat type, topography, and sound source may influence spotted owl responses. Noises close to nests are likely to be more disruptive than those far from nests and may affect prey delivery rates. Also with respect to distance and noise levels, Delaney et al. determined that the proportion of owls flushing was negatively related to distance (owls flushed more often to closer sounds) and positively related to noise level (owls flushed more often to louder sounds). Noise levels that consistently exceed 69 dBA within 165 feet (50 meters) of nesting sites are detrimental to Mexican spotted owls (USFWS, 2012a). The distance from the proposed work areas to the edge of the closest PAC is approximately 3,700 feet. The sound from the loudest equipment operating would be reduced to below 69 dBA from natural attenuation at the edge of the PAC, absent any topography or vegetation effects that would further reduce the noise level. While the 2012 Mexican Spotted Owl Recovery Plan (USFWS, 2012a) recommends noise mitigation measures be used when work occurs within a PAC during the nesting period, NSF will implement project design features to further minimize the potential for disturbance from demolition-related noise even though the proposed work areas are within recovery habitat and not within a PAC. The following project design features will be implemented:

- Demolition-related work would not be scheduled for the period between March 1 and August 31 to avoid the owl breeding season.
- Idle restrictions on heavy equipment will be enforced to reduce noise during demolition.
- Perform proposed demolition work during daylight hours to avoid effects on nocturnal foraging by Mexican spotted owl.

Because of the distance to the edge of the nearest PAC, impacts from demolition noise levels would have **no effect** on the Mexican spotted owl because the noise would naturally attenuate to less than 69 dBA before reaching the nearest PAC.

The Peñasco least chipmunk has the potential to occur within dense herbaceous undergrowth and rock-dominated areas around buildings planned for demolition, or could enter an active work area during demolition activities. Demolition activities that occur subsequent to a chipmunk entering a proposed work area could directly affect an individual of this species. Because the species could be listed before the proposed work is completed, NSF has developed the following measures to be protective of the species should it be listed. Prior to the start of any work, work areas and immediate surrounding areas would be surveyed for the Peñasco least chipmunk and, if species are found within or adjacent to the work areas, additional site-specific protective measures would be implemented and may include:

- Pre-demolition surveys for the Peñasco least chipmunk would be performed using cameras or live traps to identify/collect individuals before the start of proposed work. Surveys and capture efforts would be performed in accordance with appropriate USFWS, USFS, and NMDGF protocols and collection permits.
- Species collected at buildings proposed for demolition would be relocated to a previously identified habitat area outside of proposed activities. Relocation would be performed in accordance with appropriate USFWS, USFS, and New Mexico Department of Game and Fish protocols and permits. Relocation sites would be approved by USFWS, USFS, and NMDGF prior to initiation of surveys.

With implementation of the capture and relocate procedures if the Peñasco least chipmunk is identified within work areas, the demolition activities that would be implemented under Alternative 1 **may affect**, but are **not likely to adversely affect**, the Peñasco least chipmunk.

The habitat in the proposed work areas is not suitable to support the Sacramento Mountains thistle. This species would not occur in proposed work areas and there would be **no effect** on the Sacramento Mountains thistle.

6.1.1.2 Operations

Operations at the Sacramento Peak Observatory would not change from current operations under Alternative 1. Undeveloped portions of the Observatory would remain undeveloped.

There would be no potential to impact listed or candidate species in the undeveloped areas of the Sacramento Peak Observatory. Operations under Alternative 1 would have **no effect** on Mexican spotted owl, Peñasco least chipmunk, or Sacramento Mountains thistle. No adverse modification of critical habitat for the Mexican spotted owl from operations would occur.

6.1.2 Indirect Impacts

Stormwater runoff could move offsite resulting in degradation of habitats from erosion or sedimentation. Standard construction stormwater best management practices (BMPs), as specified in the site-specific SWPPP that would be developed and implemented for the demolition activities under Alternative 1 would minimize the potential for offsite impacts. With implementation of appropriate construction stormwater management controls, no adverse impacts to offsite habitats, including forest meadows and potential Sacramento Mountains thistle habitat, from erosion or sedimentation would be expected and no indirect impacts to listed or candidate species or their habitats would occur. No indirect impacts from demolition related noise would be expected because of the attenuation of noise to less than 69 dBA before reaching any of the nearby PACs.

No indirect impacts to protected species would be expected from operation of the Observatory after demolition is complete. Operations would be comparable to current operations and measures in place to minimize the potential for environmental impacts would be continued.

6.2 Alternative 2 – Transition to Partial Operations with Interested Parties

6.2.1 Direct Impacts

6.2.1.1 Implementation

The magnitude and intensity of disturbance under Alternative 2 would be comparable to that described for Alternative 1. Demolition activities would be limited to the previously disturbed areas around the 22 structures identified for removal. No work would occur in undisturbed areas within the Sacramento Peak Observatory. Following demolition activities, disturbed areas would be re-landscaped consistent with other maintained areas on the Observatory and the use of pesticides for routine grounds maintenance would be permitted only through a plan coordinated and approved by USFS. Project design features would be implemented, as described for Alternative 1 in Section 6.1.1.

Demolition under Alternative 2 would have **no effect** on Mexican spotted owl. The areas where demolition would occur is within designated Mexican spotted owl recovery habitat. The demolition activities would not affect the amount and distribution of nesting and roosting habitat or key foraging habitat (all key elements of recovery habitat), as no tree clearing would occur and demolition activities would occur only within previously disturbed and landscaped areas that do not provide suitable habitat for this species. Due to the vegetation being maintained through regular mowing, these areas do not provide appreciable habitat for voles or other prey items for the Mexican spotted owl. Additionally, implementation of this Alternative would not negatively affect the ability of the identified recovery habitat to be restored and/or enhanced so that it could be developed into habitat that would support the MSO in the future. As previously discussed, the proposed work areas do not contain elements that would contribute to PCEs for critical habitat. Because the proposed work is not within critical habitat and because it would not cause any adverse modification to elements that would contribute to PCEs for critical habitat, there is no potential for adverse modification of critical habitat for this species under this proposed Alternative.

As discussed in Section 6.1.1, impacts from demolition noise levels would have **no effect** on the Mexican spotted owl because the noise would naturally attenuate to less than 69 dBA before reaching the nearest PAC.

The Peñasco least chipmunk has the potential to occur within dense herbaceous undergrowth and rock-dominated areas around buildings planned for demolition, or could enter an active work area during demolition activities. NSF has developed the following measures to be protective of the species should it be listed during the time frame of the proposed Alternative selection and implementation. Prior to the start of any work, work areas and immediate surrounding areas would be surveyed for the Peñasco least chipmunk and, if it is found within or adjacent to the work areas, additional appropriate site-specific protective measures previously specified in Section 6.1.1 would be implemented. With implementation of the capture and relocate procedures, the demolition activities that would be implemented under Alternative 2 **may affect**, but are **not likely to adversely affect**, the Peñasco least chipmunk.

The habitat in the proposed work areas is not suitable to support the Sacramento Mountains thistle. This species would not occur in proposed work areas and there would be **no effect** on the Sacramento Mountains thistle.

6.2.1.2 Operations

Under Alternative 2, operations after demolition is complete would have a comparable potential for impacts to protected species as described for Alternative 1.

There would be no potential to impact listed or candidate species in the undeveloped areas of the Sacramento Peak Observatory. Operations under Alternative 2 would have **no effect** on Mexican spotted owl, Peñasco least chipmunk, or Sacramento Mountains thistle. Additionally, no direct impacts to critical habitat of the Mexican spotted owl from operations would occur.

6.2.2 Indirect Impacts

Standard construction stormwater BMPs, as specified in the site-specific SWPPP that would be developed and implemented for the demolition activities under Alternative 2, would minimize the potential for offsite impacts from erosion or sedimentation. With implementation of appropriate construction stormwater management controls, no adverse impacts to offsite habitats, including forest meadows and potential Sacramento Mountains thistle habitat, would be expected related to erosion or sedimentation and no indirect impacts to listed or candidate species or their habitats would occur. No indirect impacts from demolition related noise would be expected because of the attenuation of noise to less than 69 dBA before reaching any of the nearby PACs.

No indirect impacts to protected species would be expected from operation of the Observatory after demolition is complete. Operations would be comparable to, but slightly reduced compared to current operations, and measures in place to minimize the potential for environmental impacts would be continued. The potential for indirect impacts would be comparable to those described for Alternative 1. No indirect impacts to protected species would occur during operations under Alternative 2.

6.3 Alternative 3 – Mothballing of Facilities

6.3.1 Direct Impacts

6.3.1.1 Implementation

Demolition activities would be limited to the previously disturbed areas around the Residential House Trailer, Relocatable Housing, and Recreation House identified for removal and existing disturbed areas where mothballing of existing structures is proposed. No work would occur in undisturbed areas within the Sacramento Peak Observatory. Following demolition activities, disturbed areas would be re-landscaped consistent with other maintained areas on the Observatory and the use of pesticides for routine grounds maintenance would be permitted only through a plan coordinated and approved by USFS. Project design features would be implemented as described for Alternative 1 in Section 6.1.1.

Demolition under Alternative 3 would have **no effect** on Mexican spotted owl. The areas where demolition would occur is within designated Mexican spotted owl recovery habitat. The demolition

activities would not affect the amount and distribution of nesting and roosting habitat or key foraging habitat (all key elements of recovery habitat), as no tree clearing would occur and demolition activities would occur only within previously disturbed and landscaped areas that do not provide suitable habitat for this species. Due to the vegetation being maintained through regular mowing, these areas do not provide appreciable habitat for voles or other prey items for the Mexican spotted owl. Additionally, implementation of this Alternative would not negatively affect the ability of the identified recovery habitat to be restored and/or enhanced so that it could be developed into habitat that would support the MSO in the future. As previously discussed, the proposed work areas do not contain elements that would contribute to PCEs for critical habitat. Because the proposed work is not within critical habitat and because it would not cause any adverse modification to elements that would contribute to PCEs for critical habitat, there is no potential for adverse modification of critical habitat for this species under this proposed Alternative.

As discussed in Section 6.1.1, impacts from demolition noise levels would have **no effect** on the Mexican spotted owl because the noise would naturally attenuate to less than 69 dBA before reaching the nearest PAC.

The Peñasco least chipmunk has the potential to occur within areas surrounding the structures proposed to be demolished, or could enter an active work area during demolition activities. NSF has developed the following measures to be protective of the species should it be listed during the time frame of the proposed Alternative selection and implementation. Prior to the start of any work, work areas and immediate surrounding areas would be surveyed for Peñasco least chipmunk and, if it is found within or adjacent to the work areas, additional appropriate site-specific protective measures previously specified in Section 6.1.1 would be implemented. With implementation of the capture and relocate procedures, the demolition activities that would be implemented under Alternative 3 **may affect**, but are **not likely to adversely affect**, the Peñasco least chipmunk.

The habitat in the proposed work areas is not suitable to support the Sacramento Mountains thistle. This species would not occur in proposed work areas and there would be **no effect** on the Sacramento Mountains thistle.

6.3.1.2 Operations

Under Alternative 3, operations after any demolition-related activities is complete would be suspended for a number of years and only necessary maintenance would occur during this period. This maintenance is expected to be similar with regard to impacts to biological resources as maintenance under current operations. No change from baseline conditions would be expected and no adverse impacts to listed or candidate species would be expected from maintenance during the mothball phase.

Operations during the mothball phase at the Sacramento Peak Observatory under Alternative 3 would have **no effect** on Mexican spotted owl, Peñasco least chipmunk, or Sacramento Mountains thistle. Additionally, no direct impacts to critical habitat of the Mexican spotted owl from operations would occur.

6.3.2 Indirect Impacts

Standard construction stormwater BMPs, as specified in the site-specific SWPPP that would be developed and implemented for the demolition activities under Alternative 3 would minimize the potential for offsite impacts related to erosion or sedimentation. With implementation of appropriate construction stormwater management controls, no adverse impacts to offsite habitats, including forest meadows and potential Sacramento Mountains thistle habitat, would be expected from erosion or sedimentation and no indirect impacts to listed or candidate species or their habitats would occur. No indirect impacts from demolition related noise would be expected because of the attenuation of noise to less than 69 dBA before reaching any of the nearby PACs.

No indirect impacts to protected species would be expected from maintenance during the mothball phase, as only routine maintenance would be performed. No indirect impacts to protected species would occur during the mothball phase under Alternative 3.

6.4 Alternative 4 – Demolition and Site Restoration

6.4.1 Direct Impacts

6.4.1.1 Implementation

The magnitude and intensity of disturbance under Alternative 4 would be substantially greater than that described for Alternative 1, but still would be confined to previously disturbed areas around the structures identified for removal. No work would occur in undisturbed areas within the Sacramento Peak Observatory. Demolition activities would encompass 68 structures, with the removal of all structures to a maximum of 4 feet (1.2 meters) below existing ground surface grade to enable the restoration of the ground surface topography. Following demolition activities, a Vegetation Restoration Management Plan would be prepared and implemented to delineate boundaries for restoration, identify measures to stabilize soil and re-establish vegetation onsite, designate plant species to be used, and establish a monitoring plan that includes target goals and evaluation metrics. During restoration efforts, pesticide use would be permitted only through a plan coordinated and approved by USFS.

Due to the vegetation being maintained through regular mowing, these areas do not provide suitable habitat for the Mexican spotted owl or appreciable habitat for voles or other prey items. Project design features would be implemented as described for Alternative 1 in Section 6.1.1. Additionally, NSF would develop and implement a Vegetation Restoration Management Plan consistent with the Lincoln National Forest Land and Resources Management Plan that would delineate boundaries for restoration, identify measures to stabilize soil and re-establish vegetation onsite, designate plant species to be used, and establish a monitoring plan that includes target goals for species establishment and the prevention of the spread of invasive weeds, as well as evaluation metrics.

During the demolition period, noise and vibration will occur. These levels would not be continuous and would attenuate as sound travels from the work areas because of the increase in distance, terrain, and generally closed forest vegetation surrounding the Sacramento Peak Observatory.

Noise from blasting explosives (anticipated for the demolition of the aboveground portion of the DST) would exceed the 69-dBA threshold defined in the 2012 Recovery Plan (USFWS, 2012a) for noise impacts to nesting birds within PACs. However, the blast would be a single event consisting of a single blast or a sequence of concurrent blasts, depending on the structure of the building and the specific need to drop the building within its footprint. Whether a single detonation or a concurrent sequence is used, it would be a single noise event lasting less than 2 seconds. However, it would not be a large explosion – explosive demolition uses multiple directional charges of the minimum size to cut the internal supports of the structure and cause the building to collapse and avoid expulsion of airborne debris.

Sound levels from blasting explosives would be short-term and would attenuate from the work areas due to the increase in distance and terrain. The controlled explosive demolition would be a single noise event and would be within the parameters allowable under the 2012 Recovery Plan (USFWS, 2012a) without mitigation. Because noise levels within the PACs would not exceed 69 dBA on a continuous basis and intermittent louder noise events would not occur more than twice per hour, no adverse impacts to the Mexican spotted owl from demolition-related noise from blasting would be expected. Additionally, implementation of the project design feature restricting demolition-related work to occur during daylight hours outside of the breeding season further reduces the potential for adverse impacts to the Mexican spotted owl.

Because disturbance would be limited to previously disturbed and landscaped areas that do not provide suitable habitat for the Mexican spotted owl or its prey species, demolition under Alternative 4 would have **no effect** on the Mexican spotted owl.

The areas where demolition would occur do not contain elements that would contribute to PCEs for critical habitat. The proposed work is not within designated critical habitat and would not cause any adverse modification to elements that would contribute to PCEs for critical habitat; therefore, there is no potential for adverse modification of critical habitat for this species under Alternative 4. The demolition activities would not affect the amount and distribution of nesting and roosting habitat or key foraging

habitat (all key elements of recovery habitat), as no tree clearing would occur and demolition activities would occur only within previously disturbed and landscaped areas that do not provide suitable habitat for this species. Additionally, implementation of Alternative 4 would not negatively affect the ability of the identified recovery habitat to be restored and/or enhanced so that it could be developed into habitat that would support the MSO in the future.

The Peñasco least chipmunk has the potential to occur within dense herbaceous undergrowth and rock-dominated areas around buildings planned for demolition, or could be more likely to enter an active work area during demolition activities compared to other proposed Alternatives. Demolition activities subsequent to a chipmunk entering a proposed work area could directly affect an individual of this species. Because there is potential for the species to be listed before the work is completed, NSF has developed the following measures to be protective of the species should it be listed. Prior to the start of any work, work areas and immediate surrounding areas would be surveyed for the Peñasco least chipmunk and, if it is found within or adjacent to the work areas, additional appropriate site-specific protective measures previously specified in Section 6.1.1 would be implemented.

With implementation of the capture and relocate procedures, the demolition activities that would be implemented under Alternative 4 **may affect**, but are **not likely to adversely affect**, the Peñasco least chipmunk.

The habitat in the proposed work areas is not suitable to support the Sacramento Mountains thistle. This species would not occur in proposed work areas and there would be **no effect** on the Sacramento Mountains thistle.

6.4.1.2 Operations

There would be no Observatory-related operations following completion of demolition activities. Minimal human activity may occur if utilities are maintained by Apache Point Observatory and/or if USFS decides to retain and maintain some facilities, and implementation of the Vegetation Restoration Management Plan would require maintenance of areas revegetated for a limited period following demolition activities. No adverse impacts to listed or candidate species would be expected from activities following the demolition phase. Long-term beneficial impacts would be expected because of the reduced levels of human activity with closure of the Observatory and as natural habitats mature following restoration of the site.

6.4.2 Indirect Impacts

Standard construction stormwater BMPs as specified in the site-specific SWPPP that would be developed and implemented for the demolition activities under Alternative 4 would minimize the potential for offsite impacts related to erosion or sedimentation. With implementation of appropriate construction stormwater management controls, no adverse impacts to offsite habitats, including forest meadows and potential Sacramento Mountains thistle habitat, would be expected and no indirect impacts to listed or candidate species or their habitats from erosion or sedimentation would occur from demolition activities. No indirect impacts from demolition related noise would be expected because of the attenuation of noise to less than 69 dBA before reaching any of the nearby PACs.

Following demolition and the subsequent return of the property to USFS, long-term population and habitat monitoring and evaluation of the Mexican spotted owl would fall under the continued efforts of the USFS Regional Office for monitoring and evaluation of the Lincoln National Forest under the guidance of the Lincoln National Forest Land and Resource Management Plan (USFS, 1986). These post-demolition monitoring measures, coupled with the reduction in human activity following closure of the Observatory and expected habitat improvement resulting from vegetation restoration, would ultimately lead to minor, beneficial, long-term impacts to the Mexican spotted owl.

6.5 Cumulative Impacts

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this BA. Future federal actions that are unrelated to the Proposed Action are not considered in this section because they require separate consultation pursuant to

Section 7 of the ESA. Since the land within and adjacent to the action area is almost exclusively managed by the USFS, or under permit from the USFS, most activities that could potentially affect listed species are federal activities and subject to additional Section 7 consultations.

Foreseeable actions on non-federal lands, or non-federally managed lands, and are reasonably certain to continue to occur include road maintenance of N.M. 6563. This has been designated the Sunspot Scenic Byway by the state of New Mexico, and is maintained by the state. Maintenance activities include plowing snow in the winter and applying dirt for traction, and patching/repaving as the need is identified. This road is expected to remain in State jurisdiction and maintenance into next 20 years or more. State road maintenance would not interact with any of the proposed alternatives and no cumulative impacts would result.

6.6 Project Design Features to Avoid and Minimize Potential for Impacts

The following project design features would be implemented under all proposed Alternatives to minimize or avoid impacts to listed or candidate species:

- Implement seasonal restrictions to avoid demolition during the Mexican spotted owl breeding period; do not conduct demolition-related work between March 1 and August 31.
- Idle restrictions on heavy equipment will be enforced to reduce noise during demolition.
- Develop and implement a site-specific SWPPP that would specify stormwater control BMPs and proper maintenance of those BMPs to control runoff from precipitation events and minimize the potential for offsite scour and sedimentation.
- No clearing of wooded/forested areas would occur.
- Perform proposed demolition work during daylight hours to avoid effects on nocturnal foraging by Mexican spotted owl.
- Implement landscaping or revegetation as appropriate:
  - Under proposed Alternatives 1 through 3: Re-landscape disturbed areas consistent with the other maintained grounds, as necessary, with pesticide use for routine grounds maintenance permitted only through a plan coordinated and approved by USFS.
  - Under proposed Alternative 4: Develop and implement a Vegetation Restoration Management Plan consistent with the Lincoln National Forest Land and Resources Management Plan to delineate boundaries for restoration, identify measures to stabilize soil and reestablish vegetation onsite, designate plant species to be used, and establish a monitoring plan that includes target goals and evaluation metrics. Pesticide use associated with site restoration efforts would be permitted only through a plan coordinated and approved by USFS.
- If the Peñasco least chipmunk becomes federally listed prior to implementation of the selected Alternative, pre-demolition surveys would be performed using cameras or live traps to identify/collect individuals before the start of proposed work. Species collected at buildings proposed for demolition would be relocated to a previously identified habitat area outside of proposed activities. Surveys, capture efforts, and relocation would be performed in accordance with appropriate USFWS, USFS, and NMDGF protocols and collection permits. Relocation sites would be approved by USFWS, USFS, and NMDGF.

SECTION 7.0

Conclusions

NSF proposes to reduce funding at the Sacramento Peak Observatory and is considering four proposed Alternatives for this purpose. Through this BA, NSF has formulated a determination regarding the potential effects on the federally threatened Mexican spotted owl and candidate species Peñasco least chipmunk from the reduction of funding at the Sacramento Peak Observatory under implementation of the each of the proposed Alternatives.

Under all of the proposed Alternatives, implementation of appropriate site-specific protective measures would be implemented during demolition activities and during subsequent operations, as applicable. In addition, each proposed Alternative would include implementation of stormwater management measures during demolition to minimize the potential for offsite movement of runoff. Additional site-specific protection measures would be developed and implemented as appropriate during work.

NSF commits to implementing the project design features identified in Section 6.6 to avoid and minimize impacts to the extent practicable. NSF requests USFWS concurrence with the following determinations of findings of this analysis regarding the proposed Alternatives under consideration to reduce funding to the Sacramento Peak Observatory:

- Alternative 1: Implementation under Alternative 1 would have **no effect** on the Mexican spotted owl. Proposed demolition activities would occur outside the breeding season for the Mexican spotted owl and would not be within an identified PAC. With implementation of the site-specific project design features to minimize the potential for impacts, no adverse modification of critical habitat for this species would occur.

  With implementation of the site-specific project design features to minimize the potential for impacts, the demolition activities that would be implemented under Alternative 1 **may affect**, but are **not likely to adversely affect**, the Peñasco least chipmunk.

  With implementation of the site-specific project design features to minimize the potential for impacts, Alternative 1 would have **no effect** on the Sacramento Mountains thistle.

  Operations under Alternative 1 would have **no effect** on the Mexican spotted owl, Peñasco least chipmunk, or Sacramento Mountains thistle.

- Alternative 2: Implementation under Alternative 2 would have **no effect** on the Mexican spotted owl. Proposed demolition activities would occur outside the breeding season for the Mexican spotted owl would not be within an identified PAC. With implementation of the site-specific project design features to minimize the potential for impacts, no adverse modification of critical habitat for this species would occur.

  With implementation of the site-specific project design features to minimize the potential for impacts, the demolition activities that would be implemented under Alternative 2 **may affect**, but are **not likely to adversely affect**, the Peñasco least chipmunk.

  With implementation of the site-specific project design features to minimize the potential for impacts, Alternative 2 would have **no effect** on the Sacramento Mountains thistle.

  Operations under Alternative 2 would have **no effect** on the Mexican spotted owl, Peñasco least chipmunk, or Sacramento Mountains thistle.

- Alternative 3: Implementation under Alternative 3 would have **no effect** on the Mexican spotted owl. Proposed demolition activities would occur outside the breeding season for the Mexican spotted owl would not be within an identified PAC. With implementation of the site-specific project design features to minimize the potential for impacts, adverse modification of critical habitat for this species would occur.

With implementation of the site-specific project design features to minimize the potential for impacts, the demolition activities that would be implemented under Alternative 3 **may affect**, but are **not likely to adversely affect**, the Peñasco least chipmunk.

With implementation of the site-specific project design features to minimize the potential for impacts, Alternative 3 would have **no effect** on the Sacramento Mountains thistle.

Operations under Alternative 3 would have **no effect** on the Mexican spotted owl, Peñasco least chipmunk, or Sacramento Mountains thistle.

- Alternative 4: Implementation under Alternative 4 would have **no effect** on the Mexican spotted owl. Proposed demolition activities would occur outside the breeding season for the Mexican spotted owl would not be within an identified PAC. With implementation of the site-specific project design features to minimize the potential for impacts, no adverse modification of critical habitat for this species would occur.

  With implementation of the site-specific project design features to minimize the potential for impacts, the demolition activities that would be implemented under Alternative 4 **may affect**, but are **not likely to adversely affect**, the Peñasco least chipmunk.

  With implementation of the site-specific project design features to minimize the potential for impacts, Alternative 4 would have **no effect** on the Sacramento Mountains thistle.

  Operations under Alternative 4 would have **no effect** on the Mexican spotted owl, Peñasco least chipmunk, or Sacramento Mountains thistle.

  Long-term beneficial impacts would be expected because of the reduced levels of human activity with closure of the Observatory and as natural habitats mature following restoration of the site.

Implementation of any of the proposed Alternatives would not threaten the continued existence of protected species known to occur or with the potential to occur at the Sacramento Peak Observatory.

Critical habitat has not been designated for the Peñasco least chipmunk or the Sacramento Mountains thistle. Therefore, there would be no potential for adverse modification of critical habitat for these species.

Designated critical habitat for the Mexican spotted owl exists adjacent to the Sacramento Peak Observatory and the Observatory is within recovery habitat. However, NSF has determined that there would be **no adverse modification** of designated critical habitat due to the proposed demolition activities associated with any of the proposed Alternatives. There are no PACs at the Sacramento Peak Observatory; the nearest PAC is located 3,700 feet southeast of the Observatory, with eight additional PACs in the surrounding area, ranging in distance from approximately 4,800 feet to 13,800 feet. No tree clearing would occur, and demolition activities would occur only within previously disturbed and landscaped areas that do not provide suitable habitat for this species. Implementation of the Proposed Action under any of the alternatives would not negatively affect the ability of the identified recovery habitat to be restored and/or enhanced so that it could be developed into habitat that would support the MSO in the future. Additionally, these proposed demolition activities would occur only outside the breeding season.

SECTION 8.0

Review of Literature and Other Information

The following summary indicates the primary references used during preparation of this BA.

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SECTION 9.0

List of Preparers, Contributors, and Persons Contacted

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SECTION 10.0

Consultation History

A Notice of Intent to prepare an Environmental Impact Statement for this Proposed Action was published in the Federal Register on July 5, 2016, to initiate the public scoping process and satisfy NSF's requirements under the National Environmental Policy Act. A letter was sent to the New Mexico Ecological Services Field Office on July 7, 2016, to solicit scoping comments from USFWS. No response was received with regard to scoping concerns; however, NSF coordinated with USFWS via email to confirm the correct point of contact and contact information for future coordination on its EIS efforts and review of this BA.

NSF generated an official species list using the USFWS IPaC tool on September 12, 2016 in order to prepare the Draft BA. A second species list was generated using the IPaC tool on February 28, 2017 to verify that the listed species were still current prior to finalizing the BA.

Because the Sacramento Peak Observatory is located on National Forest System lands, NSF has coordinated with USFS during preparation of this BA. USFS provided extensive input and will be provided a copy of all correspondence related to Section 7 consultation.

NSF intends to provide this BA to USFWS for review, and will request concurrence with the findings presented in this BA via informal consultation.

Additionally, while not part of the consultation effort for the Proposed Action analyzed in this BA, the USFS completed formal Section 7 consultation with UFSWS for the continued implementation of the Land and Resource Management Plan for the Lincoln National Forest of the Southwestern Region (Cons. #2012-F-0008), which resulted in issuance of a BO dated March 30, 2012. The BO addresses the USFS's continued implementation of the Land and Resource Management Plan, and its effects to 6 federally-listed species and one designated critical habitat. The BO is incorporated by reference in this BA.

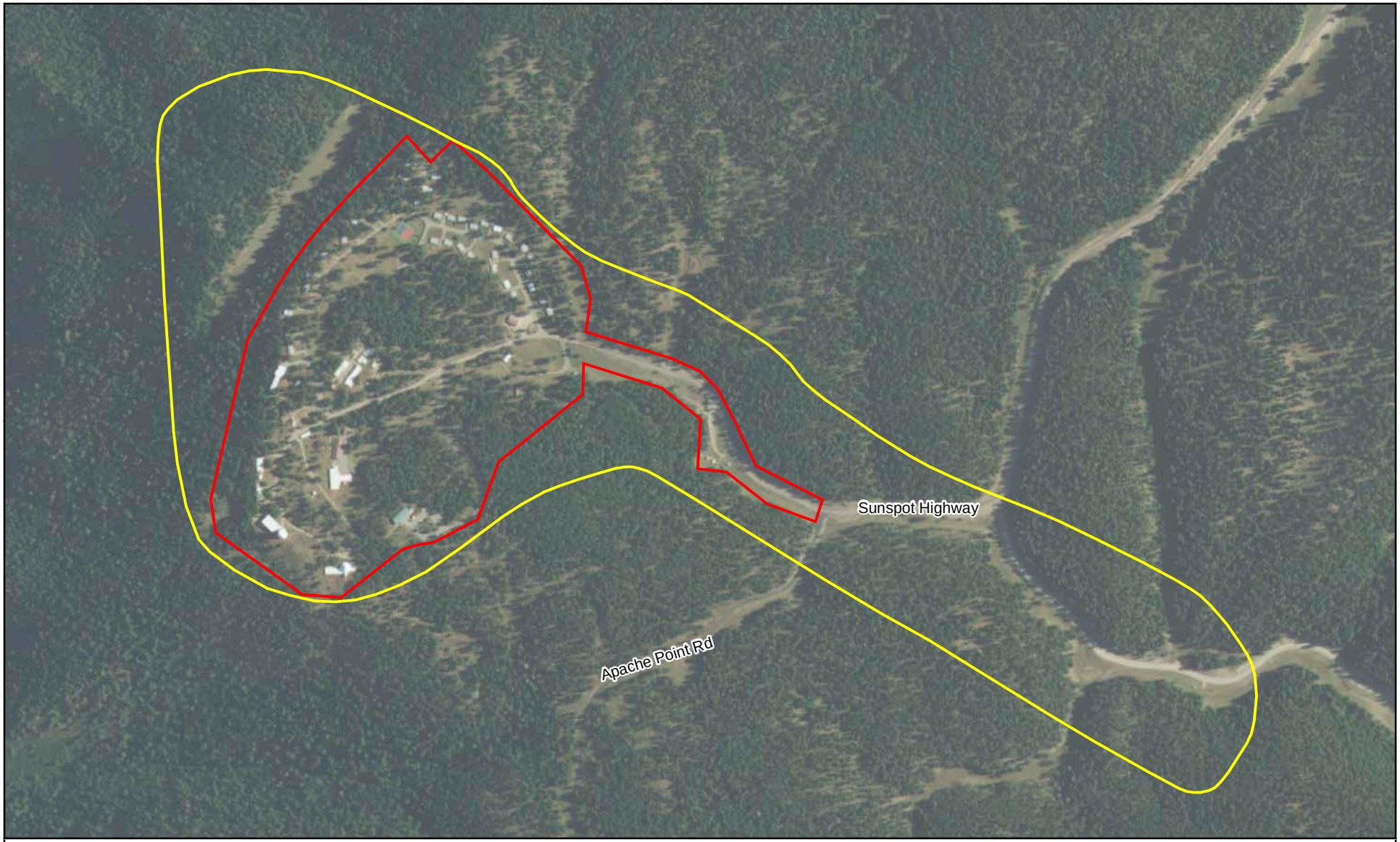
See Appendix B for a detailed list of coordination efforts between NSF, USFS, and USFWS.

Table

Table 1. Summary of Facilities per Alternative

Facility Name	Facilities for Each Alternative			
	Alternative 1 Transition to Full Operations	**Alternative 2 Transition to Partial Operations**	**Alternative 3 Mothballing of Facilities**	**Alternative 4 Demolition and Site Restoration**
Telescopes				
#3000 – John Evans Facility	Mothball	Mothball	Mothball	Demolition
#3002 – Grain Bin Telescope	Mothball	Mothball	Mothball	Demolition
#3040 – Hilltop Dome	Keep and Maintain	Mothball	Mothball	Demolition
#3042 – Vacuum Tower (Dunn Solar) Telescope	Keep and Maintain	Keep and Maintain	Mothball	Demolition
#3009 – ISOON Building (Patrol Dome)	Keep and Maintain	Mothball	Mothball	Demolition
#3001 – Visitor Center	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Operations Support				
#3004 – Main Lab	Keep and Maintain	Mothball	Mothball	Demolition
#3008, 3011, 3012, 3029 – Storage (Quonset Hut)	Keep and Maintain	Mothball	Mothball	Demolition
#3024 – Storage	Mothball	Mothball	Mothball	Demolition
#3031 & #3032 – CE Shops	Keep and Maintain	Keep and Maintain	Mothball	Demolition
#3036 – Equipment Storage / Salt Barn	Keep and Maintain	Keep and Maintain	Mothball	Demolition
#3037 – Storage	Mothball	Mothball	Mothball	Demolition
#3039 – Weather Station	Keep and Maintain	Keep and Maintain	Mothball	Demolition
#3005 – Machine / Electronics Shop	Keep and Maintain	Mothball	Mothball	Demolition
#3006 – Welding Shop / Library	Keep and Maintain	Mothball	Mothball	Demolition
#3010 – Community Center	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Oil Storage	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Mercury Storage	Keep and Maintain	Keep and Maintain	Mothball	Demolition
#3034 – Paint Storage	Keep and Maintain	Keep and Maintain	Mothball	Demolition
#3007 – Paint Shop	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Onsite Residential Support				
#3060 – Laundromat	Keep and Maintain	Keep and Maintain	Mothball	Demolition
#3013 – VOQ (Visitor Officers Quarters)	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Redwood Family Housing Duplex Units (3 total)	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Redwood Family Housing Units (10 total)	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Relocatable Visitor Housing (20 Total)	Demolition	Demolition	Demolition	Demolition
Recreation House	Demolition	Demolition	Demolition	Demolition
Recreation Court	Keep and Maintain	Mothball	Mothball	Demolition
Residential House Trailer	Demolition	Demolition	Demolition	Demolition
Site Utilities				
#3038 – Emergency Generator Building and Fuel Storage	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Buried Electrical, Water, Gas Lines, and Storm Drain System	Keep and Maintain	Keep and Maintain	Keep and Maintain	Keep and Maintain
Water Tower and Buried Water Tanks	Keep and Maintain	Keep and Maintain	Keep and Maintain	Keep and Maintain
#3050, 3051 – Water Wells and Water Well Buildings	Keep and Maintain	Keep and Maintain	Keep and Maintain	Keep and Maintain
#3033 – Pump Station Reservoir	Keep and Maintain	Keep and Maintain	Keep and Maintain	Keep and Maintain
# 3053, 3054, 3055, 3056 – Sewage Treatment Plant	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Propane Storage	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Fencing / Rock Walls	Keep and Maintain	Keep and Maintain	Mothball	Demolition
Roads and Sidewalks	Keep and Maintain	Keep and Maintain	Keep and Maintain	Keep and Maintain

Figures



Project Area
Overall Property Limits

N
W E
S

0 500 1,000
Feet

Figure 1
Project Location Map
Sacramento Peak Observatory
Sunspot, New Mexico

Aerial Source: National Agriculture Imagery Program (NAIP), 2016

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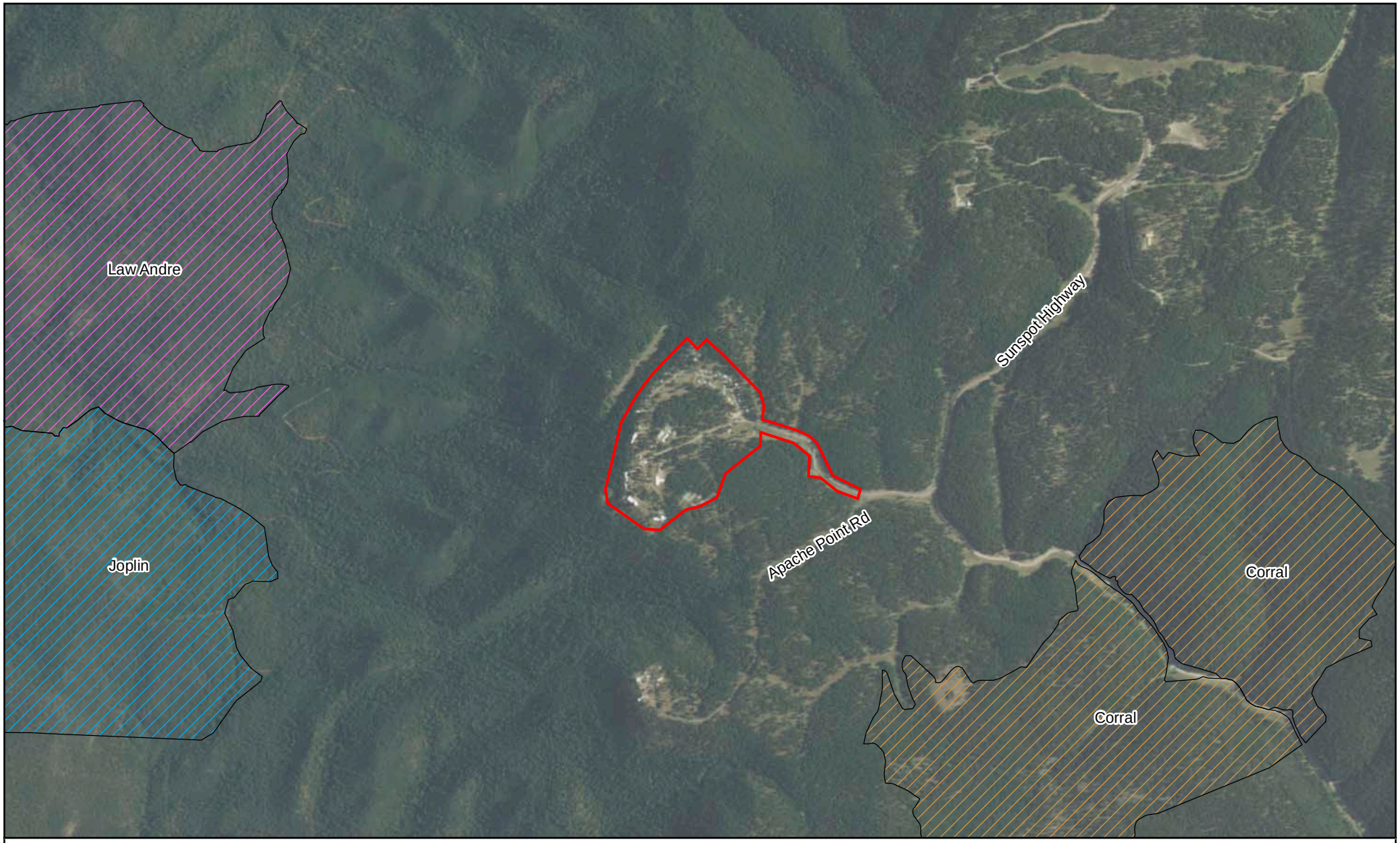

Project Area

Mexican Spotted Owl PAC

Corral

Joplin

Law Andre

Data Source: MSO PAC received from USFS 9/23/2016
Aerial Source: National Agriculture Imagery Program (NAIP), 2016

N
W E
S

0 1,000 2,000
Feet

Figure 2
Mexican Spotted Owl PACs
Sacramento Peak Observatory
Sunspot, New Mexico

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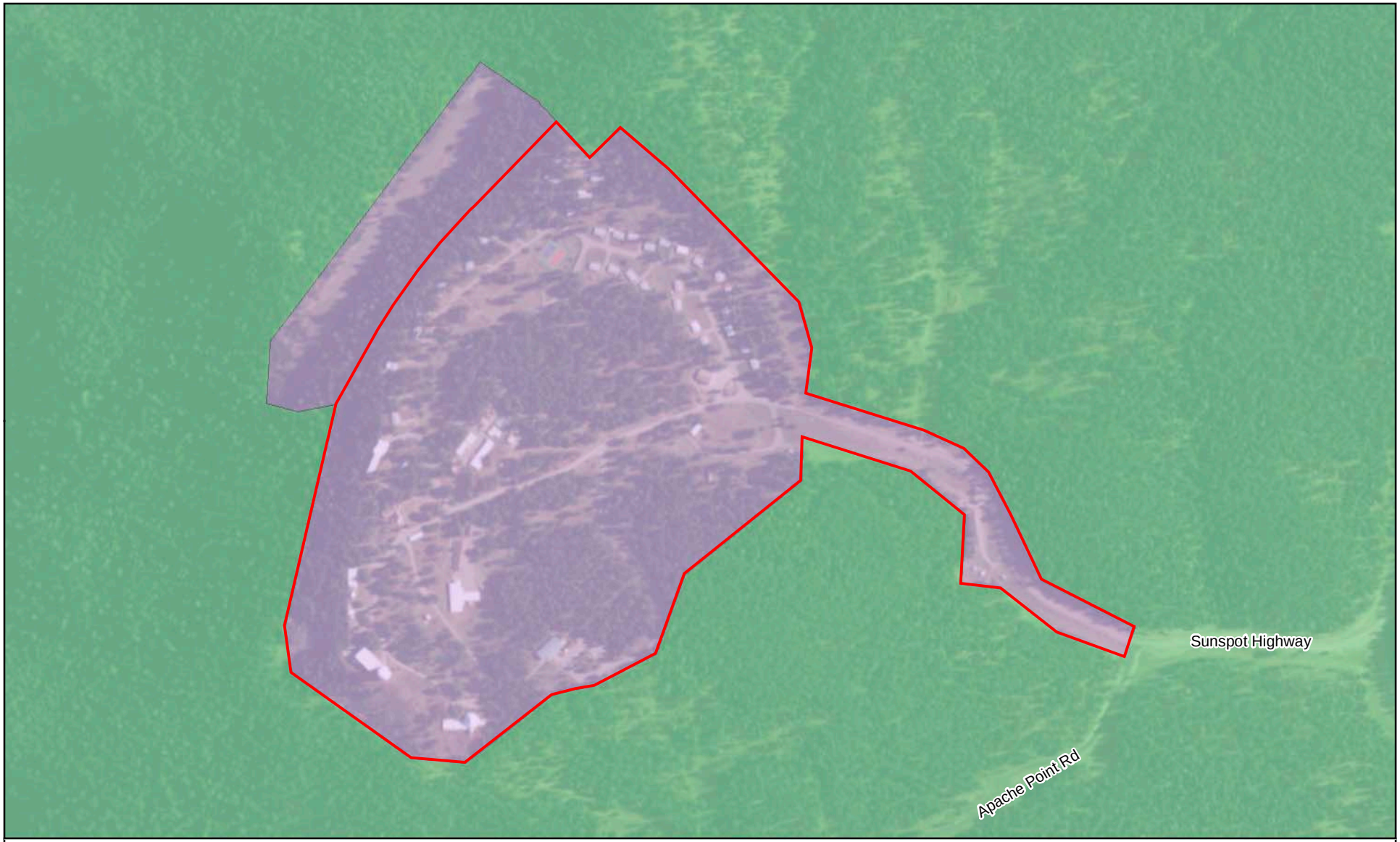

Project Area
Mexican Spotted Owl Critical Habitat
Mexican Spotted Owl Recovery Habitat

N
W E
S

0 300 600
Feet

Figure 3
Mexican Spotted Owl
Critical and Recovery Habitat
Sacramento Peak Observatory
Sunspot, New Mexico

Data Source: USFS Critical Habitat Downloaded 2/8/2017 (Administrative/Developed Areas are considered Recovery Habitat)
Aerial Source: National Agriculture Imagery Program (NAIP), 2016

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Appendix A
Threatened, Endangered & Candidate Species Excluded from Detailed Analysis but Found in the Lincoln National Forest

Scientific Name	Common Name	Status	Source	Habitat	Comments
Plants					
Escobaria sneedii* var. *leei **(formerly *Coryphantha sneedii var. leei*)**	Lee's Pincushion Cactus	T	Lincoln National Forest (USFS)	Species grows in semi-desert grassland and is restricted to north-facing ledges of the Tansil Limestone Formation. Populations occur at elevations of 3,900 to 4,900 feet surrounded by sparse vegetation and low shrubs.	Species found in the Lincoln National Forest but not on Sacramento Ranger District. This project area does not have any habitat attributes needed for this species to occur.
Escobaria sneedii* var. *sneedii ***(formerly Coryphantha sneedii var. sneedii***	Sneed's Pincushion Cactus	E	Lincoln National Forest (USFS)	Species grows in semi-desert grassland and is restricted to cracks on vertical cliffs or ledges of limestone. Populations occur at elevations of 3,900 to 7,700 feet.	Species found in the Lincoln National Forest but not in Sacramento Ranger District. This project area does not have any habitat attriubutes needed for this species to occur.
Hedeoma todsenii	Todsen's Pennyroyal	E	Lincoln National Forest (USFS), IPaC (USFWS)	The species is found in scrub and Pinon-juniper on the western slope of the Sacramento Mountains. It grows on gypseous limestone soil at an elevation range from 6,200 to 7,400 feet.	Species is not known to occur or have habitat in or near the project area, though it may occur elsewhere on the Sacramento Ranger District. This project area does not have any habitat attriubutes needed for this species to occur.
Echinocereus fendleri var. kuenzleri	Kuenzler's Hedgehog Cactus	E	Lincoln National Forest (USFS), IPaC (USFWS)	The habitat is found on gentle, gravel to rocky slopes and benches on limestone or limy standstones, in Great Plains grassland, oak woodland, or pinon-juniper woodlands.	Species is not known to occur or have habitat in or near the project area, though it may occur elsewhere on the Sacramento Ranger District. Only occurs on the eastern portion of the district. This project area does not have any habitat attributes needed for this species to occur.
Argemone pleiacantha spp. pinnatisecta	Sacramento Prickly Poppy	E	Lincoln National Forest (USFS), IPaC (USFWS)	Found only within canyons of the western escarpment of the Sacramento Ranger District. The project area is outside the documented habitat and does not have any habitat attributes needed for this species to occur.	Species is not known to occur or have habitat in or near the project area, though it may occur elsewhere on the Sacramento Ranger District.
Cirsium wrightii	Wright's Marsh Thistle	PT	Lincoln National Forest (USFS), IPaC (USFWS)	Strictly a wetland species that occupies alkaline spring seeps at low to moderate elevations. Inhabits the Chihuahuan Desert floristic region and can occur at moderate elevations in pinyon-juniper woodlands.	Species is not known to occur or have habitat in or near the project area, though it may occur elsewhere on the Sacramento Ranger District. This project area does not have any habitat attributes needed for this species to occur.

Scientific Name	Common Name	Status	Source	Habitat	Comments
Mammals					
Zapus hudsonicus luteus	New Mexico Meadow Jumping Mouse	E	Lincoln National Forest (USFS), IPaC (USFWS)	Riparian wetlands along streams that include dense, riparian herbaceous vegetation primarily composed of hydrophytic sedges and forbs.	Species is not known to occur or have habitat within the project area, though it may occur elsewhere on the Sacramento Ranger District. Neither occupied habitat nor designated critical habitat are found within or downstream of the project area.
Birds					
Coccyzus americanus	Yellow Billed Cuckoo	T	Lincoln National Forest (USFS), IPaC (USFWS)	Uses wooded habitat with dense cover and nearby water features, including woodlands with low, scrubby, vegetation, abandoned farmland, and dense thickets along streams and marshes.	The USFS has determined that this species is not known to occur or have habitat in or near the project area. This project area does not have any habitat attributes needed for this species to occur.
Sterna antillarum	Least tern	E	Lincoln National Forest (USFS), IPaC (USFWS)	Sparsely vegetated riverine sandbars, dike field sandbar islands, sand and gravel pits, and lake and reservoir shorelines (USFWS, 1990).	Species is not known to occur or have habitat in or near the project area. This project area does not have any habitat attributes needed for this species to occur.
Falco femoralis septentrionalis	Northern Aplomado Falcon	EXPN	IPaC (USFWS)	Yucca-covered sand ridges in coastal prairies, riparian woodlands in open grasslands, and in desert grasslands with scattered mesquite and yucca.	Species is not known to occur or have habitat in or near the project area. This project area does not have any habitat attributes needed for this species to occur.
Charadrius montanus	Mountain Plover	PT	Lincoln National Forest (USFS)	Species prefers open ground with little or no cover for roosting and breeding which include alkaline flats. Habitat also includes shortgrass prairie and open mountain terraces.	Species is not known to occur or have habitat in or near the project area. This project area does not have any habitat attributes needed for this species to occur.
Fish					
Gila pandora	Rio Grande Chub	PE	Lincoln National Forest (USFS)	Distribution includes the Upper Rio Grande and Pecos River systems in Colorado and New Mexico. Species prefers flowing pools of headwater streams and small rivers.	Species is not known to occur or have habitat in or near the project area. This project area does not have any habitat attributes needed for this species to occur.

Appendix B
Sacramento Peak Biological Assessment – Agency Communication Log

Sacramento Peak Biological Assessment – Agency Communication Log

Communication	Date Sent/Received	Topic/Purpose
Scoping Letter from NSF	Sent 7/7/16	Requested relevant information to be considered in EIS.
Email from NSF	Sent 10/17/16	Kristen Hamilton sent email to confirm the correct POC for USFWS .
Email from USFWS	Received 10/20/16	Jodie Smithem responded with correct email address (generic) to send EIS to during comment period (nmesfo@fws.gov); she noted that once the project is assigned to the appropriate staff member, they will get in contact with NSF regarding any questions or to provide a response.
Email from NSF	Sent 10/20/16	Kristen Hamilton sent an email to Jodie Smithem to confirm that NSF will forward the scoping (email) notice to the generic email.
Email from USFWS	Received 10/20/16	Jodie Smithem responded that she had already sent the scoping email and the July 7th letter on for processing, so no need to send to the generic email address.
Online USFWS IPaC Tool	Created 9/12/16	Obtained official species list from USFWS website.
Draft BE Submittal to USFS	1/13/17	CH2M submitted the Draft BE to USFS for review, comments requested by 1/27/17.
Sample Documents/Site Info from USFS	1/13/17	USFS provided sample documents and other LNF-specific information for consideration in the BE/BA via email.
USFS Comments on Draft BE	1/30/17	USFS provided tracked changes and general comments on the Draft BE, including request to change name to BA.
Online USFWS IPaC Tool	Created 2/28/17	Obtained updated official species list from USFWS website.
NSF Submits Draft Final BA to USFS for Review	4/14/17	NSF submitted Draft Final BA and list of responses to USFS comments on Draft BE.
USFS Comments on Revised Draft Final BA	4/28/17	USFS provided comments to NSF on the revised Draft Final BA.
Teleconference with USFS	5/4/17	Conference call between NSF, USFS, and CH2M to discuss comments on the revised Draft Final BA. Following the call, USFS provided the BO for LNF and a sample BA with PCE information.
Second Revision Draft Final BA Submitted to USFS	5/31/17	Sent to USFS for final review before submitting to USFWS.
USFS Comments on Second Revision Draft Final BA	6/14/17	Received final comments from USFS prior to submitting to USFWS.
NSF Submittal of BA to USFWS	6/15/17	Request informal consultation and concurrence with determinations of the BA.
USFWS Response to BA	7/15/17 (est)	Provide response to review of BA.

Appendix 3C

Cultural Resources Structure Summary

Surveyed Building/Structure Name (Building Number) *	Year Built	Description	Function	Alterations/Additions	Contributing to Historic District?
TELESCOPES					
Grain Bin Dome (3002)	1950	First telescope dome built at Sac Peak; 25-foot grain silo, converted from a grain bin from a Sears and Roebuck catalogue	Solar telescope (not in active use)	Alterations: interior changes to accommodate various telescopes	Contributing
John W. Evans Solar Facility [housed in the Big Dome] (3000)	1952	30-foot dome on concrete walls, concrete block building adjacent and a "slide-off" building on raised tracks; contains a 16-inch coronograph and a 12-inch coelostat	Solar telescope (not in active use)	Alterations: interior alterations to accommodate various telescopes; dome door system changed (1959); Additions: west addition (1961), second west addition (1963), laboratory space added (1966)	Contributing
Patrol Dome (ISOON Building) (3009)	1960-1963	20-foot dome on concrete wall attached with a one-story hyphen to the Hilltop Dome	Solar telescope (not in active use)	Addition: dome was originally detached from the Hilltop building. Connecting corridor was added.	Contributing
Hilltop Dome (3040)	1963	Concrete block laboratory building attached to the Patrol Dome	Solar telescope (not in active use)	Addition: Hilltop building was originally detached from the Patrol Dome. Connecting corridor was added.	Contributing
Richard B. Dunn Solar Telescope (formerly Vacuum Tower Telescope) (3042)	1969	220-foot tower, 180-foot shaft below ground, concrete walls and an attached, two-story, concrete laboratory building with a thermal plastic vinyl roof	Solar telescope	Additions: small metal shed addition and larger concrete block shed addition on the rear elevation; windows have been covered with an opaque material	Contributing
HOUSING					
Visitor Officers Quarters (VOQ) (3013)	1952	Two-story wood frame apartment building with 5 apartments	Residential	Alterations: minor interior	Contributing
Redwood Family Housing (3014ns)	1952	One-story wood frame duplex	Residential	Alterations: minor	Contributing
Redwood Family Housing (also known as Director's House) (3015)	1952	One-story wood frame ranch house	Residential	Additions: expanded living room, added deck and extra bedroom	Contributing
Redwood Family Housing (3016ns)	1952	One-story wood frame duplex	Residential	Alterations: minor	Contributing
Redwood Family Housing (3017)	1952	One-story wood frame ranch house	Residential	Alterations: minor	Contributing
Redwood Family Housing (3018)	1952	One-story wood frame ranch house	Residential	Alterations: minor	Contributing
Redwood Family Housing (3019)	1952	One-story wood frame ranch house	Residential	Alterations: minor	Contributing
Redwood Family Housing (3020ns)	1952	One-story wood frame duplex	Residential	Alterations: minor	Contributing
Redwood Family Housing on Hound Dog Hill (3044)	1958	One-story wood frame ranch house	Residential	Alterations: minor	Contributing
Redwood Family Housing on Hound Dog Hill (3045)	1958	One-story wood frame ranch house	Residential	Alterations: minor	Contributing
Redwood Family Housing on Hound Dog Hill (3046)	1958	One-story wood frame ranch house	Residential	Alterations: minor	Contributing
Redwood Family Housing on Hound Dog Hill (3047)	1958	One-story wood frame ranch house	Residential	Alterations: minor	Contributing
Redwood Family Housing on Hound Dog Hill (3048)	1958	One-story wood frame ranch house	Residential	Alterations: minor	Contributing
Redwood Family Housing on Hound Dog Hill (3049)	1958	One-story wood frame ranch house	Residential	Alterations: minor	Contributing
Relocatable Housing (3061)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3062)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3063)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3064)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3065)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3066)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3067)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing

Surveyed Building/Structure Name (Building Number) *	Year Built	Description	Function	Alterations/Additions	Contributing to Historic District?
Relocatable Housing (3068)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3069)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3070) (also known as the Recreation House)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3071)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3072)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3073)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3074)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3075)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3076)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3077)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3079)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3081)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3083)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Relocatable Housing (3085)	1966	One-story, "foldable," ranch house	Residential	N/A	Contributing
Main Lab (3004)	1952	Irregular plan, one-story, concrete block building with a two-story, concrete block addition	Office space, computing facility, library	Alterations: door replacements; minor alterations to several windows Addition: Two-story laboratory space added (1966)	Contributing
Machine/Electronics Shop (3005)	1953	Rectangular plan, metal building	Machine/electronics shop	Alterations: original flat roof replaced with a gabled roof. Additions: north addition and full length addition to east elevation	Contributing
Welding Shop/Library (3006)	1962	Rectangular plan, metal building	Welding shop/library annex	Addition: library at the north end of the building was an addition to the welding shop	Contributing
Storage (Quonset Hut) (3008)	1951	Quonset hut on concrete slab	Electronics storage	N/A	Contributing
Community Center (former Mess Hall) (3010)	1952	One-story, wood frame building	Kitchen, office space, community center (originally contained the post office, officer's club, and dining facilities)	N/A	Contributing
Storage (Quonset Hut) (3011)	1951	Quonset hut on concrete slab	Facilities maintenance storage	Alterations: several windows have been replaced	Contributing
Storage (Quonset Hut) (3012)	1951	Quonset hut on concrete slab	Community shop, storage	Alterations: several windows have been replaced or covered with metal	Contributing
Storage Building (3024)	1958	Metal frame shed	Storage	N/A; poor condition	Non Contributing
Furniture Storage (Quonset Hut) (3029)	1951	Quonset hut on concrete slab	Furniture storage	Alterations: side windows have been covered with opaque boards; some siding has been replaced; poor condition	Non Contributing
Civil Engineering (CE) Shop (3031)	1953	One-story concrete block and plywood building with flat roof	Carpentry, welding, electrical shops	Alterations: Open front elevation was enclosed at an unknown date	Contributing
CE Shop (3032)	1953	Long, one-story, concrete block building	Facilities shops	Addition; one bay garage added for firetruck storage along with a small rear apartment	Contributing

Surveyed Building/Structure Name (Building Number) *	Year Built	Description	Function	Alterations/Additions	Contributing to Historic District?
Paint Storage (3034)	1959	Small concrete block building	Paint/hazardous waste storage	Alterations: replacement doors	Contributing
Equipment Storage/Salt Barn (3036)	1961	Wood frame, metal shed, dirt floor	Equipment storage	N/A	Contributing
Storage (3037)	1953	Concrete block	Facilities maintenance storage	N/A	Contributing
Emergency Generator Building (3038)	1962	Concrete block building on a raised concrete foundation	Emergency generator room	Alterations: two windows on front elevation have been replaced with louvered metal vents	Contributing
Weather Station (3039)	1955	One-story, square plan, concrete block building with a flat roof	Weather station/storage	Alterations: several window panes have been replaced with opaque materials	Contributing
Laundromat [formerly public restrooms] (3060)	circa late 1950s	One-story concrete block building	Laundromat, custodial storage	Alterations: minor interior alterations; two windows replaced	Contributing
INFRASTRUCTURE					
Pump Station Reservoir (3033)	1953	Concrete block building with two 10,000-gallon concrete, ground-level storage tanks	Reservoir	Addition: metal shed	Contributing
Water Well Building (3050)	1953	Metal frame sheds with aluminum siding	Water well	N/A	Contributing
Water Well Building (3051)	1953	Metal frame sheds with aluminum siding	Water well	N/A	Contributing
Sewage Treatment Plant - Boiler Room (3053)	1953	Small concrete block building clad in wide, wood drop siding, mineral surface roof	Treatment plant	Alterations: replacement of a window and some exterior materials	Contributing
Sewage Treatment Plant - Trickling Filter (3054)	1957	Small concrete block shed with a corrugated metal gable roof	Trickling filter	Alterations: replacement window	Contributing
Sewage Treatment Plant - Valve Station (3055)	1961	Metal frame building with a corrugated metal roof	Valve station	N/A	Contributing
Sewage Treatment Plant - Pump Station (3056)	1966	Small metal frame building with a corrugated metal roof	Pump station	N/A	Contributing
Overhead Water Tower (no building number)	1952	120-foot tall, 25,000-gallon steel elevated water tank	Water tower	Alterations: internally recoated in the last 5 years	Contributing

Appendix 3D

Environmental Baseline Study

FINAL

Environmental Baseline Study

Sacramento Peak Observatory
Sunspot, New Mexico

Prepared for

National Science Foundation

May 2016

ch2m

Executive Summary

This Environmental Baseline Study (EBS) has been prepared to document the current environmental conditions on the approximately 175-acre contiguous parcel of Sacramento Peak Observatory (herein referred to as the subject property) located in Sunspot, New Mexico. The National Science Foundation requested this EBS to determine the environmental condition prior to any future divestment activities. This EBS report has been prepared in accordance with the ASTM International (ASTM) provisional standards practice for *Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM, 2013).

This EBS report is based on information obtained through a records search, visual site inspections, physical site inspections, and interviews. The records search included a review of available records, including environmental restoration reports, previous surveys, building drawings, and inspection reports. Visual surveys of the subject property and interviews with current employees were conducted. The EBS also included an evaluation of environmental conditions at offsite properties that could pose environmental concerns or affect the subject property. For adjacent properties, visual surveys consisted of windshield surveys.

The following recognized environmental conditions (RECs) were found on the subject property:

- Soil impacts are possible at the wastewater treatment discharge area. All wastewater from the subject property facilities, including sinks from laboratories, discharges to the sanitary sewer system (except prior to the Evans Facility being connected to the sewage system). Facilities connected also include maintenance facilities and photograph process facilities in addition to the laboratories. The treatment plant discharges the treated effluent onto a 4-acre parcel of property via a series of perforated pipes at ground surface. In fiscal year 2008 sampling of the treatment plant discharge detected exceedances of BTEX and chlorinated solvents. Other than the one reported sampling event with VOC exceedances, only Total Haloacetic Acids (HAA5) exceedances were reported in the database search. No records of any repeat sampling, further studies, or cleanup activities were identified or available.
- Based on the 1979 Environmental Assessment, photo processing chemicals were discharged to a chemical pond located behind Big Dome (John Evans Facility). Chemicals and rinse water received no treatment and are allowed to flow into an inadequately designed and constructed pond. The wastewater seeped through the dikes impacting the surrounding wooded area. No records of any cleanup activities were identified or available; however, the pond no longer exists.
- Based on a Preliminary Assessment at the Property performed in July of 1992, an oil disposal pit consisting of a subsurface gravel drain field existed in the maintenance area. National Optical Astronomy Observatory maintenance personnel historically drained oil from two 2,477 cubic-inch emergency, diesel generators housed in Building 3038 into the pit through a 2-inch-diameter drain pipe. The National Optical Astronomy Observatory personnel estimated 240 gallons of oil entered into the pit before they capped the drain pipe and abandoned the pit. The U.S. Army Corp of Engineers estimated that the U.S. Air Force may have drained over 2,000 gallons of oil into the pit during their occupation of the site. No records of any cleanup activities were identified or available.

No historical or controlled recognized environmental conditions were found on the subject property.

The following *de minimis* conditions were identified on the subject property:

- Staining on the concrete floor in the hazardous material storage building
- Stain on auto shop building floor appeared to be petroleum

The following are other conditions on the subject property that are not considered RECs, but are worth disclosing:

- Six pole-mounted transformers located near the maintenance area were not labeled as to whether they contain Polychlorinated Biphenyls (PCBs). Additionally, three disconnected transformers are located near the new transformers at the maintenance area staged on the ground. No leaks or stressed vegetation were observed near the transformers.
- Asbestos was reported to be in Buildings 3000, 3004, 3010, 3013, 3040, 3042, 3060, T3055, and all of the housing. No abatement records were found.
- No lead-based paint surveys were found. Majority of the buildings were built prior to 1978 and are likely to have lead-based paint.
- The Vacuum Tower Telescope (Dunn Telescope) contains approximately 8 to 10 metric tons of mercury in a bearing located 193 feet below ground surface. The mercury would need to be properly disposed if the telescope is dismantled.

To assess the potential for adjacent properties to affect the subject property, a records search and database search of RECs within 1 mile of the subject property was performed for this EBS (see Attachment C). No other neighboring properties appear to have the potential to environmentally affect the properties.

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Acronyms and Abbreviations

ACM	asbestos-containing material
AST	aboveground storage tank
ASTM	ASTM International
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
DOT	department of transportation
EBS	Environmental Baseline Study
EDR	Environmental Data Resources, Inc.
FINDS	Facility Index System/Facility Registry System
HREC	Historical Recognized Environmental Condition
LBP	lead-based paint
LUST	leaking underground storage tank
NOAO	National Optical Astronomy Observatories
NPL	National Priorities List
NSF	National Science Foundation
PCB	polychlorinated biphenyl
pCi/L	picocurie per liter
RCRA	Resource Conservation and Recovery Act
REC	recognized environmental condition
RTE	rare, threatened, or endangered
SF	square feet
The subject property	Sacramento Peak Observatory
TSCA	Toxic Substances Control Act
USAF	U.S. Air Force
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
VSI	visual site inspection

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SECTION 1

Introduction

The National Science Foundation (NSF) issued a Statement of Work for the Divestment Options Studies for the NSF-funded Telescopes and Observatories Project Task Order on July 29, 2014 and a scope revision on August 5, 2014 under Blanket Purchase Agreement NSFDACS14B1186. This document describes the Environmental Baseline Study (EBS) portion of the task order for the approximately 175-acre property of the Sacramento Peak Observatory, hereinafter referred to as the subject property, located in Sunspot, New Mexico. Figure 1-1 depicts the location of the subject property.

This EBS report is organized as follows:

- Section 1 presents the purpose and scope of the EBS.
- Section 2 describes the site and the current uses.
- Section 3 provides historical uses of the property.
- Section 4 presents the environmental setting information and findings on the property.
- Section 5 presents results of the adjacent property assessment for the EBS.
- Section 6 presents information provided from interviews.
- Section 7 provides findings and conclusions.
- Section 8 provides the certification page.
- Section 9 provides the references consulted in preparing this document.

The appendices to this document include the following:

- Attachment A contains photographs taken during the January 26-27, 2015 site visit.
- Attachment B contains the Environmental Data Resources, Inc. (EDR) reports for the subject properties and adjacent properties.
- Attachment C contains copies of historical aerial photographs and historical topographic maps for the subject property.

This EBS report has been prepared in accordance with the ASTM International (ASTM) provisional standards practice for *Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM, 2013).

1.1 Purpose of Environmental Condition of Subject Property Report

The purpose of this EBS report is to document the environmental condition of the subject property prior to any divestment activities or changes in operational strategy.

The purpose of the EBS is to identify, to the extent feasible, the presence or likely presence of any hazardous substances or petroleum products on the subject property under conditions that indicate an existing release, a past release, or a material threat of release of any hazardous substances or petroleum products into structures on the subject property. This does not include *de minimis* conditions that do not present a threat to human health or the environment, and that generally would not be the subject of an enforcement action if brought to the attention of appropriate government agencies.

This EBS report is intended to help NSF conduct the following tasks:

- Develop sufficient information to identify what actions are necessary to protect human health and the environment prior to a real property transaction.

- Aid in establishing lease or deed restrictions.
- Support notice, when required under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) § 120(h)(3), of the type, quantity, and timeframe of any storage, release, or disposal of hazardous materials or petroleum products and their wastes on the properties.
- Define potential liabilities associated with real property transactions.
- Evaluate possible effects on property valuation caused by contamination or other identified concerns.

1.1.1 Content of Environmental Baseline Survey Report

The information contained in this EBS report was obtained through a records search, visual site inspections (VSIs), physical site inspections, and interviews. The records search included an analysis of historical aerial photographs (Attachment C) and a review of available regulatory agency records.

VSIs were performed in accordance with ASTM E1527-13 *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM, 2013). The inspection consisted of a visual examination of the subject properties.

The EBS also included an assessment of environmental conditions on properties within the ASTM standard radius search distance of the subject properties that could pose an environmental concern. As part of this assessment, reasonably ascertainable environmental databases were identified. Search radii were used to identify sites located in the general area of the subject properties. Adjacent properties were visually surveyed from accessible public areas as part of the EBS activities.

This EBS report specifically addresses the approximately 175-acre subject property, which is located in Sunspot, New Mexico. The general location and the subject property are illustrated in Figures 1-1 and 1-2.

Database and windshield surveys were conducted for several properties adjacent to the subject property. In addition, a records search was performed for properties within 1 mile of the subject property. The records and surrounding property evaluations are described in Sections 3 and 4, respectively.

Aerial photo source: Google ©2015, modified by CH2M HILL

North

0 250 500

Approximate scale in feet

FIGURE 1-1
Project Location Map
Baseline Divestment Studies
Sacramento Peak Observatory
Sunspot, New Mexico

ch2m

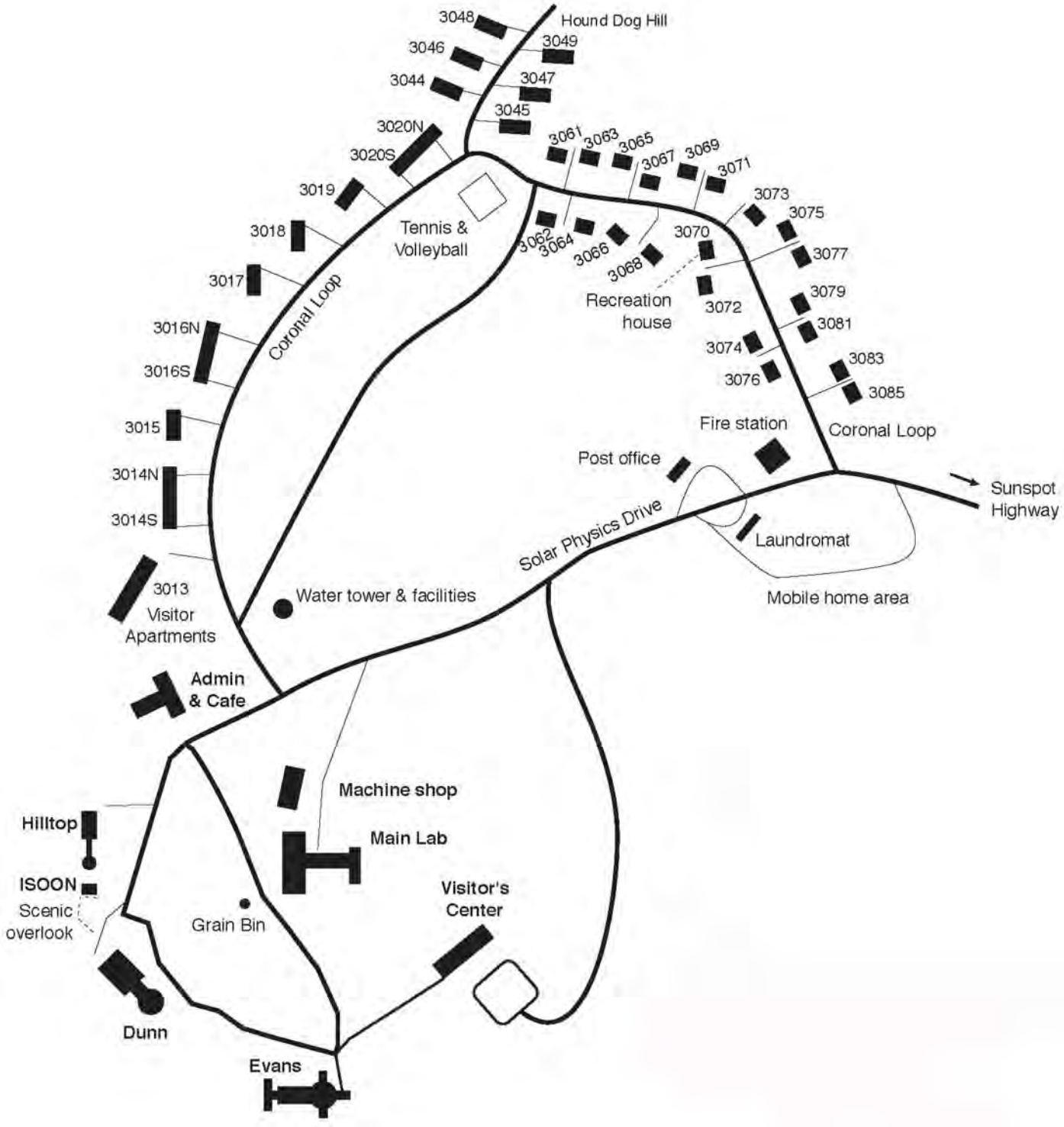

FIGURE 1-2
Subject Property
Baseline Divestment Studies
Sacramento Peak Observatory
Sunspot, New Mexico

1.2 Survey Methodology

1.2.1 Site Reconnaissance

VSIs were conducted January 26 through January 27, 2015. The VSIs included an escorted walk-through of accessible areas of buildings, facilities, and open areas. One of the primary objectives of the VSIs was to note visual evidence of contamination or potential sources of contamination, including leaks, spills, and any other evidence of past or current releases. Each of the existing buildings were visually inspected; however the interiors of occupied residential quarters, and several locked storage container buildings were not visually inspected.

1.2.2 Records Search and Review

The onsite records search was performed January 26 through January 27, 2015 and was facilitated by Mr. Rex Hunter and Mr. Jeff Roberts. They also provided environmental documentation and facilitated the visual inspection.

1.2.3 Interviews

Interviews were conducted January 26 through January 27, 2015 with the site personnel who were knowledgeable of the environmental issues with the subject property. Section 6 lists persons interviewed.

1.2.4 Review of Special Resources

There were no reviews of special resources.

1.3 Significant Assumptions

There are no significant assumptions.

1.4 Limitations, Exceptions, and Data Gaps

1.4.1 Limitations

The interior of some residential housing was not surveyed. The property line where there were no access roads was not viewed. Dense vegetation limited line of sight in some areas. No test pits were installed to inspect subsurface soil conditions. No sampling or analysis of any media was conducted during this survey.

This report has been prepared in compliance with ASTM E1527-13. In preparing this report, CH2M HILL has relied on certain information provided by federal, state, and local officials and other parties referenced herein, and on information contained in the files of governmental agencies that was reasonably ascertainable at the time of this assessment. Although there may have been some degree of overlap in the information provided by these various sources, an independent verification of the accuracy or completeness of all information reviewed or received during the course of this site assessment was not conducted.

1.4.2 Exceptions

There are no identified exceptions.

1.4.3 Data Gaps

According to § 3.2.20 of ASTM E1527-13, a data gap is a lack of or inability to obtain information required by the ASTM standard despite good faith efforts to gather the data. Data gaps may result from incompleteness in any of the activities required by the ASTM standard. A data gap is considered significant only if it affects the ability to identify recognized environmental conditions (RECs). Data gaps that were identified are listed in Table 1-1.

Table 1-1. Data Gaps
Environmental Baseline Study, Sacramento Peak Observatory, Sunspot, New Mexico

Data Gap	Explanation	Significance of Gap
Site History	Site history not available in 5-year intervals.	Low – Standard historical sources of information include aerial photographs, historical topographic maps, city directory abstracts, and Sanborn Fire Insurance Maps. Additional maps would not likely provide additional relevant information.
Ground Surface Visual Inspection	Portions of the ground surface were covered in snow and could not be viewed.	Low – Areas near the majority of structures and work areas were viewed.

SECTION 2

Site Description

This section describes the methodology used to assess the environmental baseline conditions. The process included a records search, VSIs, physical site inspections, and interviews.

2.1 Location and Legal Description

In 1950, NSF entered a land use agreement with the United States Department of Agriculture, Forest Service for the purpose of establishing conditions for the use of approximately 175 acres of National Forest land for the Sacramento Peak Observatory. The Sacramento Peak Observatory is located within an approximate 50,000 acre tract of land in the Lincoln National Forest for which the U.S. Air Force (USAF) secured a withdrawal from all forms of entry and appropriation under the laws of the U.S. by Public Land Order 656 on August 15, 1950 for the purpose of protecting Sacramento Peak Observatory from possible interference that might affect the use of the site for scientific purposes.

2.2 Current Use of the Subject Property

The subject property is currently used for solar astronomy observations, research, visitor education, and support activities including, administrative, maintenance, and housing. Building uses are listed in Table 2-1.

Table 2-1. Building Uses
Environmental Baseline Study, Sacramento Peak Observatory, Sunspot, New Mexico

Property ID	Description	Year Constructed	Area (SF)	Use
Commercial Buildings				
3004	Main Lab	1953	11,656	Office Space, Computing Facility, Library
3011	Storage	1951	1,204	Facilities Maintenance Storage
3012	Storage	1951	1,200	Community Shop, Storage
3008	Storage	1951	1,200	Electronics Storage
3024	Hazardous Storage	1958	80	Storage (Vacant)
3029	Furniture Storage	1951	1,176	Furniture Storage
3031	CE Shop	1953	2,745	Facilities Shops
3034	Paint Storage	1959	189	Paint/Hazardous Waste Storage
3036	Equipment Storage/ Salt Barn	1961	1,280	Equipment Storage
3037	Storage	1953	104	Facilities Maintenance Storage
3039	Weather Station	1955	139	Weather Station/Storage
3005	Machine/Electronics Shop	1953	6,536	Machine/Electronics Shops
3006	Welding Shop/Library	1962	1,200	Weld shop/Library Annex
3007	Paint Shop	1973	240	Paint Booth
3010	Community Center	1953	3,792	Kitchen, Office Space, Community Center
3032/3031	CE Shop	1953	8,704	Carpentry, Welding, Electrical Shops
3060	Laundromat	circa 1950s	1,015	Laundromat, Custodial Storage
3001	Visitor Center	1994	5,500	Visitor Center, Meeting Room
3038	Emergency Generator Building	1962	697	Emergency Generator Room
3053	Sewage Treatment Plant - Boiler Room	1953	256	Sewage Treatment
3054	Sewage Treatment Plant - Trickling Filter	1957	192	Sewage Treatment

Table 2-1. Building Uses

Environmental Baseline Study, Sacramento Peak Observatory, Sunspot, New Mexico

Property ID	Description	Year Constructed	Area (SF)	Use
3055	Sewage Treatment Plant - Valve Station	1961	120	Sewage Treatment
3056	Sewage Treatment Plant - Pump Station	1966	267	Sewage Treatment
3050	Water Well Building	N/A	104	Water Supply
3051	Water Well Building	N/A	104	Water Supply
N/A	Mercury Storage	N/A	120	Abandoned, To Be Disposed
N/A	Oil Storage	1995	625	Oil Storage
Housing				
3013	VOQ (Visitor Officers Quarters)	1953	7,820	Visitor Housing
3014ns	Redwood Family Housing (Duplex)	1953	3,416	Residential Housing
3015	Redwood Family Housing	1953	2,058	Residential Housing
3016ns	Redwood Family Housing (Duplex)	1953	3,416	Residential Housing
3017	Redwood Family Housing	1953	1,708	Residential Housing
3018	Redwood Family Housing	1953	1,708	Residential Housing
3019	Redwood Family Housing	1953	1,708	Residential Housing
3020ns	Redwood Family Housing (Duplex)	1953	3,416	Residential Housing
3044	Redwood Family Housing	1958	1,529	Residential Housing
3045	Redwood Family Housing	1958	1,529	Residential Housing
3046	Redwood Family Housing	1958	1,529	Residential Housing
3047	Redwood Family Housing	1958	1,529	Residential Housing
3048	Redwood Family Housing	1958	1,529	Residential Housing
3049	Redwood Family Housing	1958	1,529	Residential Housing
3061	Relocatable Family Housing	1964	1,170	Residential Housing
3062	Relocatable Family Housing	1964	1,170	Residential Housing
3063	Relocatable Family Housing	1964	1,170	Residential Housing
3064	Relocatable Family Housing	1964	1,170	Residential Housing
3065	Relocatable Family Housing	1964	1,170	Residential Housing
3066	Relocatable Family Housing	1964	1,170	Residential Housing
3067	Relocatable Family Housing	1964	1,170	Residential Housing
3068	Relocatable Family Housing	1964	1,170	Residential Housing
3069	Relocatable Family Housing	1964	1,170	Residential Housing
3070	Relocatable Family Housing/Library	1965	1,170	Residential Housing
3071	Relocatable Family Housing	1964	1,170	Residential Housing
3072	Relocatable Family Housing	1965	1,170	Residential Housing
3073	Relocatable Family Housing	1964	1,170	Residential Housing
3074	Relocatable Family Housing	1965	1,170	Residential Housing
3075	Relocatable Family Housing	1965	1,170	Residential Housing
3076	Relocatable Family Housing	1965	1,170	Residential Housing
3077	Relocatable Family Housing	1965	1,170	Residential Housing
3079	Relocatable Family Housing	1965	1,170	Residential Housing
3081	Relocatable Family Housing	1965	1,170	Residential Housing
3083	Relocatable Family Housing	1965	1,170	Residential Housing
3085	Relocatable Family Housing	1965	1,170	Visitor Housing
N/A	House Trailer	N/A	720	Abandoned, to be disposed

Table 2-1. Building Uses
Environmental Baseline Study, Sacramento Peak Observatory, Sunspot, New Mexico

Property ID	Description	Year Constructed	Area (SF)	Use
Telescope Facilities				
3000	John Evans Facility	1953	6,656	Solar observations/research
3002	Grain Bin Telescope	1953	250	Solar observations/research
3040	Hilltop Dome	1953	2,272	Solar observations/research
3042	Vacuum Tower Telescope (Dunn Telescope)	1968	10,330	Solar observations/research
3009	ISOON Building (Patrol Dome)	1960	468	Solar observations/research

SF = square feet

2.3 Description of Structures, Roads, and Other Improvements

The subject property consists of the buildings listed in Section 2.2. Further descriptions of buildings and structures can be found in the divestment study submitted under separate cover. Approximately 8,000 feet of fencing surrounds the main complex of the subject property and approximately 3.5 miles of roads are within the main complex including Sunspot Highway, Coronal Loop, and Visitors Center Road. Underground sewage system lines, water lines, and propane gas lines along with overhead power lines are throughout the main complex.

2.4 Site Utilities

The water service, sanitary sewer system, and electricity utility providers and the general stormwater flow for the subject property are discussed in this section.

2.4.1 Water Service

Two onsite drinking water wells provide water to the facilities on the subject property. The depths of the wells are approximately 380 feet below ground surface. Water is stored in two 10,000-gallon tanks next to the water treatment building. Water is also stored in a water tower.

2.4.2 Wastewater

Toilets, sinks, and interior floor drains flow to the sewage treatment plant. A grease trap was found in the kitchen, but it was not known whether it was still in service. Up to 10,000 gallons per day of domestic wastewater is received and treated using a mechanical treatment plant. Treated wastewater is discharged to approximately four acres of reuse area. (New Mexico Environment Department, 2014)

2.4.3 Stormwater

Stormwater runoff on the subject property generally flows down slopes and natural swales away from structures.

2.4.4 Electric

Electric service is provided by Otero County Electric Cooperative.

2.5 Current Use of the Adjoining Property

The adjoining property to the north, east, and west is the Lincoln Nation Forest land. The Apache Point Observatory is south of the subject property.

SECTION 3

Site History

In 1950, the USAF entered a land use agreement with the United States Department of Agriculture, Forest Service for the purpose of establishing conditions for the use of approximately 175 acres of National Forest land for the Sacramento Peak Observatory. Sacramento Peak Observatory is located with an approximate 50,000 acre circular tract of land inside Lincoln National Forest for which the USAF secured a withdrawal from all forms of entry and appropriation under the laws of the U.S. by Public Land Order 656 on August 15, 1950 for the purpose of protecting Sacramento Peak Observatory from possible interference that might affect the use of the site for scientific purposes.. In September 1952, the Sacramento Peak Upper Air Research Observatory began operation as an Air Force Cambridge Research Laboratory installation and was used as a solar research facility until July 1, 1976 when the facility was transferred from the USAF to the NSF. The NSF signed a memorandum of agreement with the U.S. Department of Agriculture, Forest Service, on July 20, 1980 establishing use conditions of the subject property. The subject property was under the operation of the Association of Universities for Research in Astronomy, Inc. The NSO is managed and operated by the Association of Universities for Research in Astronomy, Inc. In 1984, the NSO became an entity within the National Optical Astronomy Observatories (NOAO), which is also managed and operated by the Association of Universities for Research in Astronomy, Inc. In 2008, NSO was separated out from NOAO again.

3.1 Previous Environmental Reports

No previous EBS's performed at the subject property were located; however, the following information was found in other environmental reports:

- An Environmental Assessment for a project to connect Building 3000 to the sanitary sewer system was prepared by Frank A. Hegnier of the Sacramento Peak Observatory in 1979. The Environmental Assessment stated that photo processing chemicals were discharged to a chemical pond located behind Big Dome (John Evans Facility). It stated that chemicals and rinse water received no treatment and are allowed to flow into an inadequately designed and constructed pond. The wastewater was seeping through the dikes, impacting the surrounding wooded area (Hegnier, 1979).
- The U.S. Army Corps of Engineers, Albuquerque District, performed a Preliminary Assessment at the subject property in July of 1992. An oil disposal pit consisting of a subsurface gravel drain field existed in the maintenance area. NOAO maintenance personnel drained oil from two 2,477-cubic-inch emergency, diesel generators housed in Building 3038 into the pit through a 2-inch-diameter drain pipe. A 3-foot-diameter by 4-foot-long, open-ended concrete pipe, with the top of the concrete approximately 3 inches above grade level surrounds the drain pipe. The NOAO personnel estimated 240 gallons of oil entered into the pit before they capped the drain pipe and abandoned the pit. The U.S. Army Corp of Engineers estimated that the USAF may have drained over 2,000 gallons of oil into the pit during their occupation of the property (U.S. Army Corps of Engineers, 1991).
- An asbestos survey was performed in 1987. The results are summarized in Section 4.3.1.

3.2 Historical Use Information of the Subject Property

3.2.1 Aerial Photographs

Available historical aerial photographs from 1973 through 2011 were reviewed. Table 3-1 summarizes the aerial photographs reviewed for the property and surrounding area.

Table 3-1. Aerial Photographs
Environmental Baseline Study, Sacramento Peak Observatory, Sunspot, New Mexico

Year	Subject Property	Adjacent and Surrounding Properties
1973	The photograph is not clear. Faint images of structures are visible, including telescopes support facilities, and residential housing.	No surrounding structures or roads are visible except a heliport area to the northwest is visible.
1982	Same as 1973 photograph.	Same as 1973 photograph.
1988	Same as 1973 photograph.	Same as 1973 photograph.
1996	Same as 1973 photograph.	Same as 1973 photograph.
2003	All structures listed in Table 2.1 are visible. The Fire Station is also visible.	No surrounding structures or roads are visible.
2009	Same as 2003 photograph.	Same as 2003 photograph.
2011	Same as 2009 photograph.	Same as 2009 photograph.

Source: EDR, 2015c

3.2.2 Topographic Maps

Available topographic maps from 1914 through 2004 were reviewed. Table 3-2 summarizes the topographic maps reviewed for the property and surrounding area.

Table 3-2. Topographic Maps
Environmental Baseline Study, Sacramento Peak Observatory, Sunspot, New Mexico

Year	Subject Property	Adjacent and Surrounding Properties
1914	No development.	Several named canyons are in and around the subject property.
1950	A road to the property and a few structures are visible.	No surrounding structures or roads are visible.
1981	The Solar Observatory, Telescope Domes, and sewage disposal are labeled at the subject property. Wells 1 and 2 are labeled on the eastern part of the subject property.	A Heliport is to the northwest of the main complex. Cosmic Ray Observatory is to the northeast. A Radio tower and facility is to the north.
2004	Same as 1981 plus the Visitors Center building is present.	Same as 1981 plus Apache Point Observatory is visible to the south.

Source: EDR, 2015b

3.3 Environmental Records

CH2M HILL contracted with EDR of Milford, Connecticut, to perform a radius search of available regulatory agency environmental databases for listings of the subject property. The complete list of

databases included in the search is presented in Section 5. Table 3-3 presents the databases in which information for the subject property was found.

Table 3-3. EDR Database Listings

Environmental Baseline Study, Sacramento Peak Observatory, Sunspot, New Mexico

Site Name	Database(s)	Site Address	Location Relative to Site
Sacramento Peak Observatory	RCRA-SQG	3010 Coronal Loop, Sunspot, NW 88349	Target Property
Sacramento Peak Observatory	FINDS	3010 Coronal Loop, Sunspot, NW 88349	Target Property

SQG	Small Quantity Generator of hazardous waste
FINDS	Facility Index System/Facility Registry System
RCRA	Resource Conservation and Recovery Act

No RECs were identified from the search.

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SECTION 4

Findings: Subject Property

4.1 Environmental Setting

The subject property is located at the west end of Telescope Loop Road off of Sunspot Highway, Sunspot, New Mexico 88349 in Otero County. It is located at the following coordinates: Latitude 32° 47’ 23.28’’N and Longitude 105° 48’ 58.32’’W. The approximate elevation of the property is 9,113 feet above sea level. The subject property is approximately 175 acres in size.

4.1.1 Climate

Climate in the area is arid to semi-arid. According to the National Oceanic and Atmospheric Administration, the average monthly high temperature ranges from 19 degrees Fahrenheit in December to 73 degrees Fahrenheit in June. The annual average precipitation is about 30.4 inches (Western Regional Climate Center, 2009).

4.1.2 Land Use

The land surrounding the subject property is undeveloped forest areas near the south central portion of New Mexico. Both residents and tourists visit the subject property. The subject property layout is shown on Figure 1-2.

4.1.3 Regional Physiography, Geology, and Topography

The subject property is located within the Rio Grande Rift physiographic province in New Mexico. The Rio Grande Rift generally extends from the north to the south of the state due to the Colorado plateau pulling away from the High Plains, which causes the Earth’s crust to be pulled and thinned. To the north, the rift is narrow and consists of a series of westward stepping basins flanked by rugged mountains. To the south, the rift broadens significantly below Socorro and then merges with the basin and range province in southwestern New Mexico. Up to 15,000 feet of the rift sediment has accumulated in the axial basins of the Rio Grande rift, which forms important aquifers for some large cities in New Mexico (New Mexico Bureau of Geology and Mineral Resources, 2014).

Rock underlying the subject property is a stratified sequence in the lower part of the Leonardian series, permean system, from the Paleozoic era (EDR, 2015a).

Otero County is generally flat land in the Tularosa basin with elevation levels ranging from 3,623 feet to 5,000 feet with mountain peaks from 6,000 to 9,645 feet (U.S. Department of Agriculture, 1981). The general topography gradient across the subject property is from the northwest to the southeast. The approximate elevation of the property is 9,113 feet above mean sea level, but varies widely over short distances (EDR, 2015a).

4.1.4 Soils and Groundwater

Soil data from the U.S. Department of Agriculture Soil Conservation Service was not available for the subject property, however, according to the EDR report the property is underlain by a soil component called Argic Cryoborolls, which is a gravelly loam and is moderately well and well drained with course textures. Argic Cryoborolls soils are characterized as gravelly loam from 0 to 9 inches, very cobbly to sandy clay loam 9-19 inches, very gravelly to sandy clay loam 19 to 24 inches, very gravelly coarse sand 24 to 40 inches, and extremely cobbly to loamy coarse sand from 40 inches to 60 inches. Depth to bedrock is greater than 60 inches (EDR, 2015a).

The subject property is not located in the 100-year or 500-year flood zones, as defined by the Federal Emergency Management Agency (EDR, 2105a; Federal Emergency Management Agency, 2015).

According to the EDR report, no groundwater wells are listed as being located within 1 mile of the subject property. One public water supply well and an additional water well were identified to the southeast and northeast of the subject property respectively (EDR, 2015a). The public water supply well is the source of drinking water for the facilities on the subject property. The second well's listed use was for livestock watering.

4.1.5 Surface Water and Wetlands

A wetland and waterbody delineation and jurisdictional determination of Waters of the U.S. were not included in this effort. A desktop analysis was completed using U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory Wetlands Mapper (USFWS, 2015a), available aerial photography, and site visit observations to identify potential wetlands and waterbodies.

According to the USFWS Wetlands Mapper, the only mapped potential wetlands in the vicinity of the property are an approximately 0.15-acre unnamed freshwater pond, located approximately 2,000 feet east of the subject property. Additionally, an unnamed 18.35-acre riverine drainage is shown near the eastern boundary of the subject property (USFWS, 2015a). No other intermittent or perennial waterbodies were identified at the subject property during site visit observations or on the USFWS Wetlands Mapper.

4.1.6 Threatened and Endangered Species

Habitat assessments and species-specific surveys to determine the presence or absence of rare, threatened, or endangered (RTE) species were not included in this effort. Publicly available sources of information regarding federally-listed RTE species that may be found on or in the vicinity of the subject property were evaluated as part of a desktop review. The USFWS Endangered Species List was the primary source of information used for the desktop analysis. The USFWS has designated areas throughout New Mexico as critical habitat for several flora and fauna species. Critical habitat for the Mexican Spotted Owl (*Strix occidentalis lucida*) has been identified to occur within subject property (USFWS, 2015b).

Twelve RTE species are listed by the USFWS as potentially occurring in Otero County, New Mexico. A general habitat description and desktop evaluation of the potential utilization of the Sacramento Peak site by RTE species are summarized for each of the 12 species in Table 4-1. Surveys for RTE species or detailed habitat assessments were not included in this effort to determine if this species or the RTE species located in Otero County are present or are likely to use the subject property. Impacts to RTE species are unknown but are not anticipated because activities would be generally limited to previously disturbed areas within the subject property.

TABLE 4-1. Rare, Threatened, and Endangered Species Summary
Environmental Baseline Study, Sacramento Peak Observatory, Sunspot, New Mexico

Group	Name	Federal Status	Habitat Description / Location	Desktop Analysis
Bird	*(Sterna antillarum)* Least Tern	Endangered	Open, sandy, or gravelly beaches and shorelines	No Potential; No coastal areas to subject property
Bird	*(Strix occidentalis lucida)* Mexican Spotted Owl	Threatened	Old growth or mature forests; canyons with vertical cliffs and riparian and conifer communities. Water sources must be present	Potential; Proximity of subject property to area.

TABLE 4-1. Rare, Threatened, and Endangered Species Summary
Environmental Baseline Study, Sacramento Peak Observatory, Sunspot, New Mexico

Group	Name	Federal Status	Habitat Description / Location	Desktop Analysis
Bird	*(Falco femoralis septentrionalis)* Northern aplomado falcon	Experimental Population; Non-essential	Open areas with sparsely scattered trees and little ground cover	Potential; Proximity of subject property to area
Bird	*(Anthus spragueii)* Sprague's Pipit	Candidate	Open Prairie and grassland	Unlikely; Identified area is not proximate to subject property
Bird	*(coccyzus americanus)* Yellow-Billed Cuckoo	Threatened	In southwest, riparian woodlands, willows, cottonwood, and mesquite stands	Potential; Proximity of subject property to area
Flowering Plants	*(Echinocereus fendleri)* Kuenzler Hedgehog cactus	Endangered	Lower fringes of pinyon-juniper canyon (USFWS, 1985)	No Potential; Identified area is not proximate to subject property
Flowering Plants	*(Cirsium vinaceum)* Sacramento Mountains thistle	Threatened	Saturated soils near springs and seeps and streams (USFWS, 1993)	No Potential; Identified area is not proximate to subject property
Flowering Plants	*(Argemone pleiacantha ssp.)* Sacramento Prickly Poppy	Endangered	Primary habitat consists of limestone canyon bottom drainages, stream banks and seeps (USFWS, 1994).	No Potential; Identified area is not proximate to subject property
Flowering Plants	*(Hedeoma todsenii)* Todsen's pennyroyal	Endangered	Gypseous-limestone soils on north slopes of pinyon-juniper woodland (USFWS, 2001).	Unlikely; Identified area is not proximate to subject property
Flowering Plants	*(Cirsium wrightii)* Wright's Marsh Thistle	Candidate	Marshy wetlands near springs in generally semi-arid to arid areas (NatureServe, 2013).	No Potential; Identified area is not proximate to subject property
Mammals	*(Zapus hudsonius luteus)* New Mexico jumping mouse	Endangered	Along rivers and streams in riparian communities with emergent herbaceous vegetation (USFWS, 2015b)	No Potential; Identified area is not proximate to subject property
Mammals	*(Tamias minimus atristratus)* Penasco least chipmunk	Candidate	Non-forested areas dense herbaceous layer or forests with trees that do not have low hanging limbs (USFWS, 2014).	Potential; Proximity of subject property to area

Sources: USFWS, 2015b

4.2 Environmental Factors

The following sections discuss environmental factors that may affect the subject property.

4.2.1 Hazardous Material/Petroleum Product Management

The majority of hazardous materials and petroleum products are stored in the new hazardous material storage building or in aboveground storage tanks (ASTs) as described in Section 4.2.2. The hazardous materials storage building is a relatively new building with no assigned building number that replaced the smaller Building 3024. Smaller quantities of products were stored in flammable lockers at buildings where they were intend to be used. Hazardous material/petroleum product inventory lists were not available. However, the following materials were observed:

- The machine shop held three flammable lockers that contained paint, paint thinner, mineral spirits, and stain.
- The electrical shop had six gallons of refrigeration oil and four small cylinders of Freon.
- The paint storage building had numerous 1-gallon paint cans, 3 gallons of xylene, 1 gallon of ethyl methyl ketone, paint thinner, oil-based primer, and ceramic tile adhesive.
- The John Evans Facility had a 55-gallon drum of waste oil with mercury contamination, two large glycol tanks, and two flammable lockers containing acetic acid, grease, xylene, and cleaners.
- The laundromat stored cleaning supplies such as bleach, glass cleaner, and bathroom cleaner.
- The paint booth had spray paint, 1-gallon paint cans, and paint thinner.
- The Auto Shop had two unused parts washers (not used in at least 10 years according to interviews) and a flammable locker with wasps spray, brake cleaner, and starting fluid.
- The main laboratory had a plating shop that contained acids and plating solutions.
- The mercury storage building had two 2-gallon containers of mercury.
- The Vacuum Telescope (Dunn Telescope) contains 8 to 10 metric tons of mercury in a bearing located 193 feet below ground surface.
- The 3008 Quonset hut stored photo chemicals and also contained miscellaneous chemicals in small containers that were in the process of being sorted prior to disposal.
- The hazardous materials storage building is used for oil and lubricant storage. Four 55-gallon drums of oil, 12 5-gallon containers of various weight oils, 4 gallons of anti-freeze, and numerous small containers of oil were stored. A flammable locker also stored small containers of oil and lubricants. The building also held a 200-gallon waste oil storage tank and containers of used oil filters.

Gasoline and Diesel are stored in ASTs, as listed in Section 4.2.2.

No significant spills of hazardous materials or petroleum products were observed; however, the following staining was observed:

- Staining on the concrete floor in the hazardous material storage building
- Staining on warehouse concrete floor in the auto shop

Generated waste is stored in the waste accumulation area, located inside the hazardous material storage building. Waste includes a 250-gallon used oil AST and a 55-gallon drum containing oil filters.

4.2.2 Aboveground Storage Tanks

Fifteen ASTs, including water and propane tanks, are on the subject property and are described on Table 4-2.

Table 4-2. ASTs Located on the Subject Property
Environmental Baseline Study, Sacramento Peak Observatory, Sunspot, New Mexico

AST Location	Capacity (gallons)	Contents
Next to Water Treatment Building	10,000	Water
Next to Water Treatment Building	10,000	Water
Next to Emergency Generator Building	1,000	Gasoline
Next to Emergency Generator Building	1,000	Diesel
Next to Emergency Generator Building	100 (Day tank)	Diesel
Next to Emergency Generator Building	500	Diesel
Dunn Facility	1,000	Glycol
Propane Storage Yard	10,000	Propane
Propane Storage Yard	10,000	Propane
Propane Storage Yard	5,000	Propane
Propane Storage Yard	3,000	Propane
Sewage Treatment Plant	2,500	Propane
Visitors Center	500	Propane
Visitors Center	500	Propane
Trailer Loop	2,500	Propane

No leaks or stains were observed at any of the ASTs.

4.2.3 Underground Storage Tanks

No underground storage tanks (USTs) were identified to be located on the subject property. A septic tank behind Building 3000 is believed to have been removed when the building was connected to the sewage treatment system.

4.2.4 Environmental Investigations

An asbestos survey was performed in 1987. The results are summarized in Section 4.3.1.

4.3 Disclosure Factors

Disclosure factors are not regulated under CERCLA and, if properly managed, do not have an environmental impact on the subject property and do not affect the subject property categorization. However, their presence may result in an environmental concern if a release to the environment has occurred. Each of the disclosure factors are discussed in the following sections.

4.3.1 Asbestos-containing Materials

Renovation and demolition of buildings with asbestos-containing materials (ACMs) have the potential for releasing asbestos fiber into the air. Asbestos fibers could be released because of disturbance or damage to various building materials, such as pipe lagging, ceilings, floor tile, sheetrock, waterlines, and gasket material.

ACM surveys were performed in 1987 at the subject property. The ACM survey results are summarized in Table 4-3. According to interviews, no records of ACM abatement were known to exist, and it is unknown if ACM abatement was performed.

Table 4-3. Confirmed ACM
Environmental Baseline Study, Sacramento Peak Observatory, Sunspot, New Mexico

Building	ACM
Building 3013	Pipe insulation in the boiler room and distribution lines contain approximately 1,200 to 1,500 linear feet of high content asbestos insulation.
Building 3060	Approximately 60 ACM mud insulated tees and elbows and two water tanks are covered with approximately 30 SF of ACM.
Building 3004	The boiler room and the distribution system contained approximately 6,500 linear feet in molded or corrugated asbestos pipe insulation and approximately 6,000 SF of hard wall board.
Building 3000	Approximately 500 linear feet of pipe insulation
Building 3042	Mechanical system has fiberglass on the linear runs of piping with asbestos mud on approximately 1,500 to 1,600 fittings and approximately 300 pipe support sling blocks. The large water tank with an approximately 300 SF of trawled on 0.5-inch thick asbestos coating.
Building 3040	Approximately 40 linear feet of molded or corrugated pipe insulation
Building 3010	The boiler room contains approximately 40 linear feet of asbestos pipe insulation
Building T-3055	Approximately 10 linear feet of pipe insulation
Redwood Housing	In each house (duplex), 200 linear feet of corrugated paper pipe insulation and 20 fittings with asbestos mud.
Hound Dog Hill Housing	In each unit contained approximately 20 to 40 tees and elbows covered with the asbestos mud. Also paper around duct boxes contained asbestos.

Source: CERL. 1987. Asbestos Evaluation Report and Recommendation, NOAO, Sunspot, New Mexico.

4.3.2 Lead-based Paint

Lead is a heavy, ductile metal commonly found in association with organic compounds, oxides, salts, and metallic lead. Human exposure to lead has been classified as an adverse health risk by agencies such as the Occupational Safety and Health Administration and U.S. Environmental Protection Agency (USEPA). Sources of exposure to lead include paint, dust, and soil.

Exposure to lead-based paint (LBP) primarily presents a health concern to children, and its use was generally discontinued in 1978. The routine application of LBP in the past and the associated peeling or degradation of paint over time have created the potential for localized lead contamination in soils around buildings that were constructed before or during 1978.

No LBP surveys were reviewed. A majority of the buildings were built prior to 1978 and are likely to have LBP. Significant peeling paint was not observed during the site reconnaissance except at the Quonset hut Buildings and Buildings 3008, 3011, 3012, and 3029.

4.3.3 Polychlorinated Biphenyls

Electrical transformers, capacitors, switches, light ballasts, and machinery with hydraulic systems are potential sources of Polychlorinated Biphenyls- (PCB-) containing oil. No PCB survey reports were available for review.

Six pole-mounted transformer located near the maintenance area were not labeled as to whether they contain PCBs. Additionally, 3 disconnected transformers are located near the new transformers at the maintenance area staged on the ground. No leaks or stressed vegetation were observed near the transformers. The transformers are owned and maintained by Otero County electric Cooperative.

Light ballasts in the buildings were not checked to determine if they contain PCBs.

4.3.4 Radon

Radon testing has not been performed at the subject property. Federal USEPA Radon Zone for Otero County, New Mexico is Zone 2 (indoor average level >= 2 picocuries per liter [pCi/L] and <= 4 pCi/L).

4.3.5 Medical/Biohazardous Waste

From the records search and interviews, no medical or biohazardous waste was found to be stored on the subject property.

4.3.6 Munitions and Explosives of Concern

From the records search and interviews, no munitions and explosive of concern are on the subject property.

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SECTION 5

Findings: Adjacent Properties

5.1 Land Use

The subject property is located within the Lincoln National Forest. Most surrounding lands are undeveloped forest land. The Apache Point Observatory is approximately 0.5-miles south of the subject property.

5.2 Surveyed Properties

CH2M HILL contracted with EDR of Milford, Connecticut, to perform a radius search of available regulatory agency environmental databases for listings of adjacent properties. The complete list of databases included in the search is presented in this section along with the findings of adjacent properties that appeared in the databases. The specific radii are identified according to source in the complete database search, provided in Attachment B. Additional sources of information includes Google Earth™.

The following databases were searched and provided in the EDR report to identify generators and transporters of hazardous wastes; hazardous waste treatment, storage, and disposal facilities; and sites where releases of hazardous materials have been reported.

No adjacent properties were identified in the records searched within 1 mile from the subject property boundary. Searches ranged from the location of the subject property to 1 mile from the subject property location. The EDR report did not identify any orphan properties (unknown locations). The only listings identified were the subject property as shown in Table 3-3.

5.2.1 Federal Databases

- USEPA National Priorities List (NPL) of uncontrolled or abandoned hazardous waste sites identified for priority remedial action (last updated 12/16/14)
- USEPA Delisted NPL site list (last updated 12/16/14)
- USEPA Proposed NPL site list (last updated 12/16/14)
- USEPA Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list of sites that either are proposed for or are on the NPL and sites that are in the screening and assessment phase for possible inclusion on the NPL (last updated 10/25/13)
- Federal Facility site listing of NPL and Base Realignment and Closure (BRAC) sites found in CERCLIS database (last updated 07/21/14)
- CERCLIS No Further Remedial Action Planned sites where, following an initial investigation, no contamination was found, contamination was removed quickly, or the contamination was not serious enough to require federal Superfund action or NPL consideration (last updated 10/25/13)
- USEPA database of RCRA facilities that are undergoing corrective action (CORRACTS)because there has been a release of hazardous waste or constituents into the environment from a RCRA facility (last updated 12/09/14)
- Treatment, storage, and disposal facilities (RCRA-TSDF) (last updated 12/09/2014)
- USEPA RCRA large-quantity, small-quantity, and conditionally exempt small-quantity generators (last updated 12/09/2014)

- U.S. Engineering Controls: Federal institutional control and engineering control registries (last updated 09/18/2014)
- Land Use Control Information System (LUCIS) records pertaining to former Navy Base Realignment and Closure sites (last updated 12/03/2014)
- Federal Emergency Response Notification System (ERNS) list of reported accidental releases of oil and hazardous substances (last updated 9/29/14)
- Federal Emergency Management Agency UST locations (last updated 01/01/10)
- U.S. Brownfields (last updated 12/22/14)
- Open Dump Inventory (ODI) (last updated 06/30/1985)
- U.S. Clandestine Drug Labs (US CDL) Drug Enforcement Administration (last updated 11/10/14)
- LIENS2 is the CERCLA Lien Information database (last updated 02/18/14)
- USEPA database of Superfund Consent Decrees (last updated 12/31/13)
- Records of Decision that document permanent remedies at an NPL site (last updated 11/25/13)
- USEPA Toxic Substances Control Act (TSCA) database, which identifies manufacturers and importers of chemical substances (last updated 12/31/2012)
- USEPA Office of Prevention, Pesticides and Toxic Substances Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA)/Federal TSCA Tracking System (FTTS), which tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA, and the Emergency Planning and Community Right-to-Know Act (last updated 10/19/2006)
- U.S. Mines Master Index File Department of Labor (last updated 12/30/2014)
- Section 7 Tracking Systems reports types and amounts of pesticides, active ingredients, and devices produced (last updated 12/31/2009)
- National Clandestine Laboratory Registry (US HIST CDL) for either clandestine drug laboratories or dump sites (last updated 11/10/2014)
- U.S. Department of Transportation (DOT) Hazardous Materials Information Reporting System(HMIRS), which contains hazardous material spill incidents reported to DOT (last updated 06/30/14)
- USEPA database of RCRA facilities that currently do not generate hazardous waste (RCRA-NonGen) (last updated 12/09/14)
- USEPA Records of Decision (ROD) database (last updated 11/25/13)
- U.S. DOT Office of Pipeline Safety (OPS) Incident and Accident Data (last updated 07/31/12)
- U.S. Department of Defense Sites (DOD) (last updated 12/31/2005)
- U.S. Army Corps of Engineers Former Used Defense Sites (FUDS) (last updated 06/06/2014)
- USEPA database of Superfund Consent Decrees (CONSENT) (last updated 12/31/13)
- Uranium Mill Tailings Sites (UMTRA) locations (last updated 09/14/2010)
- Emergency Planning and Community Right-to-Know Act inventory of toxic chemical emissions (Toxic Release Inventory System [TRIS]) (last updated 12/31/2011)
- Integrated Compliance Information System (ICIS) national enforcement and compliance program for the National Pollutant Discharge Elimination System (NPDES) (last updated 07/31/2014)

- USEPA PCB Activity Data Systems (PADS), which identifies transporters, commercial stores, and/or brokers, and disposers of PCBs who are required to notify USEPA (last updated 07/01/14)
- USEPA Material Licensing Tracking System (MLTS), maintained by the Nuclear Regulatory Commission, maintains list of sites that possess or use radioactive materials (last updated 12/29/14)
- Radiation Information Database (RADINFO) facilities regulated by USEPA for radiation and radioactivity (last updated 10/07/14)
- USEPA Facility Index System (FINDS) that contains information and "pointers" to other sources that contain more detail, including permit compliance system (PCS), Aerometric Information Retrieval System (AIRS), Enforcement Docket (DOCKET), Federal Underground Injection Control (FURS), Criminal Docket (C-DOCKET), Federal Facilities Information System (FFIS), state environmental laws and statutes (STATE), and PCB activity data system (PADS) (last updated 08/16/14)
- RCRA Administrative Action Tracking System (RAATS) contains records based on enforcement actions (last updated 04/17/1995)
- USEPA Risk Management Plans (RMP) chemical accident prevention at facilities using extremely hazardous substances (last updated 08/01/2014)
- USEPA Biennial Reporting System (BRS) database, which collects detailed data regarding large-quantity generators and treatment, storage, and disposal facilities (last updated 12/31/2011)
- USEPA 2020 Corrective Action List, (COR ACTION) a RCRA cleanup baseline includes facilities expected to need corrective action (last updated 11/11/2011)
- USEPA Lead Smelter Sites a listing of former lead smelter locations (last updated 11/25/14)
- USEPA Potentially Responsible Parties (PRP) a listing of verified potential responsible parties (last updated 10/25/13)
- USEPA Financial Assurance Information (US FIN ASSUR) facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the cleanup, closure, and post-closure care (last updated 11/19/14)
- Steam-Electric Plan Operation Data (COAL ASH DOE) listing of power plants that store ash in surface ponds (last updated 12/31/2005)
- US AIRS (AFS) Aerometric Information Retrieval System Facility Subsystem contains compliance data on air pollution sources (last updated 10/16/2014)
- US AIRS MINOR Air Facility Systems Data is a listing of minor source facilities (last updated 10/16/2014)
- Coal combustion residues surface impoundments (COAL ASH EPA) list (last updated 07/01/2014)
- PCB Transformer Database (PCB TRANSFORMER) registration database (last updated 02/01/2011)
- USEPA Watch List on enforcement matters (last updated 08/30/2013)

5.2.2 State and Tribal Databases

- Indian Reservation Locations (INDIAN RESERV) (last updated 12/31/2005)
- Federally and Indian administrated lands (FEDLAND) (last updated 12/31/2005)
- Indian Leaking UUSTs (INDIAN LUST) for USEPA Region 9 (last updated 01/08/2015)
- Indian USTs (INDIAN UST) for USEPA Region 9 (last updated 11/13/2014)

- Indian Report on the Status of Open Dumps on Indian Land (INDIAN ODI) (last updated 12/31/1998)
- State Cleanup Sites Listing (SCS) contains state cleanup sites that fall under the state's Water Quality Control Commission Regulations (last updated 11/02/2014)
- Solid Waste Facilities/Landfill Sites (SWF/LF) contains an inventory of solid waste disposal facilities or landfills in New Mexico (last updated 08/15/2013)
- Leaking Underground Storage Tank (LUST) database contains an inventory of reported LUST incidents (last updated 08/01/2006)
- Leaking Aboveground Storage Tank Listing (LAST) database contains an inventory of leaking aboveground storage tank sites (last updated 05/01/2006)
- Leaking Storage Tank Listing (LTANKS) database contains an inventory of leaking storage tank sites (last updated 05/02/2014)
- Aboveground and Underground Storage Tank Site Locations (TANKS) database contains an inventory of aboveground and underground storage tank sites (last updated 07/03/2014)
- Underground Storage Tank Site Locations (UST) database contains an inventory of underground storage tank sites (last updated 08/01/2006)
- Aboveground Storage Tank Site Locations (AST) database contains an inventory of aboveground storage tank sites (last updated 08/01/2006)
- State institutional control (INST CONTROL) registries (last updated 12/31/2014)
- Voluntary Cleanup, Oversight, and Assistance Program (VCP) allows the opportunity to work proactively with state government to address necessary cleanup of a property to return it to productive use (last updated 12/31/2014)
- Brownfields listings in New Mexico (last updated 10/01/2014)
- Recycling Facility Listing (SWRCY) in New Mexico (last updated 08/15/2013)
- Asbestos Listing of Demolition and Renovation Jobs (ASBESTOS) in New Mexico (last updated 04/01/2007)
- State Clandestine Drug Labs (CDL) New Mexico Environment Department (last updated 07/11/2013)
- State Dry Cleaners Listing (DRYCLEANERS) of locations that use perchloroethylene (last updated 01/06/2010)
- Coal mines permits database (COAL MINES) (last updated 07/13/2012)
- Coal mines permit boundaries (COAL MINES2) (last updated 06/12/2013)
- State Spills (SPILLS) listing of spills locations (last updated 12/31/2014)
- State Coalition for remediation of drycleaners (SCRD DRYCLEANERS) (last updated 03/07/2011)
- National Pollutant Discharge Elimination System (NPDES) permitted wastewater discharges (last updated 10/20/2014)
- AIRS contains a list of permitted sources by the New Mexico (last updated 01/26/2015)
- Financial Assurance Information (FIN ASSURANCE 1) information for underground solid waste facilities (last updated 12/03/2012)
- Financial Assurance Information (FIN ASSURANCE 2) information for underground hazardous waste facilities (last updated 11/12/2014)

SECTION 6

Interviews

Interviews were conducted January 26 through January 27, 2015, with the personnel listed in Table 6-1.

Table 6-1. Personnel Interviewed during the Site Visit
Environmental Baseline Study, Sacramento Peak Observatory, Sunspot, New Mexico

Personnel	Title or Department	Years at Property	Information or Services Provided
Mr. Rex Hunter	Business & Facilities Manager/NSO	25	Provided historical documentation related to the subject property. Escorted the field team during the site reconnaissance.
Mr. Jeff Roberts	Administration Manager/NSO	3	Escorted the field team during the site reconnaissance.
Mr. Bruce Smaga	Facilities Maintenance Manager/NSO	30	Provided historical documentation related to the subject property. Escorted the field team during the site reconnaissance.
Mr. Kim Streander	Synoptic Program Manager/ NSO	6	Worked at the photo lab from 1979 to 1985. Stated that the photo development wastewater was drained to a chemical pond behind Building 3000.

Information gathered from the interviews is presented within the other sections of this report.

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SECTION 7

Findings and Conclusions

This section consolidates the findings presented in Sections 4 and 5 in accordance with ASTM E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.*

The findings of this EBS report were based on reasonably available environmental information; interviews with site, state, and local personnel; a review of previous environmental studies; and federal and state database and file information related to the storage, release, treatment, or disposal of hazardous substances or petroleum products. Results were also based on visual observations of the subject property and adjacent properties.

7.1 Recognized Environmental Conditions

RECs are defined as the presence or likely presence of a hazardous substance or petroleum product on the property under conditions that indicate an existing release, a past release, or material threat of a release of hazardous substances or petroleum products into the structures of the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with applicable laws. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be subject to enforcement action if brought to the attention of the appropriate government agencies. The following RECs were found on the subject property:

- Soil impacts are possible at the wastewater treatment discharge area. All wastewater from the subject property facilities, including sinks from laboratories, discharges to the sanitary sewer system (except prior to the Evans Facility being connected to the sewage system). Facilities connected also include maintenance facilities and photograph process facilities in addition to the laboratories. The treatment plant discharges the treated effluent onto a 4-acre parcel of property via a series of perforated pipes at ground surface. In fiscal year 2008 sampling of the treatment plant discharge detected exceedances of BTEX and chlorinated solvents. Other than the one reported sampling event with VOC exceedances, only Total Haloacetic Acids (HAA5) exceedances were reported in the database search. No records of any repeat sampling, further studies, or cleanup activities were identified or available.
- Based on the 1979 Environmental Assessment, photo processing chemicals were discharged to a chemical pond located behind Big Dome (John Evans Facility). Chemicals and rinse water received no treatment and are allowed to flow into an inadequately designed and constructed pond. The wastewater seeped through the dikes impacting the surrounding wooded area. No records of any cleanup activities were identified or available; however, the pond no longer exists.
- Based on a Preliminary Assessment of the subject property performed in July 1992, an oil disposal pit consisting of a subsurface gravel drain field existed in the maintenance area. NOAO maintenance personnel historically drained oil from two 2,477-cubic-inch emergency, diesel generators housed in Building 3038 into the pit through a 2-inch-diameter drain pipe. The NOAO personnel estimated 240 gallons of oil entered into the pit before they capped the drain pipe and abandoned the pit. The U.S. Army Corp of Engineers estimated that the USAF may have drained over 2,000 gallons of oil into the pit during their occupation of the site. No records of any cleanup activities were identified or available.

7.2 Historical Recognized Environmental Conditions

A Historical Recognized Environmental Condition (HREC) is one that in the past would have been considered a REC but which is not currently considered a REC. If a past release of a hazardous substance or petroleum product has occurred in connection with the subject property and has been remediated, with such remediation accepted by a responsible regulatory agency, that condition is considered an HREC. No HRECs were identified on the subject property during this evaluation.

7.3 Controlled Recognized Environmental Conditions

A Controlled Recognized Environmental Condition is defined in the ASTM guidelines as an REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (as evidenced by the issuance of a no further action letter or equivalent, or meeting risk-based criteria established by regulatory authority), with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (such as, property use restrictions, activity use limitations, institutional controls, or engineering controls).

This evaluation did not identify any Controlled Recognized Environmental Conditions on the subject property.

7.4 *De Minimis* Conditions

De minimis conditions are conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be subject to an enforcement action if brought to the attention of the appropriate government agencies. Conditions determined to be *de minimis* are not RECs. The following *de minimis* conditions were identified on the subject property:

- Staining on the concrete floor in the hazardous material storage building.
- Stain on Auto Shop building floor appeared to be petroleum.

7.5 Other Conditions of Note

The following are other conditions on the subject property that are not considered RECs, but are worth disclosing:

- Six pole-mounted transformers located near the maintenance area were not labeled as to whether they contain PCBs. Additionally, 3 disconnected transformers are located near the new transformers at the maintenance area staged on the ground. No leaks or stressed vegetation were observed near the transformers.
- Asbestos was reported to be in Buildings 3000, 3004, 3010, 3013, 3040, 3042, 3060, T3055, and all of the housing. No abatement records were found.
- No LBP surveys were reviewed. A majority of the buildings were built prior to 1978 and are likely to have LBP.
- The Vacuum Tower Telescope (Dunn Telescope) contains approximately 8 to 10 metric tons of mercury in a bearing located 193 feet below ground surface. The mercury would need to be properly disposed if the telescope is dismantled.

SECTION 8

Certification for the Sacramento Peak EBS

CH2M HILL has performed an EBS for the approximately 175-acre subject property located in Sunspot, New Mexico. We reviewed all of the appropriate records that were made available and conducted site inspections of the facility. The information in this EBS report is based on records made available and, to the best of CH2M HILL's knowledge, is correct and current as of March 2015.

We declare that, to the best of our professional knowledge and belief, we meet the definition of environmental professional as defined in §312.10 of 40 *Code of Federal Regulations* Part 312, and we have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject properties. We have developed and performed all of the appropriate inquiries in conformance with the standards and practices set forth in 40 *Code of Federal Regulations* Part 312.

_____ _____

Michael Brose
Environmental Scientist
CH2M HILL

Date

_____ _____

David Stieb
Senior Technical Reviewer
CH2M HILL

Date

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SECTION 9

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Attachment A
Site Reconnaissance Photographs

Photo 1: Water well #1 facing east

Photo 2: Water well #2 facing south

Photo 3: Wastewater treatment facility facing west

Photo 4: Wastewater pump house facing north

Photo 5: Propane tank at wastewater treatment facility facing north

Photo 6: Wastewater discharge perforated piping facing northwest

Photo 7: Wastewater discharge perforated piping facing west

Photo 8: Supply water treatment chlorination tank

Photo 9: Propane tank yard facing northeast

Photo 10: Junkyard facing east

Photo 11: Fuel tanks facing west

Photo 12: Backup generator building facing west

Photo 13: Backup generator

Photo 14: Transformers next to generator building facing west

Photo 15: Paint storage building facing north

Photo 16: Inside paint storage building

Photo 17: Drywell location next to the generator building

Photo 18: Machine shop facing south

Photo 19: Flammable locker inside machine shop

Photo 20: Flammable lockers inside machine shop

Photo 21: Used oil tank inside hazardous waste building

Photo 22: Used oil filters inside hazardous waste building

Photo 23: Petroleum storage inside hazardous waste building

Photo 24: Hazardous waste storage building (left bay) and ground maintenance (right bay)

Photo 25: Former hazardous waste shed (empty)

Photo 26: Maintenance equipment storage and office facing northwest

Photo 27: Maintenance garage facing northwest

Photo 28: Inside maintenance garage facing northwest

Photo 29: Library and welding shop building facing northwest

Photo 30: Paint booth facing north

Photo 31: Inside paint booth

Photo 32: Waste drum inside paint booth

Photo 33: Welding shop

Photo 34: Main laboratory (far back) and maintenance shop (right) facing south

Photo 35: Flammable locker inside main lab

Photo 36: Flammable locker inside main lab

Photo 37: Flammable locker inside main lab

Photo 38: Battery charging area in main lab

Photo 39: Plating shop in main lab

Photo 40: Chemicals in plating shop

Photo 41: Suspected asbestos-containing material in main lab

Photo 42: Former photo lab in main lab

Photo 43: Film storage room

Photo 44: Main laboratory facing north

Photo 45: Grain Bin Telescope facing west

Photo 46: Visitors center facing northeast

Photo 47: Dunn Solar Telescope facing northwest

Photo 48: Empty drum inside Dunn Solar Telescope

Photo 49: Flammable lockers and nitrogen tanks inside Dunn Solar Telescope

Photo 50: Mirror coating tank inside Dunn Solar Telescope

Photo 51: Glycol tank inside Dunn Solar Telescope

Photo 52: Flammable and corrosive lockers at Dunn Telescope building

Photo 53: Former ISOON telescope building facing west

Photo 54: Weather station facing west

Photo 55: Hilltop Telescope

Photo 56: Film development room in Hilltop Telescope building

Photo 57: Evans Telescope facing south

Photo 58: Mercury storage building facing south

Photo 59: Inside mercury storage building

Photo 60: Administration and café building facing north

Photo 61: Grease trap in café kitchen

Photo 62: Quonset hut used for pottery

Photo 63: Inside Quonset hut used for pottery

Photo 64: Quonset hut near administration building facing northeast

Photo 65: Chemicals for disposal inside Quonset hut near administration building

Photo 66: Film chemical inside Quonset hut near administration building

Photo 67: Storage Quonset hut

Photo 68: Paint peeling inside storage Quonset hut

Photo 69: Quonset hut near housing area facing north

Photo 70: Inside Quonset hut near residential area

Photo 71: Laundry building facing southeast

Photo 72: Cleaning products inside laundry building

Photo 73: Trailer facing south

Photo 74: Typical residential housing

Photo 75: Fire station facing north

Photo 76: Post office facing north

Attachment B
Environmental Data Resources, Inc., Radius Map Reports with Geocheck

NSF - Sacramento Peak Observatory
Sunspot
Cloudcroft, NM 88317

Inquiry Number: 4218013.2s
March 02, 2015

The EDR Radius Map™ Report with GeoCheck®

Prepared using the EDR FieldCheck® System

EDR® Environmental Data Resources Inc

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Detail Map	3
Map Findings Summary	4
Map Findings	7
Orphan Summary	9
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GEOCHECK ADDENDUM

Physical Setting Source Addendum	A-1
Physical Setting Source Summary	A-2
Physical Setting Source Map	A-7
Physical Setting Source Map Findings	A-8
Physical Setting Source Records Searched	PSGR-1

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of the environmental records was conducted by Environmental Data Resources, Inc. (EDR). CH2M HILL, INC. used the EDR FieldCheck System to review and/or revise the results of this search, based on independent data verification by CH2M HILL, INC.. The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

SUNSPOT
CLOUDCROFT, NM 88317

COORDINATES

Latitude (North):	32.7898000 - 32° 47' 23.28''
Longitude (West):	105.8162000 - 105° 48' 58.32''
Universal Tranverse Mercator:	Zone 13
UTM X (Meters):	423571.0
UTM Y (Meters):	3628089.0
Elevation:	9113 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	32105-G7 SACRAMENTO PEAK, NM
Most Recent Revision:	1981

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20110521
Source:	USDA

TARGET PROPERTY SEARCH RESULTS

The target property was identified in the following records. For more information on this property see page 7.

Site	Database(s)	EPA ID
NATIONAL SOLAR LABORATORY 3010 CORONAL LOOP SUNSPOT, NM 88349	RCRA-SQG FINDS	NMR000018499

EXECUTIVE SUMMARY

DATABASES WITH NO MAPPED SITES

No sites were identified in following databases.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ---- National Priority List
Proposed NPL ---- Proposed National Priority List Sites
NPL LIENS ---- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---- National Priority List Deletions

Federal CERCLIS list

CERCLIS ---- Comprehensive Environmental Response, Compensation, and Liability Information System
FEDERAL FACILITY ---- Federal Facility Site Information listing

Federal CERCLIS NFRAP site List

CERC-NFRAP ---- CERCLIS No Further Remedial Action Planned

Federal RCRA CORRACTS facilities list

CORRACTS ---- Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ---- RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ---- RCRA - Large Quantity Generators
RCRA-CESQG ---- RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

US ENG CONTROLS ---- Engineering Controls Sites List
US INST CONTROL ---- Sites with Institutional Controls
LUCIS ---- Land Use Control Information System

Federal ERNS list

ERNS ---- Emergency Response Notification System

State- and tribal - equivalent CERCLIS

SHWS ---- This state does not maintain a SHWS list. See the Federal CERCLIS list and Federal NPL list.
SCS ---- State Cleanup Sites Listing

EXECUTIVE SUMMARY

State and tribal landfill and/or solid waste disposal site lists

SWF/LF ---------- Solid Waste Facilities

State and tribal leaking storage tank lists

LUST ---------- Leaking Underground Storage Tank Prioritization Database
LTANKS ---------- Leaking Storage Tank Listing
LAST ---------- Leaking Aboveground Storage Tank Sites
INDIAN LUST ---------- Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

TANKS ---------- Storage Tank Facility Listing
UST ---------- Listing of Underground Storage Tanks
AST ---------- Aboveground Storage Tanks List
INDIAN UST ---------- Underground Storage Tanks on Indian Land
FEMA UST ---------- Underground Storage Tank Listing

State and tribal institutional control / engineering control registries

INST CONTROL ---------- Sites with Institutional Controls

State and tribal voluntary cleanup sites

INDIAN VCP ---------- Voluntary Cleanup Priority Listing
VCP ---------- Voluntary Remediation Program Sites

State and tribal Brownfields sites

BROWNFIELDS ---------- Brownfields Site Listing

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ---------- A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9 ---------- Torres Martinez Reservation Illegal Dump Site Locations
ODI ---------- Open Dump Inventory
SWRCY ---------- Recycling Facility Listing
INDIAN ODI ---------- Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL ---------- Clandestine Drug Labs
CDL ---------- Clandestine Drug Laboratory Listing
US HIST CDL ---------- National Clandestine Laboratory Register

Local Land Records

LIENS 2 ---------- CERCLA Lien Information

EXECUTIVE SUMMARY

Records of Emergency Release Reports

HMIRS	Hazardous Materials Information Reporting System
SPILLS	Spill Data

Other Ascertainable Records

RCRA NonGen / NLR	RCRA - Non Generators / No Longer Regulated
DOT OPS	Incident and Accident Data
DOD	Department of Defense Sites
FUDS	Formerly Used Defense Sites
CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision
UMTRA	Uranium Mill Tailings Sites
US MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
SSTS	Section 7 Tracking Systems
ICIS	Integrated Compliance Information System
PADS	PCB Activity Database System
MLTS	Material Licensing Tracking System
RADINFO	Radiation Information Database
RAATS	RCRA Administrative Action Tracking System
RMP	Risk Management Plans
DRYCLEANERS	Drycleaner Facility Listing
NPDES	List of Discharge Permits
AIRS	Airs Information
ASBESTOS	List of Asbestos Demolition and Renovations Jobs
INDIAN RESERV	Indian Reservations
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
MINES	Coal Mine Permits Database
COAL ASH DOE	Steam-Electric Plant Operation Data
PRP	Potentially Responsible Parties
2020 COR ACTION	2020 Corrective Action Program List
Financial Assurance	Financial Assurance Information
PCB TRANSFORMER	PCB Transformer Registration Database
LEAD SMELTERS	Lead Smelter Sites
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
US AIRS	Aerometric Information Retrieval System Facility Subsystem
US FIN ASSUR	Financial Assurance Information
EPA WATCH LIST	EPA WATCH LIST

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP	EDR Proprietary Manufactured Gas Plants
EDR US Hist Auto Stat	EDR Exclusive Historic Gas Stations
EDR US Hist Cleaners	EDR Exclusive Historic Dry Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LUST	Recovered Government Archive Leaking Underground Storage Tank

EXECUTIVE SUMMARY

RGA LF---------- Recovered Government Archive Solid Waste Facilities List

SURROUNDING SITES: SEARCH RESULTS

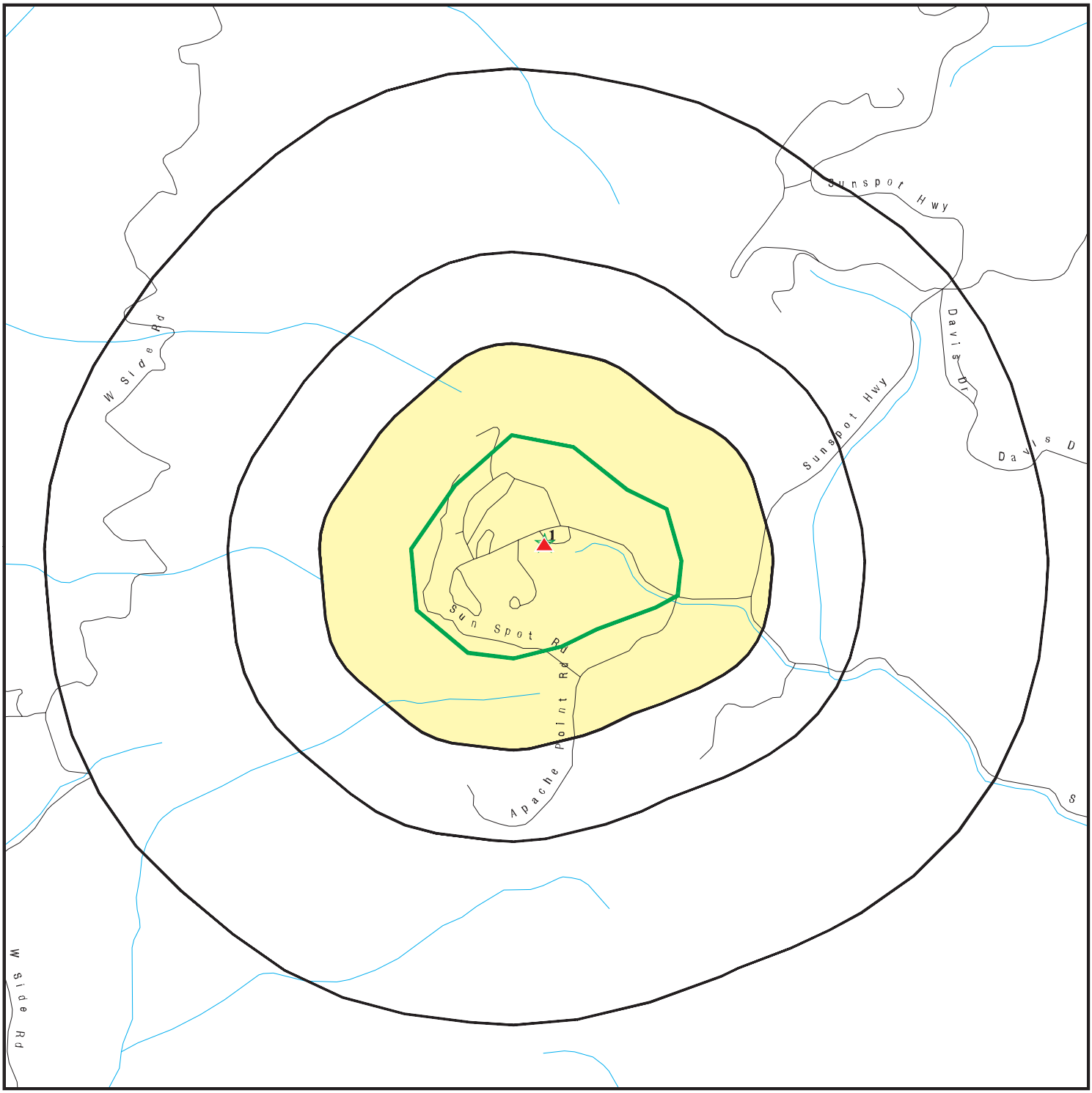
Surrounding sites were not identified.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 4218013.2S



Target Property
Sites at elevations higher than or equal to the target property
Sites at elevations lower than the target property
Manufactured Gas Plants
National Priority List Sites
Dept. Defense Sites

0 1/4 1/2 1 Miles

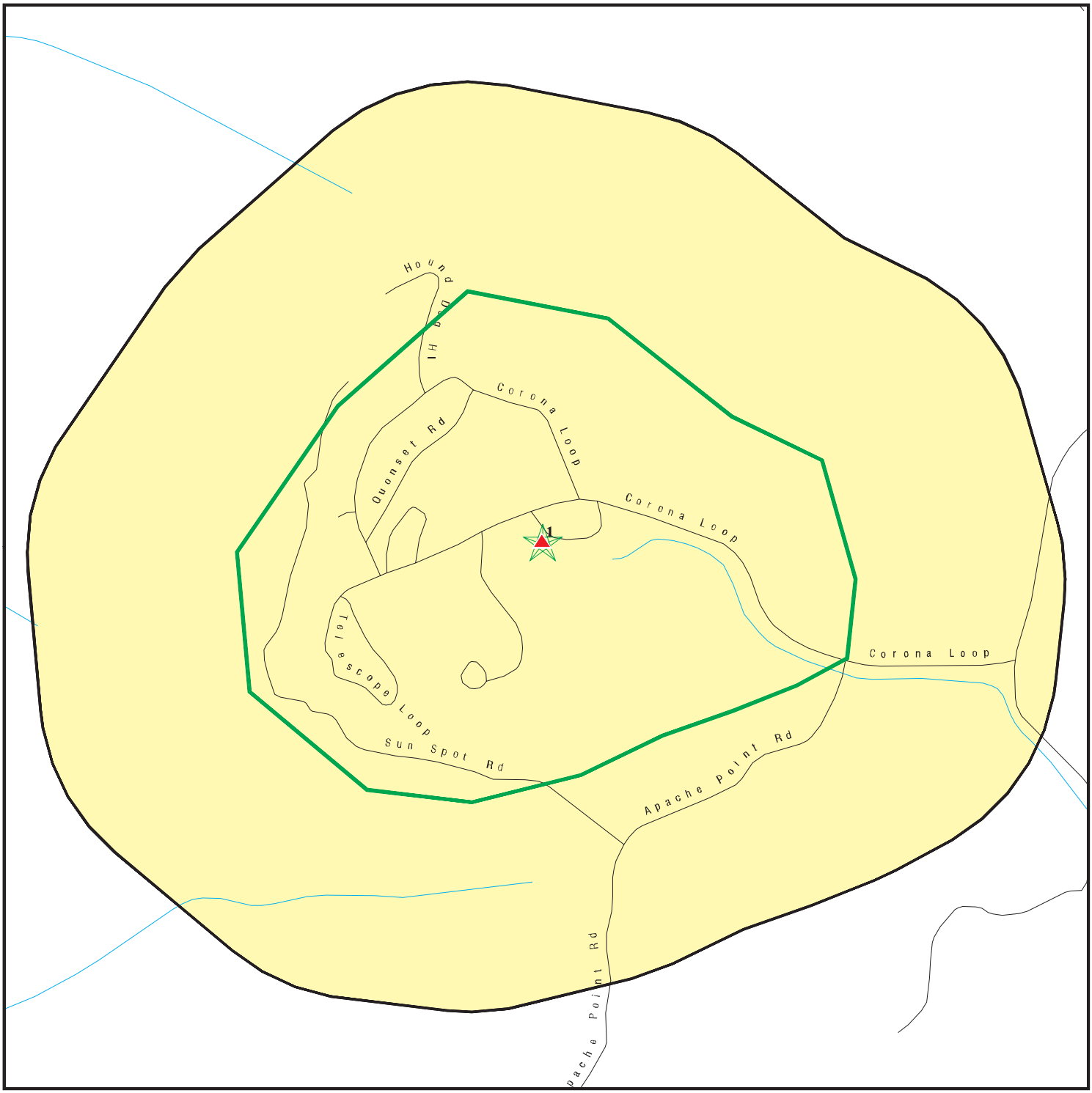
Indian Reservations BIA
Oil & Gas pipelines from USGS
100-year flood zone
500-year flood zone

N

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	NSF - Sacramento Peak Observatory	CLIENT:	CH2M Hill, Inc.
ADDRESS:	Sunspot Cloudcroft NM 88317	CONTACT:	Jean Bossart
LAT/LONG:	32.7898 / -105.8162	INQUIRY #:	4218013.2s
		DATE:	March 02, 2015 12:34 pm

DETAIL MAP - 4218013.2S



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: NSF - Sacramento Peak Observatory	CLIENT: CH2M Hill, Inc.
ADDRESS: Sunspot Cloudcroft NM 88317	CONTACT: Jean Bossart
LAT/LONG: 32.7898 / -105.8162	INQUIRY #: 4218013.2s DATE: March 02, 2015 12:34 pm

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	TP		NR	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
CERCLIS	0.500		0	0	0	NR	NR	0
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250	1	0	0	NR	NR	NR	1
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
LUCIS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent CERCLIS								
SHWS	N/A		N/A	N/A	N/A	N/A	N/A	N/A
SCS	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST	0.500		0	0	0	NR	NR	0
LTANKS	0.500		0	0	0	NR	NR	0
LAST	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN LUST	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
TANKS	0.250		0	0	NR	NR	NR	0
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
FEMA UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
INST CONTROL	0.500		0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
SWRCY	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL	TP		NR	NR	NR	NR	NR	0
CDL	TP		NR	NR	NR	NR	NR	0
US HIST CDL	TP		NR	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
SPILLS	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
DOD	1.000		0	0	0	0	NR	0
FUDS	1.000		0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
CONSENT	1.000		0	0	0	0	NR	0
ROD	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
FINDS	TP	1	NR	NR	NR	NR	NR	1
RAATS	TP		NR	NR	NR	NR	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
AIRS	TP		NR	NR	NR	NR	NR	0
ASBESTOS	TP		NR	NR	NR	NR	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
MINES	0.250		0	0	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR US Hist Auto Stat	0.250		0	0	NR	NR	NR	0
EDR US Hist Cleaners	0.250		0	0	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA LUST	TP		NR	NR	NR	NR	NR	0
RGA LF	TP		NR	NR	NR	NR	NR	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

N/A = This State does not maintain a SHWS list. See the Federal CERCLIS list.

1 **NATIONAL SOLAR LABORATORY** **RCRA-SQG** **1016142808**
Target **3010 CORONAL LOOP** **FINDS** **NMR000018499**
Property **SUNSPOT, NM 88349**

Actual:
9113 ft.

RCRA-SQG:

Date form received by agency:	03/14/2013
Facility name:	NATIONAL SOLAR LABORATORY
Facility address:	3010 CORONAL LOOP SUNSPOT, NM 88349
EPA ID:	NMR000018499
Mailing address:	CORONAL LOOP SUNSPOT, NM 88349
Contact:	DAVID HICKENS
Contact address:	NASA PARKWAY JE111 HOUSTON, TX 77058
Contact country:	US
Contact telephone:	281-483-3120
Contact email:	DAVID.HICKENS-1@NASA.GOV
EPA Region:	06
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	NASA JOHNSON SPACE CENTER
Owner/operator address:	NASA PARKWAY JE111 HOUSTON, TX 77058
Owner/operator country:	US
Owner/operator telephone:	281-483-3120
Legal status:	Federal
Owner/Operator Type:	Owner
Owner/Op start date:	01/06/1995
Owner/Op end date:	Not reported

Owner/operator name:	NASA JOHNSON SPACE CENTER
Owner/operator address:	NASA PARKWAY JE111 HOUSTON, TX 77058
Owner/operator country:	US
Owner/operator telephone:	281-483-3120
Legal status:	Federal
Owner/Operator Type:	Operator
Owner/Op start date:	01/06/1995
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No

NATIONAL SOLAR LABORATORY (Continued) **1016142808**

User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Hazardous Waste Summary:
Waste code: D009
Waste name: MERCURY

Violation Status: No violations found

FINDS:

Registry ID: 110055452923

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Count: 0 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
		NO SITES FOUND			

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 12/16/2014
Date Data Arrived at EDR: 01/08/2015
Date Made Active in Reports: 02/09/2015
Number of Days to Update: 32

Source: EPA
Telephone: N/A
Last EDR Contact: 01/08/2015
Next Scheduled EDR Contact: 04/20/2015
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 12/16/2014
Date Data Arrived at EDR: 01/08/2015
Date Made Active in Reports: 02/09/2015
Number of Days to Update: 32

Source: EPA
Telephone: N/A
Last EDR Contact: 01/08/2015
Next Scheduled EDR Contact: 04/20/2015
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 12/16/2014
Date Data Arrived at EDR: 01/08/2015
Date Made Active in Reports: 02/09/2015
Number of Days to Update: 32

Source: EPA
Telephone: N/A
Last EDR Contact: 01/08/2015
Next Scheduled EDR Contact: 04/20/2015
Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 02/13/2014
Number of Days to Update: 94

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 02/27/2015
Next Scheduled EDR Contact: 06/08/2015
Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 07/21/2014
Date Data Arrived at EDR: 10/07/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 13

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 01/09/2015
Next Scheduled EDR Contact: 04/20/2015
Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 02/13/2014
Number of Days to Update: 94

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 02/27/2015
Next Scheduled EDR Contact: 06/08/2015
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 12/09/2014
Date Data Arrived at EDR: 12/29/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 31

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 12/29/2014
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 12/09/2014
Date Data Arrived at EDR: 12/29/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 214-665-6444
Last EDR Contact: 12/29/2014
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 12/09/2014
Date Data Arrived at EDR: 12/29/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 214-665-6444
Last EDR Contact: 12/29/2014
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 12/09/2014
Date Data Arrived at EDR: 12/29/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 214-665-6444
Last EDR Contact: 12/29/2014
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 12/09/2014
Date Data Arrived at EDR: 12/29/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 214-665-6444
Last EDR Contact: 12/29/2014
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 09/18/2014
Date Data Arrived at EDR: 09/19/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 02/26/2015
Next Scheduled EDR Contact: 06/15/2015
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 09/18/2014
Date Data Arrived at EDR: 09/19/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 02/26/2015
Next Scheduled EDR Contact: 06/15/2015
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/03/2014
Date Data Arrived at EDR: 12/12/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 48

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 02/16/2015
Next Scheduled EDR Contact: 06/01/2015
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 09/29/2014
Date Data Arrived at EDR: 09/30/2014
Date Made Active in Reports: 11/06/2014
Number of Days to Update: 37

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 12/29/2014
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: Annually

State- and tribal - equivalent CERCLIS

SHWS: This state does not maintain a SHWS list. See the Federal CERCLIS list and Federal NPL list.

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: Department of the Environment
Telephone: 505-827-2918
Last EDR Contact: 12/23/2015
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: N/A

SCS: State Cleanup Sites Listing
State cleanup sites that fall under the state's Water Quality Control Commission Regulations.

Date of Government Version: 11/03/2014
Date Data Arrived at EDR: 01/20/2015
Date Made Active in Reports: 02/20/2015
Number of Days to Update: 31
Source: Environment Department
Telephone: 505-827-2855
Last EDR Contact: 01/20/2015
Next Scheduled EDR Contact: 05/04/2015
Data Release Frequency: Varies

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Solid Waste Facilities
Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 08/15/2013
Date Data Arrived at EDR: 08/20/2013
Date Made Active in Reports: 09/09/2013
Number of Days to Update: 20
Source: New Mexico Environment Department
Telephone: 505-827-0347
Last EDR Contact: 02/09/2015
Next Scheduled EDR Contact: 05/25/2015
Data Release Frequency: Semi-Annually

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tank Priorization Database
Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 08/01/2006
Date Data Arrived at EDR: 10/06/2006
Date Made Active in Reports: 11/08/2006
Number of Days to Update: 33
Source: New Mexico Environment Department
Telephone: 505-476-4397
Last EDR Contact: 12/23/2014
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: No Update Planned

LTANKS: Leaking Storage Tank Listing
A listing of leaking storage tank site locations.

Date of Government Version: 05/02/2014
Date Data Arrived at EDR: 07/08/2014
Date Made Active in Reports: 07/28/2014
Number of Days to Update: 20
Source: Environment Department
Telephone: 505-476-4390
Last EDR Contact: 01/09/2015
Next Scheduled EDR Contact: 04/20/2015
Data Release Frequency: Varies

LAST: Leaking Aboveground Storage Tank Sites
A listing of leaking aboveground storage tank sites.

Date of Government Version: 05/01/2006
Date Data Arrived at EDR: 05/01/2006
Date Made Active in Reports: 06/05/2006
Number of Days to Update: 35
Source: Environment Department
Telephone: 505-476-4397
Last EDR Contact: 12/23/2014
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: No Update Planned

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 09/23/2014
Date Data Arrived at EDR: 11/25/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 65
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 11/04/2014
Date Data Arrived at EDR: 11/07/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 10
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 05/01/2013
Date Made Active in Reports: 11/01/2013
Number of Days to Update: 184
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 01/30/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 11/10/2014
Date Data Arrived at EDR: 11/14/2014
Date Made Active in Reports: 02/09/2015
Number of Days to Update: 87
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Quarterly

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 11/03/2014
Date Data Arrived at EDR: 11/05/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 12
Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 10/06/2014
Date Data Arrived at EDR: 10/29/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 19
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 07/30/2014
Date Data Arrived at EDR: 08/12/2014
Date Made Active in Reports: 08/22/2014
Number of Days to Update: 10
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Semi-Annually

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 01/08/2015
Date Data Arrived at EDR: 01/08/2015
Date Made Active in Reports: 02/09/2015
Number of Days to Update: 32
Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 01/08/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Quarterly

State and tribal registered storage tank lists

TANKS: Storage Tank Facility Listing
A listing of aboveground and underground storage tank site locations.

Date of Government Version: 07/03/2014
Date Data Arrived at EDR: 09/04/2014
Date Made Active in Reports: 11/03/2014
Number of Days to Update: 60
Source: Environment Department
Telephone: 505-476-4390
Last EDR Contact: 12/05/2014
Next Scheduled EDR Contact: 03/16/2015
Data Release Frequency: Varies

UST: Listing of Underground Storage Tanks
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 08/01/2006
Date Data Arrived at EDR: 09/27/2006
Date Made Active in Reports: 10/23/2006
Number of Days to Update: 26
Source: New Mexico Environment Department
Telephone: 505-476-4397
Last EDR Contact: 02/26/2015
Next Scheduled EDR Contact: 06/15/2015
Data Release Frequency: No Update Planned

AST: Aboveground Storage Tanks List
Aboveground tanks that have been inspected by the State Fire Marshal.

Date of Government Version: 08/01/2006
Date Data Arrived at EDR: 09/27/2006
Date Made Active in Reports: 10/20/2006
Number of Days to Update: 23
Source: Environment Department
Telephone: 505-476-4397
Last EDR Contact: 02/26/2015
Next Scheduled EDR Contact: 06/15/2015
Data Release Frequency: No Update Planned

INDIAN UST R1: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 05/01/2013
Date Made Active in Reports: 01/27/2014
Number of Days to Update: 271
Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 01/30/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 11/04/2014
Date Data Arrived at EDR: 11/07/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 10
Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Quarterly

INDIAN UST R4: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 07/30/2014
Date Data Arrived at EDR: 08/12/2014
Date Made Active in Reports: 08/22/2014
Number of Days to Update: 10
Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Semi-Annually

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 09/23/2014
Date Data Arrived at EDR: 11/25/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 65

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 11/13/2014
Date Data Arrived at EDR: 11/18/2014
Date Made Active in Reports: 02/09/2015
Number of Days to Update: 83

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Quarterly

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 11/03/2014
Date Data Arrived at EDR: 11/05/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 12

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 11/10/2014
Date Data Arrived at EDR: 11/14/2014
Date Made Active in Reports: 02/09/2015
Number of Days to Update: 87

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Quarterly

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 10/06/2014
Date Data Arrived at EDR: 10/29/2014
Date Made Active in Reports: 11/06/2014
Number of Days to Update: 8

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Semi-Annually

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 01/12/2015
Next Scheduled EDR Contact: 04/27/2015
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

INST CONTROL: Sites with Institutional Controls
Sites included in the Voluntary Cleanup listing that have Institutional Controls in place.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 01/20/2015
Date Made Active in Reports: 02/20/2015
Number of Days to Update: 31
Source: Environment Department
Telephone: 505-827-2754
Last EDR Contact: 01/20/2015
Next Scheduled EDR Contact: 05/04/2015
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

VCP: Voluntary Remediation Program Sites
Sites involved in the Voluntary Remediation Program.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 01/20/2015
Date Made Active in Reports: 02/20/2015
Number of Days to Update: 31
Source: Environment Department
Telephone: 505-827-2754
Last EDR Contact: 01/20/2015
Next Scheduled EDR Contact: 05/04/2015
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27
Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 09/29/2014
Date Data Arrived at EDR: 10/01/2014
Date Made Active in Reports: 11/06/2014
Number of Days to Update: 36
Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 12/31/2014
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Site Listing
A listing of targeted brownfields assessment.

Date of Government Version: 10/01/2014
Date Data Arrived at EDR: 10/03/2014
Date Made Active in Reports: 12/09/2014
Number of Days to Update: 67
Source: New Mexico Environment
Telephone: 505-827-0171
Last EDR Contact: 02/13/2015
Next Scheduled EDR Contact: 05/25/2015
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 12/22/2014
Date Data Arrived at EDR: 12/22/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 38

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 12/22/2014
Next Scheduled EDR Contact: 04/06/2015
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SWRCY: Recycling Facility Listing
A listing of recycling facility locations.

Date of Government Version: 08/15/2013
Date Data Arrived at EDR: 08/20/2013
Date Made Active in Reports: 09/09/2013
Number of Days to Update: 20

Source: Environment Department
Telephone: 505-827-0197
Last EDR Contact: 02/09/2015
Next Scheduled EDR Contact: 05/25/2015
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 02/02/2015
Next Scheduled EDR Contact: 05/18/2015
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 11/10/2014
Date Data Arrived at EDR: 12/01/2014
Date Made Active in Reports: 02/09/2015
Number of Days to Update: 70

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 11/25/2014
Next Scheduled EDR Contact: 03/16/2015
Data Release Frequency: Quarterly

CDL: Clandestine Drug Laboratory Listing
A listing of clandestine drug labs, such as illegal methamphetamine labs.

Date of Government Version: 07/11/2013
Date Data Arrived at EDR: 04/22/2014
Date Made Active in Reports: 05/20/2014
Number of Days to Update: 28

Source: Environment Department
Telephone: 505-476-6000
Last EDR Contact: 01/23/2015
Next Scheduled EDR Contact: 05/04/2015
Data Release Frequency: Varies

US HIST CDL: National Clandestine Laboratory Register
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 11/10/2014
Date Data Arrived at EDR: 12/01/2014
Date Made Active in Reports: 02/09/2015
Number of Days to Update: 70

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 11/25/2014
Next Scheduled EDR Contact: 03/16/2015
Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information
A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/18/2014
Date Data Arrived at EDR: 03/18/2014
Date Made Active in Reports: 04/24/2014
Number of Days to Update: 37

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 01/30/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System
Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 09/30/2014
Date Data Arrived at EDR: 10/01/2014
Date Made Active in Reports: 11/06/2014
Number of Days to Update: 36

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 12/30/2014
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: Annually

SPILLS: Spill Data
Hazardous materials spills data.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 01/16/2015
Date Made Active in Reports: 02/20/2015
Number of Days to Update: 35

Source: Environment Department
Telephone: 505-827-0166
Last EDR Contact: 12/29/2014
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: Varies

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators
RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 12/09/2014
Date Data Arrived at EDR: 12/29/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 31
Source: Environmental Protection Agency
Telephone: 214-665-6444
Last EDR Contact: 12/29/2014
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42
Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 02/03/2015
Next Scheduled EDR Contact: 05/18/2015
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62
Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 01/15/2015
Next Scheduled EDR Contact: 04/27/2015
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 06/06/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 8
Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 12/12/2014
Next Scheduled EDR Contact: 03/23/2015
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 01/24/2014
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 31
Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 12/24/2014
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 11/25/2013
Date Data Arrived at EDR: 12/12/2013
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 74
Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 12/12/2014
Next Scheduled EDR Contact: 03/23/2015
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/07/2011
Date Made Active in Reports: 03/01/2012
Number of Days to Update: 146

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 02/27/2015
Next Scheduled EDR Contact: 06/08/2015
Data Release Frequency: Varies

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 12/30/2014
Date Data Arrived at EDR: 12/31/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 29

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 12/30/2014
Next Scheduled EDR Contact: 03/16/2015
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 07/31/2013
Date Made Active in Reports: 09/13/2013
Number of Days to Update: 44

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 01/29/2015
Next Scheduled EDR Contact: 06/08/2015
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 01/15/2015
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 14

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 12/22/2014
Next Scheduled EDR Contact: 04/06/2015
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 02/23/2015
Next Scheduled EDR Contact: 06/08/2015
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 02/23/2015
Next Scheduled EDR Contact: 06/08/2015
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 07/31/2014
Date Data Arrived at EDR: 10/29/2014
Date Made Active in Reports: 11/06/2014
Number of Days to Update: 8

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 01/09/2015
Next Scheduled EDR Contact: 04/27/2015
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 10/15/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 33

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 01/16/2015
Next Scheduled EDR Contact: 04/27/2015
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 12/29/2014
Date Data Arrived at EDR: 01/08/2015
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 21

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 12/04/2014
Next Scheduled EDR Contact: 03/23/2015
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 10/07/2014
Date Data Arrived at EDR: 10/08/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 12

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 02/27/2015
Next Scheduled EDR Contact: 04/20/2015
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 08/16/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40

Source: EPA
Telephone: (214) 665-2200
Last EDR Contact: 02/27/2015
Next Scheduled EDR Contact: 03/23/2015
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 08/01/2014
Date Data Arrived at EDR: 08/12/2014
Date Made Active in Reports: 11/06/2014
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 02/26/2013
Date Made Active in Reports: 04/19/2013
Number of Days to Update: 52

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 02/24/2015
Next Scheduled EDR Contact: 06/08/2015
Data Release Frequency: Biennially

DRYCLEANERS: Drycleaner Facility Listing

A listing of drycleaner facility locations. The listing may contain facilities that are no longer there, or under different management.

Date of Government Version: 01/06/2010
Date Data Arrived at EDR: 01/07/2010
Date Made Active in Reports: 02/04/2010
Number of Days to Update: 28

Source: Environment Department
Telephone: 505-222-9507
Last EDR Contact: 01/23/2015
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: No Update Planned

NPDES: List of Discharge Permits

General information regarding NPDES (National Pollutant Discharge Elimination System) permits.

Date of Government Version: 10/20/2014
Date Data Arrived at EDR: 10/23/2014
Date Made Active in Reports: 12/12/2014
Number of Days to Update: 50

Source: Environment Department
Telephone: 505-827-2918
Last EDR Contact: 01/23/2015
Next Scheduled EDR Contact: 05/04/2015
Data Release Frequency: Semi-Annually

AIRS: Airs Information

A listing of facilities with Air Quality Bureau permits.

Date of Government Version: 01/26/2015
Date Data Arrived at EDR: 01/28/2015
Date Made Active in Reports: 02/20/2015
Number of Days to Update: 23

Source: New Mexico Environment Department
Telephone: 505-476-4339
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Annually

ASBESTOS: List of Asbestos Demolition and Renovations Jobs

Asbestos is a common fibrous rock found worldwide which has been used in various products for over 4500 years. It has been used in over 3000 different products such as textiles, paper, ropes, wicks, stoves, filters, floor tiles, roofing shingles, clutch facings, water pipe, cements, fillers, felt, fireproof clothing, gaskets, battery boxes, clapboard, wallboard, fire doors, fire curtains, insulation, brake linings, etc.

Date of Government Version: 04/01/2007
Date Data Arrived at EDR: 05/09/2007
Date Made Active in Reports: 05/30/2007
Number of Days to Update: 21

Source: New Mexico Environment Department
Telephone: 505-827-1494
Last EDR Contact: 01/26/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Varies

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 01/15/2015
Next Scheduled EDR Contact: 04/27/2015
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 02/18/2015
Next Scheduled EDR Contact: 06/01/2015
Data Release Frequency: Varies

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 02/09/2015
Next Scheduled EDR Contact: 05/25/2015
Data Release Frequency: Quarterly

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 11/25/2014
Date Data Arrived at EDR: 11/26/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 64

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 01/05/2015
Next Scheduled EDR Contact: 04/20/2015
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

COAL MINES 2: Coal Permit Boundaries

ESRI ArcView shapefile depicting New Mexico coal mines permitted under the Surface Mining Control and Reclamation Act of 1977 (SMCRA), by either the NM Mining & Minerals Division (MMD), or by the federal DOI Office of Surface Mining, Reclamation & Enforcement.

Date of Government Version: 06/12/2013
Date Data Arrived at EDR: 06/20/2013
Date Made Active in Reports: 07/05/2013
Number of Days to Update: 15

Source: Mining & Minerals Division
Telephone: 505-476-3417
Last EDR Contact: 12/19/2014
Next Scheduled EDR Contact: 03/30/2015
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 01/15/2015
Next Scheduled EDR Contact: 04/27/2015
Data Release Frequency: N/A

FINANCIAL ASSURANCE 1: Financial Assurance Information

Information for underground solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 12/03/2012
Date Data Arrived at EDR: 01/04/2013
Date Made Active in Reports: 01/10/2013
Number of Days to Update: 6

Source: Environment Department
Telephone: 505-827-0197
Last EDR Contact: 02/02/2015
Next Scheduled EDR Contact: 05/18/2015
Data Release Frequency: Varies

FINANCIAL ASSURANCE 2: Financial Assurance Information

Information for underground hazardous waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 11/12/2014
Date Data Arrived at EDR: 11/14/2014
Date Made Active in Reports: 12/12/2014
Number of Days to Update: 28

Source: Environment Department
Telephone: 505-476-6018
Last EDR Contact: 02/02/2015
Next Scheduled EDR Contact: 05/18/2015
Data Release Frequency: Varies

COAL MINES: Coal Mine Permits Database

New Mexico coal mines permitted under the Surface Mining Control and Reclamation Act of 1977 (SMCRA), by either the NM Mining & Minerals Division (MMD), or by the federal DOI Office of Surface Mining, Reclamation & Enforcement.

Date of Government Version: 07/13/2012
Date Data Arrived at EDR: 12/17/2012
Date Made Active in Reports: 01/11/2013
Number of Days to Update: 25

Source: Bureau of Geology and Mineral Resources
Telephone: 505-476-3402
Last EDR Contact: 12/17/2012
Next Scheduled EDR Contact: 04/01/2013
Data Release Frequency: Varies

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 11/11/2011
Date Data Arrived at EDR: 05/18/2012
Date Made Active in Reports: 05/25/2012
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 02/13/2015
Next Scheduled EDR Contact: 05/25/2015
Data Release Frequency: Varies

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 10/17/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 3

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 02/13/2015
Next Scheduled EDR Contact: 05/25/2015
Data Release Frequency: Quarterly

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/16/2014
Date Data Arrived at EDR: 10/31/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 17

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 02/06/2015
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data
A listing of minor source facilities.

Date of Government Version: 10/16/2014
Date Data Arrived at EDR: 10/31/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 17

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 02/06/2015
Next Scheduled EDR Contact: 04/13/2015
Data Release Frequency: Annually

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 12/12/2014
Next Scheduled EDR Contact: 03/23/2015
Data Release Frequency: Varies

COAL ASH DOE: Sleam-Electric Plan Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 01/15/2015
Next Scheduled EDR Contact: 04/27/2015
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 01/30/2015
Next Scheduled EDR Contact: 05/11/2015
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information
All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 11/19/2014
Date Data Arrived at EDR: 11/21/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 69

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 02/16/2015
Next Scheduled EDR Contact: 06/01/2015
Data Release Frequency: Quarterly

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR US Hist Auto Stat: EDR Exclusive Historic Gas Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR US Hist Cleaners: EDR Exclusive Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the New Mexico Environment Department in New Mexico.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/03/2014
Number of Days to Update: 186

Source: New Mexico Environment Department
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the New Mexico Environment Department in New Mexico.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/16/2014
Number of Days to Update: 199

Source: New Mexico Environment Department
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 01/01/2015
Date Data Arrived at EDR: 02/04/2015
Date Made Active in Reports: 02/27/2015
Number of Days to Update: 23

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 02/04/2015
Next Scheduled EDR Contact: 05/18/2015
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 06/20/2014
Date Made Active in Reports: 08/07/2014
Number of Days to Update: 48

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 12/12/2014
Next Scheduled EDR Contact: 03/30/2015
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Licensed Child Day Care Providers
Source: Office of Child Development
Telephone: 505-827-7946

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

NSF - SACRAMENTO PEAK OBSERVATORY
SUNSPOT
CLOUDCROFT, NM 88317

TARGET PROPERTY COORDINATES

Latitude (North):	32.7898 - 32° 47' 23.28''
Longitude (West):	105.8162 - 105° 48' 58.32''
Universal Tranverse Mercator:	Zone 13
UTM X (Meters):	423571.0
UTM Y (Meters):	3628089.0
Elevation:	9113 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	32105-G7 SACRAMENTO PEAK, NM
Most Recent Revision:	1981

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

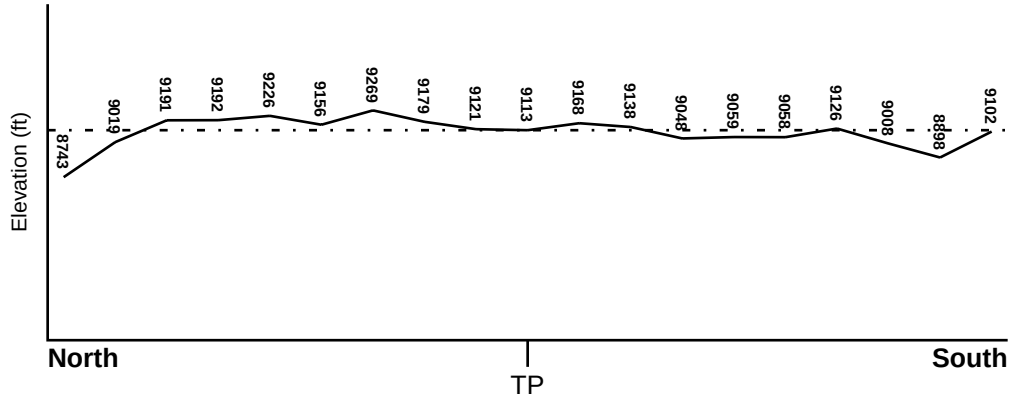
TOPOGRAPHIC INFORMATION

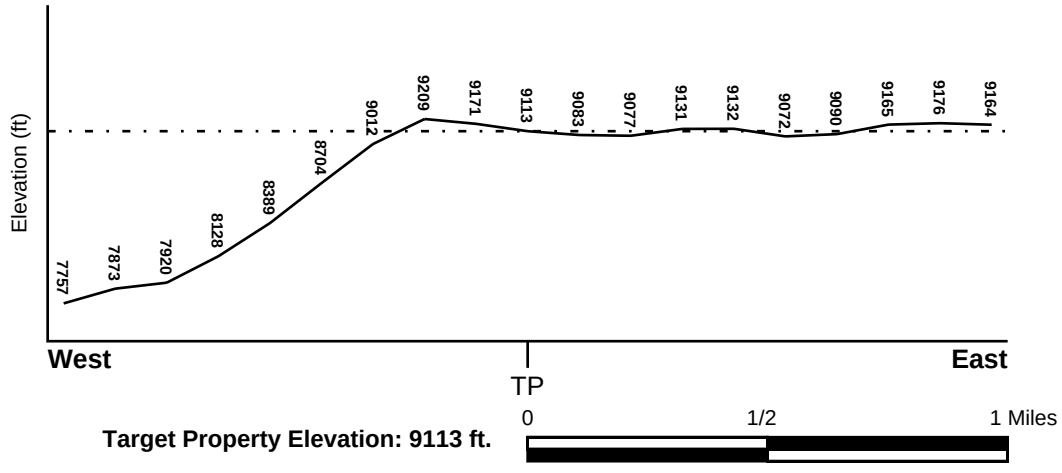
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General SE

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 9113 ft.

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
OTERO, NM	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 35035C - FEMA DFIRM Flood data

Additional Panels in search area: Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
NOT AVAILABLE	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

Era:	Paleozoic
System:	Permian
Series:	Lower part of Leonardian Series
Code:	P2a *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratifed Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps. The following information is based on Soil Conservation Service STATSGO data.

Soil Component Name: ARGIC CRYOBOROLLS

Soil Surface Texture: gravelly - loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Not reported

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: MODERATE

Depth to Bedrock Min: > 60 inches

Depth to Bedrock Max: > 60 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	9 inches	gravelly - loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 2.00 Min: 0.60	Max: 7.30 Min: 5.60
2	9 inches	19 inches	very cobbly - sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 2.00 Min: 0.60	Max: 7.30 Min: 5.60
3	19 inches	24 inches	very gravelly - sandy clay loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 6.00 Min: 2.00	Max: 7.80 Min: 5.60
4	24 inches	40 inches	very gravelly - coarse sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel.	Max: 20.00 Min: 20.00	Max: 7.30 Min: 5.60
5	40 inches	60 inches	extremely cobbly - loamy coarse sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel. COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel.	Max: 20.00 Min: 20.00	Max: 7.30 Min: 5.60

OTHER SOIL TYPES IN AREA

Based on Soil Conservation Service STATSGO data, the following additional subordinant soil types may appear within the general area of target property.

Soil Surface Textures: loam

Surficial Soil Types: loam

Shallow Soil Types: very gravelly - sandy clay loam

clay loam

Deeper Soil Types: very gravelly - clay loam

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

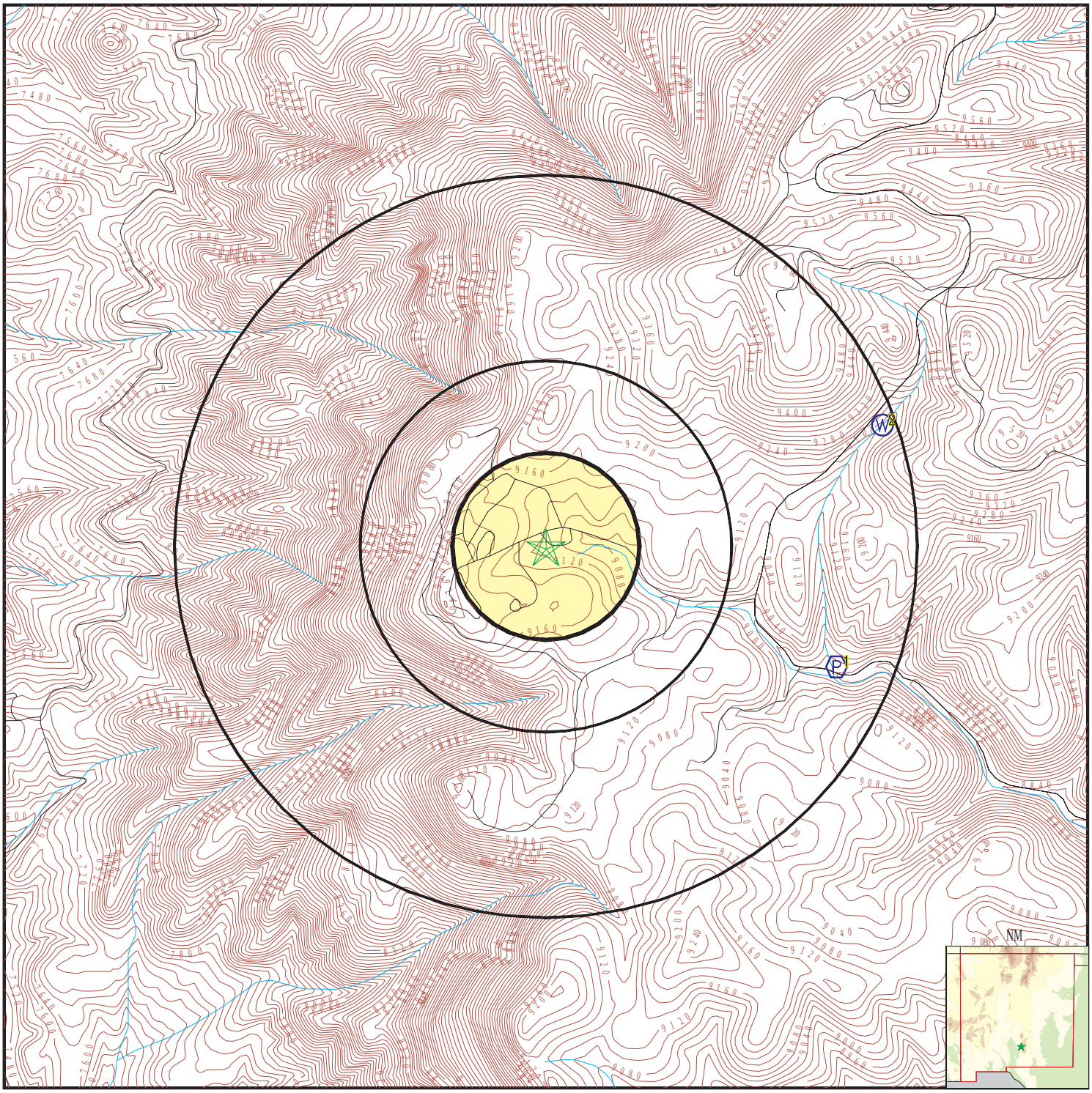
MAP ID	WELL ID	LOCATION FROM TP
1	NM3564119	1/2 - 1 Mile ESE

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
2	NM3000000027811	1/2 - 1 Mile ENE

PHYSICAL SETTING SOURCE MAP - 4218013.2s



- County Boundary
- Major Roads
- Contour Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- HD Closest Hydrogeological Data
- Oil, gas or related wells

SITE NAME: NSF - Sacramento Peak Observatory	CLIENT: CH2M Hill, Inc.
ADDRESS: Sunspot	CONTACT: Jean Bossart
Cloudcroft NM 88317	INQUIRY #: 4218013.2s
LAT/LONG: 32.7898 / -105.8162	DATE: March 02, 2015 12:35 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
1		
ESE	**FRDS PWS**	**NM3564119**
1/2 - 1 Mile		
Lower		

Epa region:	06	State:	NM
Pwsid:	NM3564119		
Pwsname:	NATIONAL SOLAR OBSERVATORY		
City served:	Not Reported	State served:	NM
Zip served:	Not Reported	Fips county:	35035
Status:	Active	Pop srvd:	66
Pwssvcconn:	47	Source:	Groundwater
Pws type:	CWS	Owner:	Fed_Govt
Contact:	HUNTER, REX		
Contactor gname:	HUNTER, REX		
Contact phone:	575-434-7075	Contact address1:	Not Reported
Contact address2:	PO BOX 62	Contact city:	SUNSPOT
Contact state:	NM	Contact zip:	88349
Activity code:	A		

Facid:	545		
Facname:	TREATMENT PLANT #1		
Facility type:	Treatment_plant	Activity code:	A
Treatment obj:	disinfection	Treatment process:	hypochlorination, post

Location Information:

Name:	NATIONAL SOLAR OBSERVATORY		
Pwstypcd:	CWS	Primsrccd:	GW
Popserved:	66		
Add1:	Not Reported		
Add2:	PO BOX 62		
City:	SUNSPOT	State:	NM
Zip:	88349	Phone:	575-434-7075
Cityserv:	SUNSPOT	Cntyserv:	Otero
Stateserv:	NM	Zipserv:	Not Reported

Enforcement Information:

Violation id:	Not Reported	Orig cd:	S
Enf fy:	2007	Enf act date:	11/30/2006
Enf act detail:	St Compliance achieved	Enf act cat:	Not Reported

Enforcement Information:

Violation id:	Not Reported	Orig cd:	S
Enf fy:	2007	Enf act date:	11/30/2006
Enf act detail:	St Compliance achieved	Enf act cat:	Not Reported

Enforcement Information:

Violation id:	Not Reported	Orig cd:	S
Enf fy:	2004	Enf act date:	11/30/2003
Enf act detail:	St Compliance achieved	Enf act cat:	Not Reported

Enforcement Information:

Violation id:	5120	Orig cd:	S
Enf fy:	2012	Enf act date:	08/07/2012
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5120	Orig cd:	S
Enf fy:	2012	Enf act date:	08/10/2012
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5120	Orig cd:	S
Enf fy:	2012	Enf act date:	08/10/2012
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5120	Orig cd:	S
Enf fy:	2012	Enf act date:	09/13/2012
Enf act detail:	St Public Notif received	Enf act cat:	Informal

Enforcement Information:

Violation id:	5119	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5119	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5119	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5118	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5118	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5118	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5117	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5117	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5117	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5116	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5116	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5116	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5115	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5115	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5115	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5114	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5114	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5114	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5113	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5113	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5113	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5112	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5112	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5112	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5111	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5111	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5111	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5110	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5110	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5110	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5109	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5109	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5109	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5108	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5108	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5108	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5107	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5107	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5107	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5106	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5106	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5106	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5105	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5105	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5105	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5104	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5104	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5104	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5103	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5103	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5103	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5102	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5102	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5102	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5101	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5101	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5101	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5100	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5100	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5100	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5099	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5099	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5099	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5098	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5098	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5098	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5097	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5097	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5097	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5096	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5096	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5096	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5095	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5095	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5095	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5094	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5094	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5094	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5093	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5093	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5093	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5092	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5092	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5092	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5091	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5091	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5091	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5090	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5090	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5090	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5089	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5089	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5089	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5088	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5088	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5088	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5087	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5087	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5087	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5086	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5086	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5086	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5085	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5085	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5085	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5084	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5084	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5084	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5083	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5083	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5083	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5082	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5082	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5082	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5081	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5081	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5081	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5080	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5080	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5080	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5079	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5079	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5079	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5078	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5078	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5078	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5077	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5077	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5077	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5076	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5076	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5076	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5075	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5075	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5075	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5074	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5074	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5074	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5073	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5073	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5073	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5072	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5072	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5072	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5071	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5071	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5071	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5070	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5070	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5070	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5069	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5069	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5069	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5068	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5068	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5068	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5067	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5067	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5067	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5066	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5066	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5066	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5065	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5065	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5065	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5064	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5064	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5064	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5063	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5063	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5063	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5062	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5062	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5062	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5061	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5061	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5061	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5060	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5060	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5060	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5059	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5059	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5059	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5058	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5058	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5058	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5057	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5057	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5057	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5056	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5056	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5056	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5055	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5055	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5055	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5054	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5054	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5054	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5053	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5053	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5053	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5052	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5052	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5052	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5051	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5051	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5051	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5050	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5050	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5050	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5049	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5049	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5049	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5048	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5048	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5048	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5047	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5047	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5047	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5046	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5046	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5046	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5045	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5045	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5045	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5044	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5044	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5044	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5043	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5043	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5043	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5042	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5042	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5042	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5041	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5041	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5041	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5040	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5040	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5040	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5039	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5039	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5039	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5038	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5038	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5038	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5037	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5037	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5037	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5036	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5036	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5036	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5035	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5035	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5035	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5034	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5034	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5034	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5033	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5033	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5033	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5032	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5032	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5032	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5031	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5031	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5031	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5030	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5030	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5030	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5029	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5029	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5029	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5028	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5028	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5028	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5027	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5027	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5027	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5026	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5026	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5026	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5025	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5025	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5025	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5024	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5024	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5024	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5023	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5023	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5023	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5022	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5022	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5022	Orig cd:	S
Enf fy:	2012	Enf act date:	11/14/2011
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5021	Orig cd:	S
Enf fy:	2010	Enf act date:	06/02/2010
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5020	Orig cd:	S
Enf fy:	2010	Enf act date:	04/19/2010
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5020	Orig cd:	S
Enf fy:	2010	Enf act date:	04/19/2010
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5020	Orig cd:	S
Enf fy:	2011	Enf act date:	05/05/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5020	Orig cd:	S
Enf fy:	2010	Enf act date:	04/21/2010
Enf act detail:	St Public Notif received	Enf act cat:	Informal

Enforcement Information:

Violation id:	5019	Orig cd:	S
Enf fy:	2010	Enf act date:	04/12/2010
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5019	Orig cd:	S
Enf fy:	2010	Enf act date:	04/12/2010
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5019	Orig cd:	S
Enf fy:	2011	Enf act date:	05/05/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5018	Orig cd:	S
Enf fy:	2011	Enf act date:	05/10/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5018	Orig cd:	S
Enf fy:	2009	Enf act date:	07/30/2009
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5005	Orig cd:	S
Enf fy:	2007	Enf act date:	11/14/2006
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5005	Orig cd:	S
Enf fy:	2007	Enf act date:	11/14/2006
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5005	Orig cd:	S
Enf fy:	2011	Enf act date:	02/25/2011
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5005	Orig cd:	S
Enf fy:	2007	Enf act date:	11/27/2006
Enf act detail:	St Public Notif received	Enf act cat:	Informal

Enforcement Information:

Violation id:	5004	Orig cd:	S
Enf fy:	2004	Enf act date:	12/11/2003
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	5004	Orig cd:	S
Enf fy:	2004	Enf act date:	11/30/2003
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	5004	Orig cd:	S
Enf fy:	2004	Enf act date:	12/22/2003
Enf act detail:	St Public Notif received	Enf act cat:	Informal

Enforcement Information:

Violation id:	5004	Orig cd:	S
Enf fy:	2004	Enf act date:	12/11/2003
Enf act detail:	St Public Notif requested	Enf act cat:	Informal

Enforcement Information:

Violation id:	5004	Orig cd:	S
Enf fy:	2004	Enf act date:	11/30/2003
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	1V00	Orig cd:	F
Enf fy:	2000	Enf act date:	03/01/2000
Enf act detail:	Fed Compliance achieved	Enf act cat:	Resolving

Violations Information:

Violoation id:	5120	Orig cd:	S
State:	NM	Viol fy:	2012
Contamcd:	3100		
Contamnm:	Coliform (TCR)		
Viol code:	23		
Viol name:	Monitoring, Routine Major (TCR)		
Rule code:	110		
Rule name:	TCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported

State mcl:	Not Reported	Cmpbdt:	07/01/2012
Cmpedt:	07/31/2012		

Violations Information:

Violoation id:	5119	Orig cd:	S
State:	NM	Viol fy:	2005
Contamcd:	2456		
Contamnm:	Total Haloacetic Acids (HAA5)		
Viol code:	27		
Viol name:	Monitoring and Reporting (DBP)		
Rule code:	210		
Rule name:	St1 DBP		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2005
Cmpedt:	12/31/2005		

Violations Information:

Violoation id:	5118	Orig cd:	S
State:	NM	Viol fy:	2005
Contamcd:	2950		
Contamnm:	TTHM		
Viol code:	27		
Viol name:	Monitoring and Reporting (DBP)		
Rule code:	210		
Rule name:	St1 DBP		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2005
Cmpedt:	12/31/2005		

Violations Information:

Violoation id:	5117	Orig cd:	S
State:	NM	Viol fy:	2006
Contamcd:	2456		
Contamnm:	Total Haloacetic Acids (HAA5)		
Viol code:	27		
Viol name:	Monitoring and Reporting (DBP)		
Rule code:	210		
Rule name:	St1 DBP		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2006
Cmpedt:	12/31/2006		

Violations Information:

Violoation id:	5116	Orig cd:	S
State:	NM	Viol fy:	2006
Contamcd:	2950		
Contamnm:	TTHM		
Viol code:	27		
Viol name:	Monitoring and Reporting (DBP)		
Rule code:	210		
Rule name:	St1 DBP		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2006
Cmpedt:	12/31/2006		

Violations Information:

Violoation id:	5115	Orig cd:	S
State:	NM	Viol fy:	2007
Contamcd:	2456		
Contamnm:	Total Haloacetic Acids (HAA5)		
Viol code:	27		
Viol name:	Monitoring and Reporting (DBP)		
Rule code:	210		
Rule name:	St1 DBP		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2007
Cmpedt:	12/31/2007		

Violations Information:

Violoation id:	5114	Orig cd:	S
State:	NM	Viol fy:	2007
Contamcd:	2950		
Contamnm:	TTHM		
Viol code:	27		
Viol name:	Monitoring and Reporting (DBP)		
Rule code:	210		
Rule name:	St1 DBP		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2007
Cmpedt:	12/31/2007		

Violations Information:

Violoation id:	5113	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	2456		
Contamnm:	Total Haloacetic Acids (HAA5)		
Viol code:	27		
Viol name:	Monitoring and Reporting (DBP)		
Rule code:	210		
Rule name:	St1 DBP		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2008
Cmpedt:	12/31/2008		

Violations Information:

Violoation id:	5112	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	2950		
Contamnm:	TTHM		
Viol code:	27		
Viol name:	Monitoring and Reporting (DBP)		
Rule code:	210		
Rule name:	St1 DBP		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2008
Cmpedt:	12/31/2008		

Violations Information:

Violoation id:	5111	Orig cd:	S
State:	NM	Viol fy:	2009
Contamcd:	2456		
Contamnm:	Total Haloacetic Acids (HAA5)		
Viol code:	27		
Viol name:	Monitoring and Reporting (DBP)		
Rule code:	210		
Rule name:	St1 DBP		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported

State mcl:	Not Reported	Cmpbdt:	01/01/2009
Cmpedt:	12/31/2009		

Violations Information:

Violoation id:	5110	Orig cd:	S
State:	NM	Viol fy:	2009
Contamcd:	2950		
Contamnm:	TTHM		
Viol code:	27		
Viol name:	Monitoring and Reporting (DBP)		
Rule code:	210		
Rule name:	St1 DBP		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2009
Cmpedt:	12/31/2009		

Violations Information:

Violoation id:	5109	Orig cd:	S
State:	NM	Viol fy:	2010
Contamcd:	2456		
Contamnm:	Total Haloacetic Acids (HAA5)		
Viol code:	27		
Viol name:	Monitoring and Reporting (DBP)		
Rule code:	210		
Rule name:	St1 DBP		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2010
Cmpedt:	12/31/2010		

Violations Information:

Violoation id:	5108	Orig cd:	S
State:	NM	Viol fy:	2010
Contamcd:	2950		
Contamnm:	TTHM		
Viol code:	27		
Viol name:	Monitoring and Reporting (DBP)		
Rule code:	210		
Rule name:	St1 DBP		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2010
Cmpedt:	12/31/2010		

Violations Information:

Violoation id:	5107	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	1038		
Contamnm:	Nitrate-Nitrite		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	331		
Rule name:	Nitrates		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2008
Cmpedt:	12/31/2008		

Violations Information:

Violoation id:	5106	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	2996		
Contamnm:	Styrene		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	310		
Rule name:	VOC		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2008
Cmpedt:	12/31/2010		

Violations Information:

Violoation id:	5105	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	2992		
Contamnm:	Ethylbenzene		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	310		
Rule name:	VOC		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2008
Cmpedt:	12/31/2010		

Violations Information:

Violoation id:	5104	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	2991		
Contamnm:	Toluene		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	310		
Rule name:	VOC		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2008
Cmpedt:	12/31/2010		

Violations Information:

Violoation id:	5103	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	2990		
Contamnm:	Benzene		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	310		
Rule name:	VOC		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2008
Cmpedt:	12/31/2010		

Violations Information:

Violoation id:	5102	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	2989		
Contamnm:	CHLOROBENZENE		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	310		
Rule name:	VOC		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported

State mcl:	Not Reported	Cmpbdt:	01/01/2008
Cmpedt:	12/31/2010		

Violations Information:

Violoation id:	5101	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	2987		
Contamnm:	Tetrachloroethylene		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	310		
Rule name:	VOC		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2008
Cmpedt:	12/31/2010		

Violations Information:

Violoation id:	5100	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	2985		
Contamnm:	1,1,2-Trichloroethane		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	310		
Rule name:	VOC		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2008
Cmpedt:	12/31/2010		

Violations Information:

Violoation id:	5099	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	2984		
Contamnm:	Trichloroethylene		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	310		
Rule name:	VOC		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2008
Cmpedt:	12/31/2010		

Violations Information:

Violoation id:	5098	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	2983		
Contamnm:	1,2-Dichloropropane		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	310		
Rule name:	VOC		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2008
Cmpedt:	12/31/2010		

Violations Information:

Violoation id:	5097	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	2982		
Contamnm:	Carbon tetrachloride		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	310		
Rule name:	VOC		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2008
Cmpedt:	12/31/2010		

Violations Information:

Violoation id:	5096	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	2981		
Contamnm:	1,1,1-Trichloroethane		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	310		
Rule name:	VOC		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2008
Cmpedt:	12/31/2010		

Violations Information:

Violoation id:	5095	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	2980		
Contamnm:	1,2-Dichloroethane		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	310		
Rule name:	VOC		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2008
Cmpedt:	12/31/2010		

Violations Information:

Violoation id:	5094	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	2979		
Contamnm:	trans-1,2-Dichloroethylene		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	310		
Rule name:	VOC		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2008
Cmpedt:	12/31/2010		

Violations Information:

Violoation id:	5093	Orig cd:	S
State:	NM	Viol fy:	2008
Contamcd:	2977		
Contamnm:	1,1-Dichloroethylene		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	310		
Rule name:	VOC		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported

State mcl: Not Reported Cmpbdt: 01/01/2008
Cmpedt: 12/31/2010

Violations Information:
Violoation id: 5092 Orig cd: S
State: NM Viol fy: 2008
Contamcd: 2976
Contamnm: Vinyl chloride
Viol code: 03
Viol name: Monitoring, Regular
Rule code: 310
Rule name: VOC
Violmeasur: Not Reported Unitmeasur: Not Reported
State mcl: Not Reported Cmpbdt: 01/01/2008
Cmpedt: 12/31/2010

Violations Information:
Violoation id: 5091 Orig cd: S
State: NM Viol fy: 2008
Contamcd: 2969
Contamnm: p-Dichlorobenzene
Viol code: 03
Viol name: Monitoring, Regular
Rule code: 310
Rule name: VOC
Violmeasur: Not Reported Unitmeasur: Not Reported
State mcl: Not Reported Cmpbdt: 01/01/2008
Cmpedt: 12/31/2010

PWS ID: NM3564119
Date Initiated: Not Reported Date Deactivated: Not Reported
PWS Name: SACRAMENTO PEAK OBSERVATORY
SACRAMENTO PEAK OBSERVATORY
SUNSPOT, NM 88349

Addressee / Facility: Not Reported

Facility Latitude: 32 47 5.0000 Facility Longitude: 105 48 8.0000
Facility Latitude: 32 47 6.0000 Facility Longitude: 105 48 8.0000
City Served: Not Reported
Treatment Class: Treated Population: 120

Violations information not reported.

ENFORCEMENT INFORMATION:

Truedate: 03/31/2009 Pwsid: NM3564119
Pwsname: NATIONAL SOLAR OBSERVATORY
Retpopsrvd: 125 Pwstypecod: C
Vioid: 1V00 Contaminant: 7000
Viol. Type: CCR Complete Failure to Report
Complperbe: 10/19/1999 0:00:00
Complperen: 3/1/2000 0:00:00 Enfdate: 3/1/2000 0:00:00
Enf action: Fed Compliance Achieved
Violmeasur: 0

Truedate:	03/31/2009	Pwsid:	NM3564119
Pwsname:	NATIONAL SOLAR OBSERVATORY		
Retpopsrvd:	125	Pwstypecod:	C
Vioid:	5004	Contaminant:	COLIFORM (TCR)
Viol. Type:	Monitoring, Routine Major (TCR)		
Complperbe:	11/1/2003 0:00:00		
Complperen:	11/30/2003 0:00:00	Enfdate:	12/11/2003 0:00:00
Enf action:	State Public Notif Requested		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	NM3564119
Pwsname:	NATIONAL SOLAR OBSERVATORY		
Retpopsrvd:	125	Pwstypecod:	C
Vioid:	5004	Contaminant:	COLIFORM (TCR)
Viol. Type:	Monitoring, Routine Major (TCR)		
Complperbe:	11/1/2003 0:00:00		
Complperen:	11/30/2003 0:00:00	Enfdate:	12/11/2003 0:00:00
Enf action:	State Violation/Reminder Notice		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	NM3564119
Pwsname:	NATIONAL SOLAR OBSERVATORY		
Retpopsrvd:	125	Pwstypecod:	C
Vioid:	5004	Contaminant:	COLIFORM (TCR)
Viol. Type:	Monitoring, Routine Major (TCR)		
Complperbe:	11/1/2003 0:00:00		
Complperen:	11/30/2003 0:00:00	Enfdate:	12/22/2003 0:00:00
Enf action:	State Public Notif Received		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	NM3564119
Pwsname:	NATIONAL SOLAR OBSERVATORY		
Retpopsrvd:	125	Pwstypecod:	C
Vioid:	5005	Contaminant:	COLIFORM (TCR)
Viol. Type:	MCL, Monthly (TCR)		
Complperbe:	11/1/2006 0:00:00		
Complperen:	11/30/2006 0:00:00	Enfdate:	11/14/2006 0:00:00
Enf action:	State Violation/Reminder Notice		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	NM3564119
Pwsname:	NATIONAL SOLAR OBSERVATORY		
Retpopsrvd:	125	Pwstypecod:	C
Vioid:	5005	Contaminant:	COLIFORM (TCR)
Viol. Type:	MCL, Monthly (TCR)		
Complperbe:	11/1/2006 0:00:00		
Complperen:	11/30/2006 0:00:00	Enfdate:	11/14/2006 0:00:00
Enf action:	State Public Notif Requested		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	NM3564119
Pwsname:	NATIONAL SOLAR OBSERVATORY		
Retpopsrvd:	125	Pwstypecod:	C
Vioid:	5005	Contaminant:	COLIFORM (TCR)
Viol. Type:	MCL, Monthly (TCR)		
Complperbe:	11/1/2006 0:00:00		
Complperen:	11/30/2006 0:00:00	Enfdate:	11/27/2006 0:00:00
Enf action:	State Public Notif Received		
Violmeasur:	Not Reported		

ENFORCEMENT INFORMATION:

System Name:	SACRAMENTO PEAK OBSERVATOR		
Violation Type:	CCR Complete Failure to Report		
Contaminant:	7000		
Compliance Period:	1999-10-19 - 2000-03-01		
Violation ID:	00V0001		
Enforcement Date:	2000-03-01	Enf. Action:	Fed Compliance Achieved
System Name:	NATIONAL SOLAR OBSERVATORY		
Violation Type:	CCR Complete Failure to Report		
Contaminant:	7000		
Compliance Period:	10/19/1999 0:00:00 - 3/1/2000 0:00:00		
Violation ID:	1V00		
Enforcement Date:	3/1/2000 0:00:00	Enf. Action:	Fed Compliance Achieved
System Name:	NATIONAL SOLAR OBSERVATORY		
Violation Type:	CCR Complete Failure to Report		
Contaminant:	7000		
Compliance Period:	10/19/99 - 03/01/00		
Violation ID:	1V00		
Enforcement Date:	03/01/00	Enf. Action:	Fed Compliance Achieved
System Name:	NATIONAL SOLAR OBSERVATORY		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	11/1/2003 0:00:00 - 11/30/2003 0:00:00		
Violation ID:	5004		
Enforcement Date:	12/11/2003 0:00:00	Enf. Action:	State Public Notif Requested
System Name:	NATIONAL SOLAR OBSERVATORY		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	11/1/2003 0:00:00 - 11/30/2003 0:00:00		
Violation ID:	5004		
Enforcement Date:	12/22/2003 0:00:00	Enf. Action:	State Public Notif Received
System Name:	NATIONAL SOLAR OBSERVATORY		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	11/01/03 - 11/30/03		
Violation ID:	5004		
Enforcement Date:	12/11/03	Enf. Action:	State Public Notif Requested
System Name:	NATIONAL SOLAR OBSERVATORY		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	11/01/03 - 11/30/03		
Violation ID:	5004		
Enforcement Date:	12/22/03	Enf. Action:	State Public Notif Received
System Name:	NATIONAL SOLAR OBSERVATORY		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	11/1/2003 0:00:00 - 11/30/2003 0:00:00		
Violation ID:	5004		
Enforcement Date:	12/11/2003 0:00:00	Enf. Action:	State Violation/Reminder Notice
System Name:	NATIONAL SOLAR OBSERVATORY		
Violation Type:	Monitoring, Routine Major (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	11/01/03 - 11/30/03		
Violation ID:	5004		
Enforcement Date:	12/11/03	Enf. Action:	State Violation/Reminder Notice

ENFORCEMENT INFORMATION:

System Name:	NATIONAL SOLAR OBSERVATORY		
Violation Type:	MCL, Monthly (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	11/01/06 - 11/30/06		
Violation ID:	5005		
Enforcement Date:	11/14/06	Enf. Action:	State Violation/Reminder Notice
System Name:	NATIONAL SOLAR OBSERVATORY		
Violation Type:	MCL, Monthly (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	11/01/06 - 11/30/06		
Violation ID:	5005		
Enforcement Date:	11/14/06	Enf. Action:	State Public Notif Requested
System Name:	NATIONAL SOLAR OBSERVATORY		
Violation Type:	MCL, Monthly (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	11/01/06 - 11/30/06		
Violation ID:	5005		
Enforcement Date:	11/27/06	Enf. Action:	State Public Notif Received

CONTACT INFORMATION:

Name:	NATIONAL SOLAR OBSERVATORY	Population:	125
Contact:	HUNTER, REX	Phone:	Not Reported
Address:	PO BOX 62		
Address 2:	SUNSPOT		
	NM, 88 575-4		

2
ENE
1/2 - 1 Mile
Higher

NM WELLS **NM3000000027811**

Objectid:	204696		
Pod rec nb:	161550		
Pod basin:	SP	Pod nbr:	03640
Pod suffix:	Not Reported		
Northing:	3628794		
Easting:	425035		
Grant :	Not Reported	County:	OT
Tws:	17S	Rng:	11E
Sec:	27	Qtr 4th:	4
Qtr 16th:	4	Qtr 64th:	2
Start date:	08/31/47	Finish dat:	12/31/30
Plug date:	03/09/88		
Depth well:	0		
Grnd wtr s:	Not Reported		
Depth wate:	0		
Estimate y:	0		
Casing siz:	0		
Subdiv nam:	Not Reported	Blk:	Not Reported
Wrats s id:	0		
Legal desc:	Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Pod name:	Not Reported		
Elevation:	0		
Aquifer:	Not Reported		
Lat deg:	0		
Lat min:	0		
Lat sec:	0		
Lon deg:	0		
Lon min:	0		
Lon sec:	0		
Pod status:	ACT	Ditch name:	SEEP SPRING
Utm zone:	13	Utm source:	G
Utm accura:	0	Tract nbr:	Not Reported
Map nbr:	Not Reported	Utm error:	Not Reported
Oid :	124419		
Own end da:	12/30/99	Own lname:	UNITED STATES OF AMERICA
Own fname:	Not Reported	Addr1:	LINCOLN NAT'L FORREST
Addr2:	FEDERAL BLDG, 11TH & NEW YORK	City:	ALAMOGORDO
State:	NM	Zip:	Not Reported
Use:	72-12-1 LIVESTOCK WATERING		
Total div:	.16		
Site id:	NM3000000027811		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: NM Radon

Radon Test Results

Zip	Total Sites	Pct. < 4 Pci/L	4 < 10 Pci/L	10 < 20 Pci/L	> 20 Pci/L
88317	2	50.0	50.0	0.0	0.0

Federal EPA Radon Zone for OTERO County: 2

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 88317

Number of sites tested: 3

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	9.233 pCi/L	33%	33%	33%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

OTHER STATE DATABASE INFORMATION

RADON

State Database: NM Radon
Source: Environment Department
Telephone: 505-827-1093
Radon Test Results

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary faultlines, prepared in 1975 by the United State Geological Survey

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

Attachment C
Aerial Photographs and Topographic Maps

NSF - Sacramento Peak Observatory
Sunspot
Cloudcroft, NM 88317

Inquiry Number: 4218013.9
February 26, 2015

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th Floor
Shelton, Connecticut 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Date EDR Searched Historical Sources:

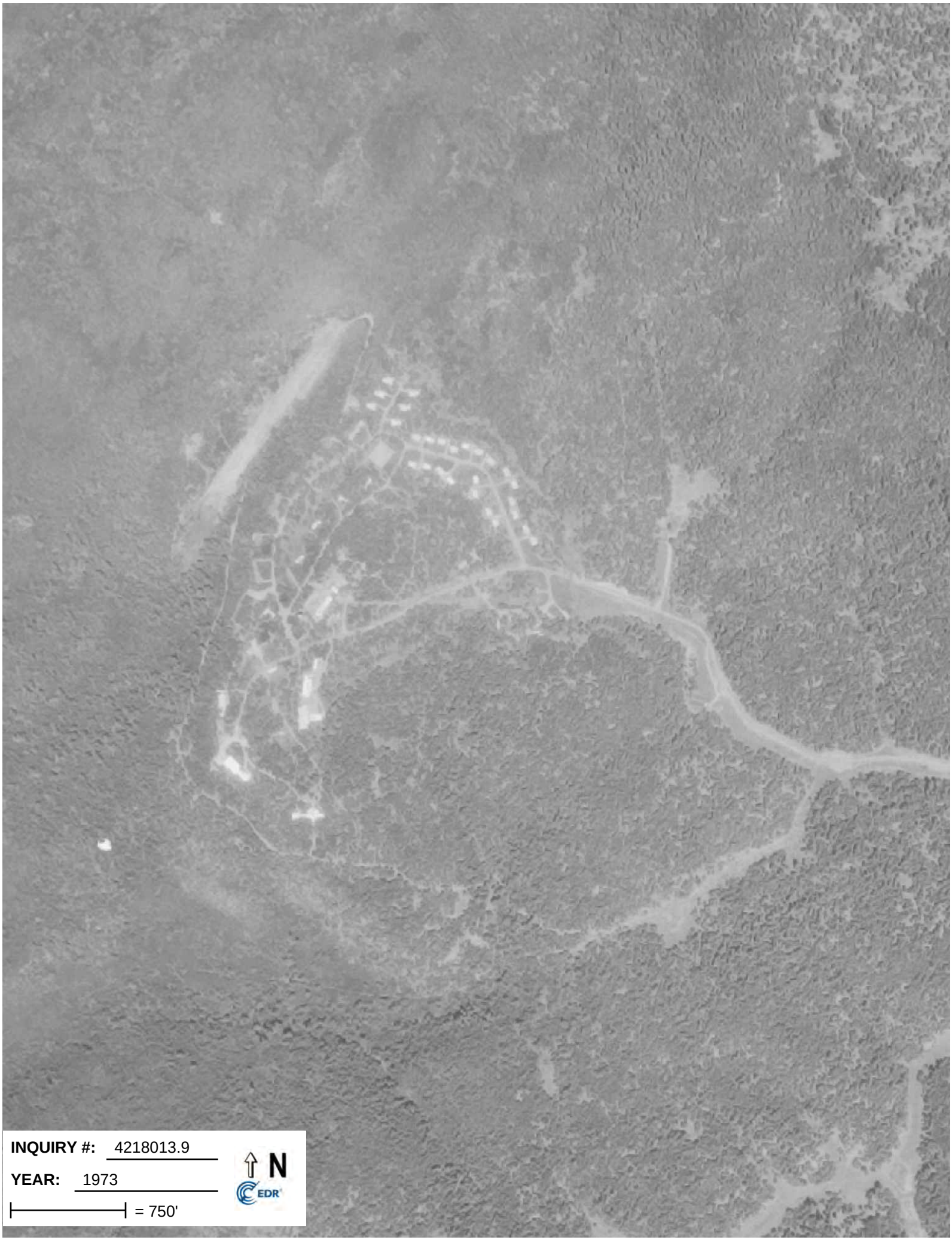
Aerial Photography February 26, 2015

Target Property:

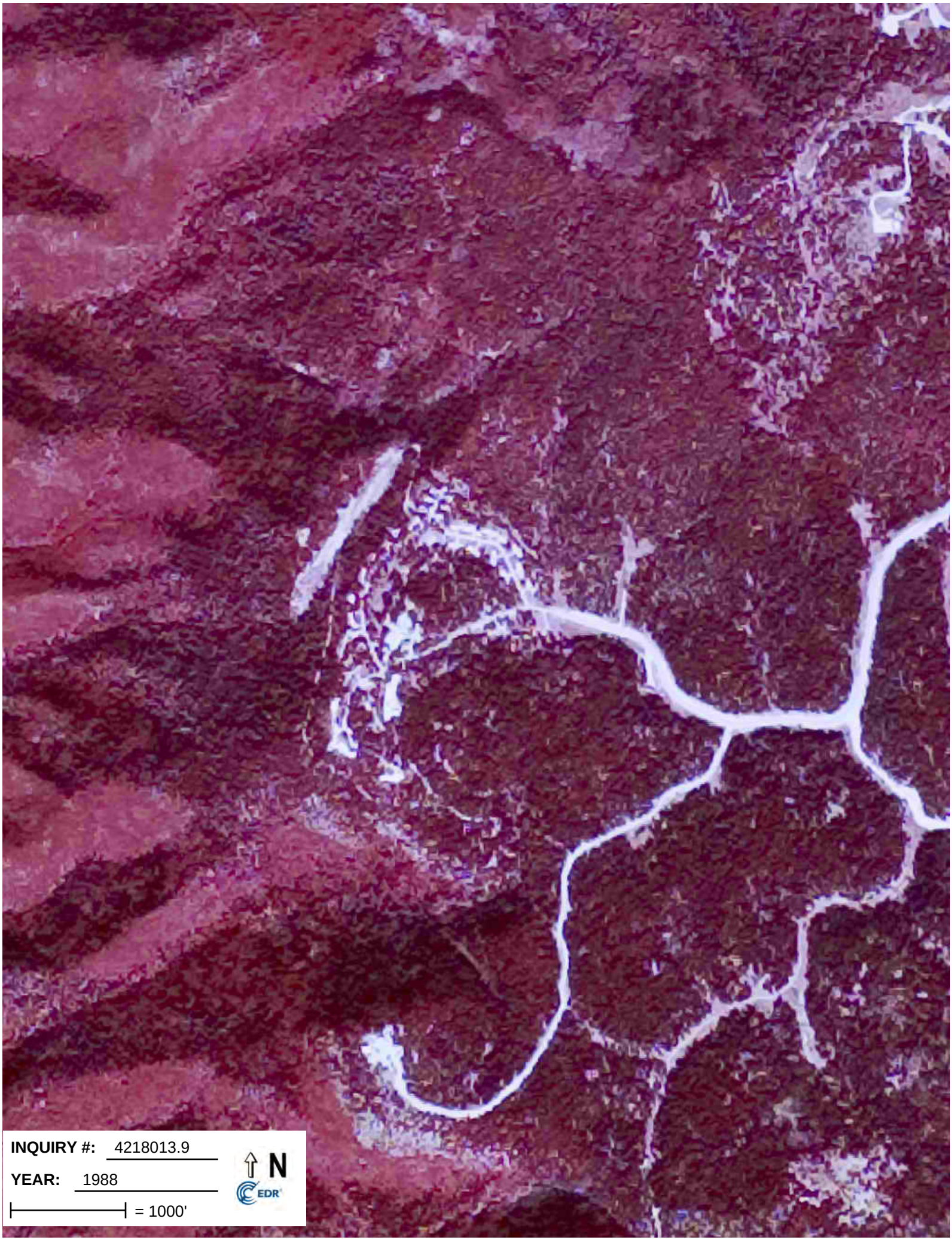
Sunspot

Cloudcroft, NM 88317

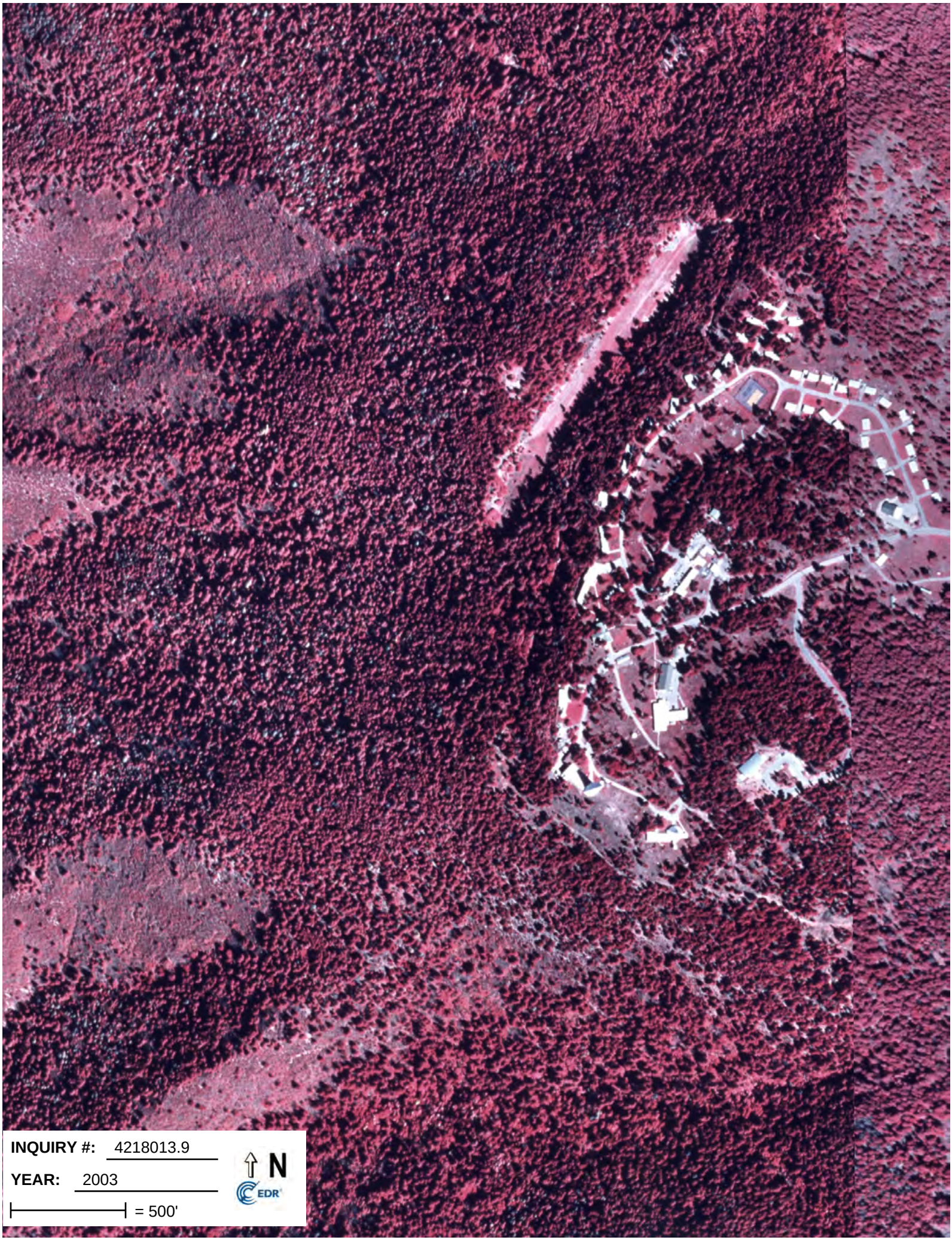
Year	***Scale***	***Details***	***Source***
1973	Aerial Photograph. Scale: 1"=750'	Flight Date: August 06, 1973	EDR
1982	Aerial Photograph. Scale: 1"=1000'	Flight Date: October 02, 1982	EDR
1988	Aerial Photograph. Scale: 1"=1000'	Flight Date: September 26, 1988	EDR
1996	Aerial Photograph. Scale: 1"=750'	Flight Date: October 11, 1996	EDR
2003	Aerial Photograph. Scale: 1"=500'	DOQQ - acquisition dates: September 26, 2003	USGS/DOQQ
2003	Aerial Photograph. Scale: 1"=500'	DOQQ - acquisition dates: September 26, 2003	USGS/DOQQ
2009	Aerial Photograph. Scale: 1"=500'	Flight Year: 2009	USDA/NAIP
2009	Aerial Photograph. Scale: 1"=500'	Flight Year: 2009	USDA/NAIP
2011	Aerial Photograph. Scale: 1"=500'	Flight Year: 2011	USDA/NAIP
2011	Aerial Photograph. Scale: 1"=500'	Flight Year: 2011	USDA/NAIP

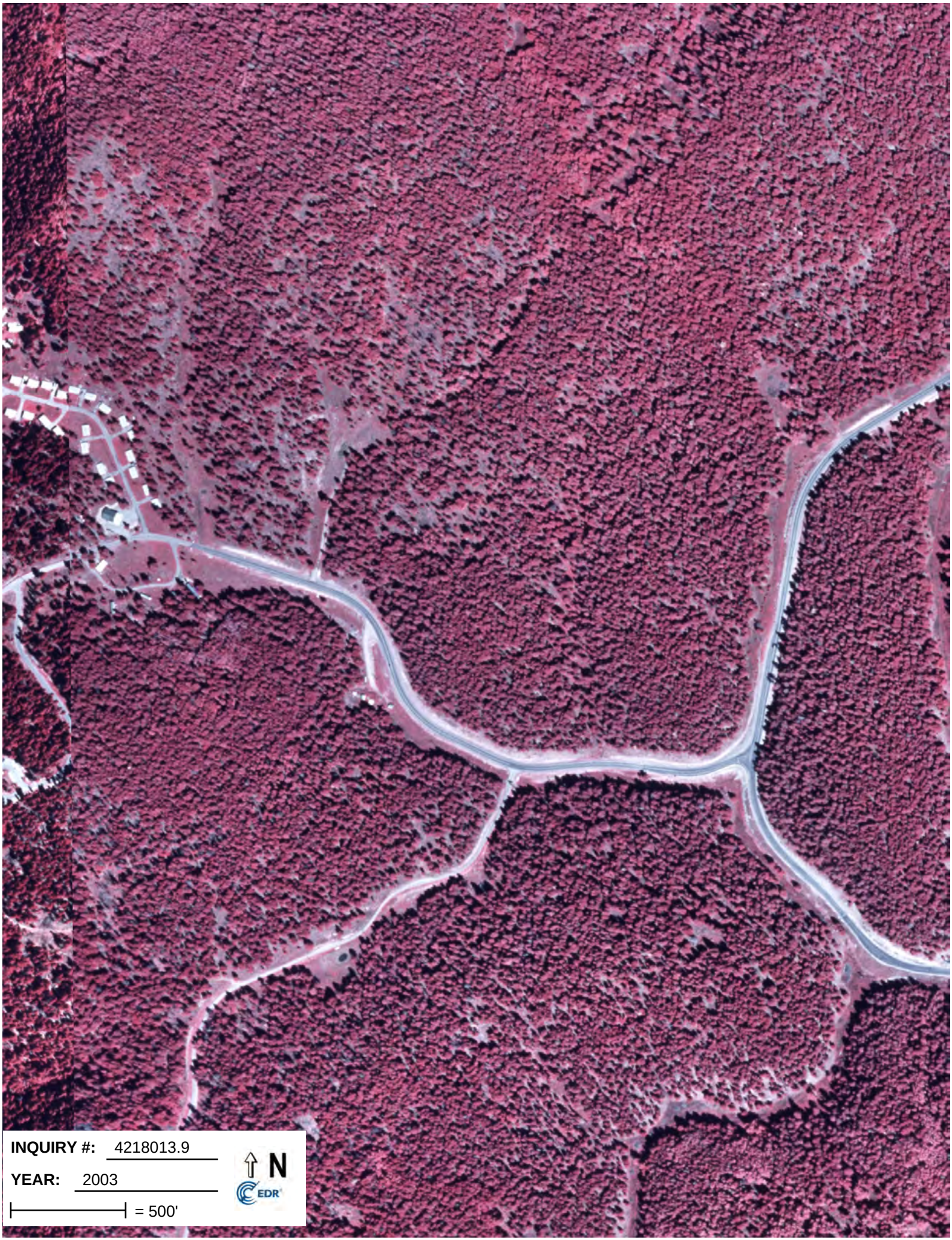

INQUIRY #: 4218013.9
YEAR: 1973
= 750'
N
EDR


INQUIRY #: 4218013.9
YEAR: 1982
= 1000'
N
EDR


INQUIRY #: 4218013.9
YEAR: 1988
= 1000'
N
EDR


INQUIRY #: 4218013.9
YEAR: 1996
= 750'
N
EDR


INQUIRY #: 4218013.9
YEAR: 2003
= 500'
N
EDR


INQUIRY #: 4218013.9
YEAR: 2003
= 500'
N
EDR


INQUIRY #: 4218013.9
YEAR: 2009
= 500'
N
EDR


INQUIRY #: 4218013.9
YEAR: 2009
= 500'
N
EDR


INQUIRY #: 4218013.9
YEAR: 2011
= 500'
N
EDR


INQUIRY #: 4218013.9
YEAR: 2011
= 500'
N
EDR

NSF - Sacramento Peak Observatory
Sunspot
Cloudcroft, NM 88317

Inquiry Number: 4218013.4
February 25, 2015

EDR Historical Topographic Map Report

6 Armstrong Road, 4th Floor
Shelton, Connecticut 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topographic Map Report

Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

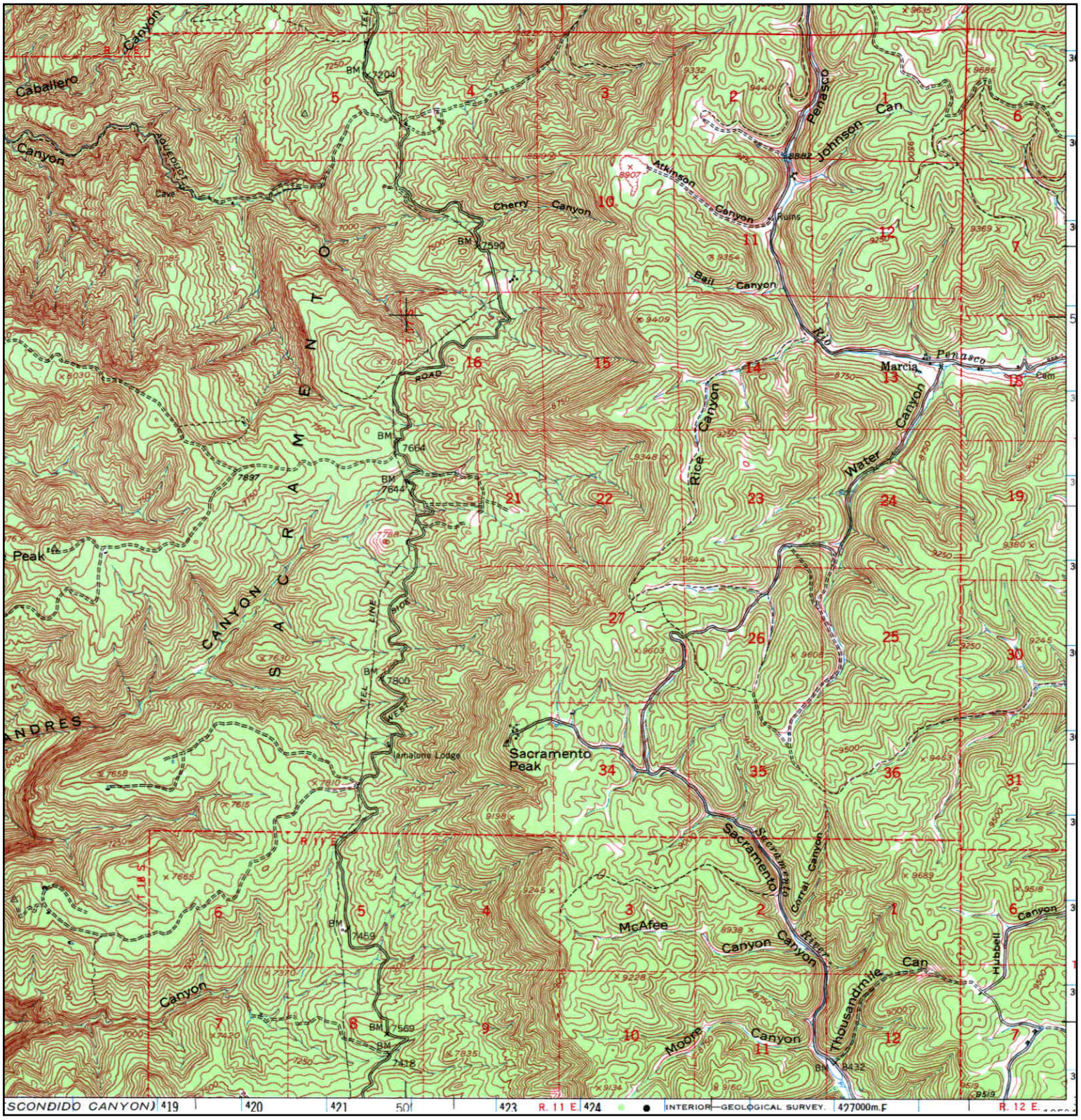
Historical Topographic Map

Unsurveyed Area on the Topographic Map

N

TARGET QUAD		SITE NAME:	NSF - Sacramento Peak Observatory	CLIENT:	CH2M Hill, Inc.
NAME:	ALAMO NATIONAL FOREST	ADDRESS:	Sunspot Cloudcroft, NM 88317	CONTACT:	Jean Bossart
MAP YEAR:	1914	LAT/LONG:	32.7898 / -105.8162	INQUIRY#:	4218013.4
SERIES:	60			RESEARCH DATE:	02/25/2015
SCALE:	1:250000				

Historical Topographic Map



N	TARGET QUAD NAME: ALAMOGORDO MAP YEAR: 1950 SERIES: 15 SCALE: 1:62500	SITE NAME: NSF - Sacramento Peak Observatory ADDRESS: Sunspot Cloudcroft, NM 88317 LAT/LONG: 32.7898 / -105.8162	CLIENT: CH2M Hill, Inc. CONTACT: Jean Bossart INQUIRY#: 4218013.4 RESEARCH DATE: 02/25/2015

Historical Topographic Map

N	TARGET QUAD NAME: SACRAMENTO PEAK MAP YEAR: 1981 SERIES: 7.5 SCALE: 1:24000	SITE NAME: NSF - Sacramento Peak Observatory ADDRESS: Sunspot Cloudcroft, NM 88317 LAT/LONG: 32.7898 / -105.8162	CLIENT: CH2M Hill, Inc. CONTACT: Jean Bossart INQUIRY#: 4218013.4 RESEARCH DATE: 02/25/2015

Historical Topographic Map

N	TARGET QUAD NAME: SACRAMENTO PEAK MAP YEAR: 2004 SERIES: 7.5 SCALE: 1:24000	SITE NAME: NSF - Sacramento Peak Observatory ADDRESS: Sunspot Cloudcroft, NM 88317 LAT/LONG: 32.7898 / -105.8162	CLIENT: CH2M Hill, Inc. CONTACT: Jean Bossart INQUIRY#: 4218013.4 RESEARCH DATE: 02/25/2015

Appendix 3E

Socioeconomics Information

Appendix 3E

Employment and Median Earnings for 2009 and 2014 by Occupation for the City of Alamogordo, Otero County and the State of New Mexico (in 2014 inflation-adjusted dollars [a])

	City of Alamogordo					Otero County					New Mexico				
	2009 Estimate	2014 Estimate	2014 % Distribution	2009 - 2014 % Change	2014 Median earnings (dollars)	2009 Estimate	2014 Estimate	2014 % Distribution	2009 - 2014 % Change	2014 Median earnings (dollars)	2009 Estimate	2014 Estimate	2014 % Distribution	2009 - 2014 % Change	2014 Median earnings (dollars)
Civilian employed population 16 years and over	15,347	11,691		-24%	$25,857	25,560	22,243		-13%	$25,975	877,146	875,947		-0.1%	$30,018
Management, business, science, and arts occupations:	4,103	3,143	27%	-23%	$45,186	6,709	6,048	27%	-10%	$44,171	295,963	311,860	36%	5%	$48,300
Management, business, and financial occupations:	1,526	1,107	35%	-27%	$51,042	2,416	2,038	34%	-16%	$50,017	106,760	112,117	36%	5%	$52,382
Management occupations	1,264	851	77%	-33%	$56,319	1,833	1,476	72%	-19%	$50,551	76,223	79,089	71%	4%	$55,041
Business and financial operations occupations	262	256	23%	-2%	$36,757	583	562	28%	-4%	$44,904	30,537	33,028	29%	8%	$47,640
Computer, engineering, and science occupations:	600	364	12%	-39%	$51,964	942	925	15%	-2%	$58,125	51,272	49,025	16%	-4%	$67,677
Computer and mathematical occupations	155	95	26%	-39%	$38,125	226	312	34%	38%	$60,833	16,736	16,930	35%	1%	$62,790
Architecture and engineering occupations	384	181	50%	-53%	$65,721	566	484	52%	-14%	$59,306	21,434	20,143	41%	-6%	$76,406
Life, physical, and social science occupations	61	88	24%	44%	$40,000	150	129	14%	-14%	$47,546	13,102	11,952	24%	-9%	$61,545
Education, legal, community service, arts, and media occupations:	1,366	1,070	34%	-22%	$40,665	2,290	1,973	33%	-14%	$39,095	97,775	102,323	33%	5%	$36,764
Community and social services occupations	437	141	13%	-68%	$48,750	592	251	13%	-58%	$45,804	14,860	16,765	16%	13%	$35,259
Legal occupations	102	98	9%	-4%	$42,432	119	131	7%	10%	$61,875	9,676	10,006	10%	3%	$56,495
Education, training, and library occupations	689	711	66%	3%	$40,920	1,209	1,450	73%	20%	$36,348	56,766	60,206	59%	6%	$37,065
Arts, design, entertainment, sports, and media occupations	138	120	11%	-13%	$22,344	370	141	7%	-62%	$21,534	16,473	15,346	15%	-7%	$26,896
Healthcare practitioner and technical occupations:	611	602	19%	-1%	$43,750	1,061	1,112	18%	5%	$44,643	40,156	48,395	16%	21%	$52,835
Health diagnosing and treating practitioners and other technical occupations	333	415	69%	25%	$47,331	488	794	71%	63%	$47,425	27,060	33,798	70%	25%	$61,438
Health technologists and technicians	278	187	31%	-33%	$28,946	573	318	29%	-45%	$29,679	13,096	14,597	30%	11%	$35,498
Service occupations:	3,122	3,082	26%	-1%	$15,232	5,870	5,598	25%	-5%	$15,165	164,644	180,054	21%	9%	$16,074
Healthcare support occupations	432	384	12%	-11%	$16,866	793	774	14%	-2%	$20,602	20,186	23,519	13%	17%	$19,448
Protective service occupations:	467	563	18%	21%	$43,583	799	993	18%	24%	$44,350	23,045	24,679	14%	7%	$40,007
Firefighting and prevention, other protective service workers and supervisors	339	314	56%	-7%	$33,571	486	556	56%	14%	$38,750	13,668	13,325	54%	-3%	$32,329
Law enforcement workers including supervisors	128	249	44%	95%	$49,688	313	437	44%	40%	$47,038	9,377	11,354	46%	21%	$46,394
Food preparation and serving related occupations	859	862	28%	0%	$10,890	1,560	1,514	27%	-3%	$10,689	50,625	55,253	31%	9%	$12,271
Building and grounds cleaning and maintenance occupations	587	540	18%	-8%	$12,875	1,088	1,156	21%	6%	$10,685	36,885	38,342	21%	4%	$15,722
Personal care and service occupations	777	733	24%	-6%	$12,411	1,630	1,161	21%	-29%	$12,889	33,903	38,261	21%	13%	$14,047
Sales and office occupations:	4,528	3,043	26%	-33%	$21,860	6,746	5,387	24%	-20%	$21,991	215,435	203,765	23%	-5%	$24,823
Sales and related occupations	2,031	1,041	34%	-49%	$12,969	2,906	2,091	39%	-28%	$15,961	93,804	88,837	44%	-5%	$21,687
Office and administrative support occupations	2,497	2,002	66%	-20%	$25,502	3,840	3,296	61%	-14%	$25,708	121,631	114,928	56%	-6%	$26,062
Natural resources, construction, and maintenance occupations:	2,274	1,805	15%	-21%	$26,929	3,857	3,559	16%	-8%	$27,303	115,075	99,875	11%	-13%	$31,127
Farming, fishing, and forestry occupations	31	94	5%	203%	$2,833	218	287	8%	32%	$25,536	9,344	9,740	10%	4%	$20,317
Construction and extraction occupations	1,070	813	45%	-24%	$26,312	2,129	1,562	44%	-27%	$25,741	70,931	56,995	57%	-20%	$31,074
Installation, maintenance, and repair occupations	1,173	898	50%	-23%	$35,163	1,510	1,710	48%	13%	$30,861	34,800	33,140	33%	-5%	$35,955
Production, transportation, and material moving occupations:	1,320	618	5%	-53%	$29,318	2378	1,651	7%	-31%	$25,333	86,029	80,393	9%	-7%	$27,345
Production occupations	387	177	29%	-54%	$47,798	960	589	36%	-39%	$18,924	39,433	33,760	42%	-14%	$27,057
Transportation occupations	734	316	51%	-57%	$42,500	1032	774	47%	-25%	$29,545	31,104	31,149	39%	0%	$32,104
Material moving occupations	199	125	20%	-37%	$13,826	386	288	17%	-25%	$13,636	15,492	15,484	19%	0%	$18,679

Sources: USCB, 2009, 2014

[a] Inflation-adjusted dollars are calculated using the average Consumer Price Index for a given calendar year and represent the change “buying power” because of the increases in the prices of all goods and services purchased by consumers.

Appendix 5A

Notice of Intent

and Evaluation Center, ATTN: UAS Federal Register Response, Johns Hopkins University Applied Physics Laboratory, 11100 Johns Hopkins Road, Mail Stop 17N444, Laurel, MD 20723–6099.

FOR FURTHER INFORMATION CONTACT: For more information on this request for information contact Emre Gunduzhan (NIJ RT&E Center) at (240) 228–7269 or *administrator@nijrtecenter.org.* For more information on the NIJ RT&E Center, visit *http://nij.gov/funding/awards/pages/award-detail.aspx?award=2013-MU-CX-K111* and view the description or contact Martin Novak (NIJ Research Division) at (202) 598–7795. Please note that these are not toll-free telephone numbers.

Nancy Rodriguez,

Director, National Institute of Justice.

[FR Doc. 2016–15804 Filed 7–1–16; 8:45 am]

BILLING CODE 4410–18–P

DEPARTMENT OF LABOR

Employment and Training Administration

Notice of Availability of Funds and Funding Opportunity Announcement for Disability Employment Initiative Cooperative Agreements

AGENCY: Employment and Training Administration, Labor.

ACTION: Notice of Funding Opportunity Announcement (FOA).

Funding Opportunity Number: FOA–ETA–16–07.

SUMMARY: The Employment and Training Administration (ETA), U.S. Department of Labor (DOL, or the Department, or we), announces the availability of approximately $15.6 million in grant funds authorized by Section 169, subsection (b), of the Workforce Innovation and Opportunity Act (WIOA).

The purpose of this program is to provide funding to expand the capacity of American Job Centers (AJCs), also known as One-Stop Centers, to improve the employment outcomes of three population focus areas: (1) Adults (ages 18 and older) with visible and non-visible disabilities, including those who have acquired disabilities in adulthood; (2) youth (ages 14–24) with visible and non-visible disabilities, including those who have chronic health conditions; and (3) individuals (ages 14 and older) with significant disabilities. The DEI plans to accomplish this by increasing their participation in career pathways systems and successful existing programs in the public workforce system in partnership with vocational rehabilitation, community colleges and other education, human service, and business partners. Capitalizing on the flexibility that the career pathways model provides to use innovative service delivery strategies, grantees will use their award to support job-driven approaches in their pre-existing career pathway systems and programs. This will further equip individuals with disabilities with the skills, competencies, and credentials necessary to help them obtain in-demand jobs, increase earnings, and advance their careers.

The Department intends to award at least one cooperative agreement in each of three population focus areas: (1) Adults (ages 18 and older) with visible and non-visible disabilities, including those who have acquired disabilities in adulthood; (2) youth (ages 14–24) with visible and non-visible disabilities, including those who have chronic health conditions; and (3) individuals (ages 14 and older) with significant disabilities.

We expect to fund approximately 8 cooperative agreements (as defined in 2 CFR 200.24) to state workforce agencies, ranging from $1.5 million to $2.5 million each. Applicants may also include entities receiving funds under WIOA Section 166 grants. An eligible applicant is a tribe, tribal consortium, or tribal non-profit organization that receives funds under WIOA Section 166 Indian and Native American Program. States that received DEI Round VI funds are not eligible for funding under this FOA.

The complete FOA and any subsequent FOA amendments in connection with this funding opportunity are described in further detail on ETA's Web site at *https://www.doleta.gov/grants/find_grants.cfm* or on *http://www.grants.gov.* The Web sites provide application information, eligibility requirements, review and selection procedures, and other program requirements governing this funding opportunity.

DATES: The closing date for receipt of applications under this announcement is August 1, 2016. Applications must be received no later than 4:00:00 p.m. Eastern Time.

FOR FURTHER INFORMATION CONTACT: Erika Beasley, 200 Constitution Avenue NW., Room N–4716, Washington, DC 20210; Telephone: 202–693–3906.

Jimmie Curtis is the Grant Officer for the Funding Opportunity Announcement.

Signed June 29, 2016, in Washington, DC.

Donna Kelly,

Grant Officer, Employment and Training Administration.

[FR Doc. 2016–15830 Filed 7–1–16; 8:45 am]

BILLING CODE 4510–FN–P

NATIONAL SCIENCE FOUNDATION

Notice of Intent To Prepare an Environmental Impact Statement and Initiate Consultation for Proposed Changes to Sacramento Peak Observatory Operations, Sunspot, New Mexico; Notice of Public Scoping Meetings and Comment Period

AGENCY: National Science Foundation.

ACTION: Notice of intent to prepare an environmental impact statement and public scoping meetings and comment period.

SUMMARY: In compliance with the National Environmental Policy Act of 1969, as amended, the National Science Foundation (NSF) intends to prepare an environmental impact statement (EIS) to evaluate potential environmental effects of proposed changes to operations at Sacramento Peak Observatory, in Sunspot, New Mexico. (See **SUPPLEMENTARY INFORMATION** below for more detail.) By this notice, NSF is announcing the beginning of the scoping process to solicit public comments and identify issues to be analyzed in the EIS. At this juncture, NSF would welcome public comments on the preliminary proposed alternatives and resource areas identified for analysis. NSF also intends to initiate consultation under section 106 of the National Historic Preservation Act to evaluate potential effects to the Sacramento Peak Observatory.

DATES: This notice initiates the public scoping process for the EIS and the initiation of public involvement under section 106 per 36 CFR 800.2(d). Comments on issues may be submitted verbally during the scoping meeting scheduled for July 21, 2016 (see details in **SUPPLEMENTARY INFORMATION**), or in writing until August 5, 2016. To be eligible for inclusion in the Draft EIS, all comments must be received prior to the close of the scoping period. NSF will provide additional opportunities for public participation upon publication of the Draft EIS.

ADDRESSES: You may submit comments related to this proposal by either of the following methods:

• *Email to: envcomp-AST-sacpeak@nsf.gov,* with subject line ''Sacramento Peak Observatory''.

• *Mail to:* Ms. Elizabeth Pentecost, RE: Sacramento Peak Observatory, National Science Foundation, Suite 1045, 4201 Wilson Blvd., Arlington, VA 22230.

FOR FURTHER INFORMATION CONTACT: For further information regarding the EIS process or Section 106 consultation, please contact: Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, VA 22230; telephone: (703) 292–4907; email: *epenteco@nsf.gov.*

SUPPLEMENTARY INFORMATION: Sacramento Peak Observatory is located in Sunspot, New Mexico, within the Lincoln National Forest in the Sacramento Mountains. Established by the U.S. Air Force via a memorandum of agreement with the U.S. Forest Service in 1950, the facility was transferred to the National Science Foundation (NSF) in 1976. NSF and the U.S. Forest Service executed a land use agreement (signed in 1980) to formalize this transition and the continued use of the land for the observatory. The primary research facility still in operation at the Sacramento Peak site is the Richard B. Dunn Solar Telescope (DST), currently managed by the National Solar Observatory (NSO). The DST is a high-spatial resolution optical/infrared solar telescope. In addition to its own operations, the Sacramento Peak Observatory supplies water for the nearby Apache Point Observatory (APO).

The NSF Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences, through a series of academic community-based reviews, has identified the need to divest several facilities from its portfolio in order to deliver the best performance on the emerging and key science technology of the present decade and beyond. In 2012, NSF's Division of Astronomical Sciences (AST's) portfolio review committee, under the category of solar facilities stated that, ''AST and NSO should plan for the continued use of the Dunn Solar Telescope (DST) as a world-class scientific observatory, supporting the solar physics community, to within two years of the Advanced Technology Solar Telescope (ATST) [now the Daniel K. Inouye Solar Telescope, DKIST] first light.'' In 2016, in response to this recommendation, NSF completed a feasibility study to inform and define options for the site's future disposition that would involve significantly decreasing or eliminating NSF funding of the Sacramento Peak Observatory. Alternatives to be evaluated in the EIS will be refined through public input, with preliminary proposed alternatives that include the following:

- Continued NSF investment for science-focused operations (No-Action Alternative)
- Transition to full operations with interested parties for solar astronomy research
- Transition to partial operations with interested parties, and decommissioning or mothballing of facilities not proposed to be used
- Mothballing of facilities limited to basic maintenance
- Deconstruction and site restoration

The purpose of the public scoping process is to determine relevant issues that will influence the scope of the environmental analysis, including identification of viable alternatives, and guide the process for developing the EIS. At present, NSF has identified the following preliminary resource areas for analysis of potential impacts: Air quality, biological resources, cultural resources, geological resources, solid waste generation, health and safety, socioeconomics, traffic, and groundwater resources. NSF will consult under section 106 of the National Historic Preservation Act and section 7 of the Endangered Species Act in coordination with this EIS process, as appropriate. Federal, state, and local agencies, along with other stakeholders that may be interested or affected by NSF's decision on this proposal are invited to participate in the scoping process and, if eligible, may request to participate as a cooperating agency.

Proposal Information: Information will be posted, throughout the EIS process, at *www.nsf.gov/ast.*

Scoping Meeting: NSF will host one public scoping meeting.

Meeting Date and Location: July 21, 2016, from 6 p.m. to 8 p.m., New Mexico Museum of Space History, 3198 State Route 2001, Alamogordo, NM 88310. Tel: (575) 437–2840.

Comments will be transcribed by a court reporter. Please contact NSF at least one week in advance of the meeting if you would like to request special accommodations (*i.e.,* sign language interpretation, etc.).

Dated: June 24, 2016.

Suzanne H. Plimpton,

Reports Clearance Officer, National Science Foundation.

[FR Doc. 2016–15783 Filed 7–1–16; 8:45 am]

BILLING CODE 7555–01–P

NUCLEAR REGULATORY COMMISSION

[Docket Nos. 50–369 and 50–370; NRC–2016–0049]

Duke Energy Carolinas, LLC; McGuire Nuclear Station, Units 1 and 2; Alternative to the Physical Inventory Requirements for Movable In-Core Detectors

AGENCY: Nuclear Regulatory Commission.

ACTION: Exemption; issuance.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is issuing an exemption for Renewed Facility Operating License Nos. NPF–9 and NPF–17, issued to Duke Energy Carolinas, LLC (the licensee) that would allow an alternative to the physical inventory requirements for movable in-core detectors for the McGuire Nuclear Station, Units 1 and 2 (McGuire), located in Mecklenburg County, North Carolina.

DATES: July 5, 2016.

ADDRESSES: Please refer to Docket ID NRC–2016–0049 when contacting the NRC about the availability of information regarding this document. You may obtain publicly-available information related to this document using any of the following methods:

• *Federal Rulemaking Web site:* Go to *http://www.regulations.gov* and search for Docket ID NRC–2016–0049. Address questions about NRC dockets to Carol Gallagher; telephone: 301–415–3463; email: *Carol.Gallagher@nrc.gov.* For technical questions, contact the individual listed in the **FOR FURTHER INFORMATION CONTACT** section of this document.

The exemption is being withheld from public disclosure pursuant section 2.390 of title 10 of the *Code of Federal Regulations* (10 CFR), because it contains official use only security-related information. A non-sensitive summary of the exemption is included in this notice.

FOR FURTHER INFORMATION CONTACT: G. Edward Miller, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001; telephone: 301–415–2481, email: *Ed.Miller@nrc.gov.*

SUPPLEMENTARY INFORMATION:

I. Background

Duke Energy Carolinas, LLC is the holder of Renewed Facility Operating License Nos. NPF–9 and NPF–17, which authorize operation of McGuire. The license provides, among other things, that the facility is subject to all rules,

Appendix 5B

Newspaper Advertisements

THE NATION

Police kill Illinois man in shootout

EAST ST. LOUIS, Ill. — A nude man armed with a shotgun and a pistol was killed in an exchange of shots with police Monday morning after he stood in a street firing at homes and pointing a weapon at passing motorists, officials said.

Illinois state police, who are investigating but did not participate in the shooting, identified the dead man as Jason Brooks, 41, of East St. Louis.

"Brooks discharged a weapon at bystanders and then in the direction of two black, male officers, who returned fire," according to a prepared statement from the state police. Brooks also is black. No one else was wounded.

East St. Louis Police Chief Michael Hubbard said the man was spotted about 6 a.m. He was still firing when two officers arrived, said Washington Park Police Chief Tony Tomlinson.

"Some cars were hit, and there were bullets in houses," Tomlinson said. Police "felt he was a threat, and he was pointing at cars. They realized that they couldn't de-escalate it and thought everyone out there was in danger."

House passes bill regulating aviation

WASHINGTON — The House has passed an aviation bill aimed at boosting airport security, reducing screening lines and refunding fees to passengers whose luggage is lost or arrives late.

The bill also extends the Federal Aviation Administration's programs for 14 months at current funding levels. It was approved by a voice vote.

House and Senate lawmakers reached an agreement last week clearing the way for passage after the chairman of the House Transportation Committee, Pennsylvania congressman Bill Shuster, agreed to temporarily drop his effort to remove air traffic control operations from the FAA and place them under a private, nonprofit corporation.

The Senate is expected to vote later this week. The FAA's current operating authority expires Friday.

CVS: Woman stole nail polish in bulk

NEW ORLEANS — New Orleans police said a 27-year-old woman is accused of stealing $860 worth of fingernail polish from a CVS drug store — in one day.

Authorities said in a news release that Raushawn Ford was arrested Monday and held without bond on charges of theft and possessing stolen property. The news release quoted CVS' loss prevention officer as saying that Ford also had stolen from two other stores.

The release did not elaborate on when and how Ford allegedly stole the polish.

According to the CVS website, it sells nail polish for anywhere from 99 cents to $17 a bottle.

— Journal Wire Reports

Inmate kills 2 bailiffs at Mich. courthouse

CHELSEA PURGAHN/KALAMAZOO GAZETTE

Police tape surrounds the Berrien County Courthouse in St. Joseph, Mich., on Monday. Two bailiffs were shot and killed inside the courthouse by a jail inmate before court officers killed the gunman Monday morning.

Deputy, civilian also hurt in escape attempt

BY DAVID EGGERT AND ED WHITE
ASSOCIATED PRESS

ST. JOSEPH, Mich. — A jail inmate trying to escape from a western Michigan courthouse wrested a gun from an officer Monday, killing two bailiffs and injuring two more people before he was fatally shot by other officers, a sheriff said.

People scrambled for cover inside the Berrien County Courthouse in St. Joseph, a city of about 8,300 people in the southwestern corner of Michigan, about 100 miles northeast of Chicago.

"Our hearts are torn apart. ... I have known them for over 30 years. It's a sad day," Sheriff Paul Bailey said of the bailiffs.

Larry Darnell Gordon, 44, who was locked up on several felony charges, was being moved from a cell for a courtroom appearance when a fight occurred and he was able to disarm an officer, Bailey said. The sheriff did not say what charges the inmate was facing.

Bailey said it does not appear that Gordon was handcuffed, adding authorities had "no warning signs" that the suspect would be violent.

The inmate shot a sheriff's deputy, killed the bailiffs and then shot a civilian in the arm in a public area, the sheriff said.

During the incident, Bailey said Gordon took hostages for a short period before trying to leave through another door. The inmate then was fatally shot "by two other bailiffs who came to render aid, along with several other officers," Bailey said.

"He was trying to escape," the sheriff said.

Bailey identified the bailiffs killed as Joseph Zangaro, 61, and Ronald Kienzle, 63. He said the longtime law enforcement officers were close friends of his who became court officers after retiring from their departments.

Zangaro was head of court security.

Both had been employed by the court for more than a decade.

Sanders' supporters aren't all lined up behind Clinton

Tension between campaigns shows during platform meeting

BY CATHERINE LUCEY
ASSOCIATED PRESS

ORLANDO, Fla. — It looks as if Bernie Sanders is ready to back Hillary Clinton. But not all his supporters are prepared to give up revolution for realism.

CLINTON: Has made policy concessions

SANDERS: Backers have supported liberal planks

After weeks of stalling as he sought liberal policy concessions from Clinton and lobbied to push the party platform to the left, the Vermont senator is expected to appear with Clinton in New Hampshire today to endorse her as the Democratic Party presidential nominee.

Still, despite some major victories in the latest draft of the platform and big concerns about presumptive Republican nominee Donald Trump, many Sanders fans at a Democratic meeting in Orlando over the weekend had clear reservations about casting a ballot for Clinton.

"Personally, I don't think I will support Hillary. I don't trust her," said Lisa Friddle, 53, a nurse from Palm Bay, Fla. "I can't see backing someone I don't believe in."

Those sentiments were echoed by Xavier Gaud, 26, of Orlando, who said he would prefer that Sanders run as an independent. If Sanders isn't on the ballot, he said it was "more likely I will support Jill Stein," the leader of the minor Green Party.

Clinton and Sanders will appear today at a high school in Portsmouth, N.H., the leadoff primary state where he trounced her last winter.

In recent days, Clinton has announced new policies on higher education and health care in a nod to his liberal campaign. The party platform also shows Sanders' influence, with a commitment to a $15 federal minimum wage and tougher language on climate change.

Tensions between the campaigns simmered throughout the platform meeting in a steamy hotel ballroom over two marathon days. Despite winning concessions on many issues, Sanders supporters booed angrily over losses, such as failing to get clear opposition to the Trans-Pacific Partnership trade deal.

Near the meeting's end, Sanders backers angrily shouted down an effort to add Clinton's name to the document in a number of places, which they took as an implication that she was already the official nominee.

Some key progressive groups did start falling in line behind Clinton on Monday. The Communications Workers of America, which had previously backed Sanders, announced its endorsement, as did the Progressive Action PAC, the political committee for the Congressional Progressive Caucus.

Clinton, who needs to capture the liberals and young people who flocked to Sanders to defeat Trump, has also been campaigning with popular Sen. Elizabeth Warren of Massachusetts, and with President Barack Obama.

Trump sympathizes with criticisms of police conduct

GOP candidate still delivers law-and-order message on trail

ASSOCIATED PRESS

VIRGINIA BEACH, Va. — Donald Trump said Monday he believes relations between police and the nation's African-American community are "far worse" than people think, predicting that protests against police violence that followed last week's slaying of five police officers in Dallas "might be just the beginning for this summer."

TRUMP: Says jobs will restore spirits

In an interview with The Associated Press, the presumptive GOP nominee struck a balance between the law-and-order rhetoric he has espoused during his campaign and an appreciation for the concerns held by African-Americans nationwide about the conduct of police.

Trump suggested that a lack of training for officers might be at least partially to blame for the two police shootings that led to last Thursday's protest in Dallas, where a lone gunman killed five in an act of vengeance against white officers. At the same time, Trump denounced the name of the Black Lives Matter movement as "a very divisive term."

The interview followed a speech on veterans issues in which Trump declared, "I am the law and order candidate," an echo of Richard Nixon's response to protest violence that broke out in 1968 following the assassination of Martin Luther King Jr. Like Trump, Nixon was a Republican running for president at the time.

"It's time for our hostility against our police, and against all members of law enforcement, to end, and end immediately, right now," Trump said during his speech, comparing anti-police sentiment to the harassment faced by returning veterans in the aftermath of the Vietnam War.

But Trump also referenced the "tragic deaths in Louisiana and Minnesota" during his event, saying they made clear that "a lot of work" must be done to ensure all Americans feel their safety is being protected.

Trump said he was disturbed by the images of the killings of Alton Sterling, who was shot by police last Tuesday in Baton Rouge, La., after being pinned to the pavement by two officers.

The following day, Philando Castile was fatally shot by an officer in suburban St. Paul, Minn.

"I thought they were horrible, horrible to witness," Trump said. "Whether that's a lack of training or whatever, but I thought they were two incidents that were absolutely horrible to witness. At the same time, our country is losing its spirit. African-Americans are absolutely losing their spirit."

Trump framed that issue in largely economic terms, blaming the mood of the nation's black community on high unemployment and low wages.

"Jobs can solve so many problems," he said. "And we're going to open our country up and we're going to be a huge jobs producer again instead of having terrible jobs.

Asked specifically what he would say to African-Americans who feel targeted by police because of their race, Trump said, "We have to talk to 'em and we have to build up the spirit."

Texas gov. to have skin grafts after scalding

Abbott will miss Obama's Dallas visit

ASSOCIATED PRESS

DALLAS — Texas Gov. Greg Abbott will spend Monday night in hospital and miss President Barack Obama's visit to Dallas in the wake of the deadly shooting as he recovers from extensive burns to his legs and feet caused by scalding hot water.

Abbott's office announced he had developed a "minor infection" after sustaining second- and third-degree burns on both legs below the knee and both feet on Thursday while vacationing with his family in Jackson Hole, Wyo. The Republican will remain at Brooke Army Medical Center in San Antonio, Texas, and today will undergo skin grafts to repair damage to his feet.

Afterward, he's "expected to be discharged and will return to Austin," his office said in a statement, adding, "As a result of today's news, and regretfully, Governor Abbott will not be able to attend tomorrow's memorial service." Abbott's wife, Cecilia, will attend in his place.

Obama cut short a visit to Spain and will be in Dallas to deliver remarks at a memorial service. He also is expected to meet with families of the officers killed.

Abbott spokesman Matt Hirsch has said the governor scalded himself with hot water, but has declined to provide further details. The governor uses a wheelchair after a tree fell on him while he was out for a jog in 1984, leaving him paralyzed from the waist down. Despite that, Hirsh says that Abbott has felt pain as nerve receptors in his legs and feet react to the shock of being burned.

Abbott is chairman of the Texas delegation to next week's Republican National Convention in Cleveland, but his office says he may not be well enough to attend. Monday's statement said that "further decisions on Governor Abbott's schedule continue to be day-to-day."

Obama: America united after painful week

GREGORY KORTE
USA TODAY

WARSAW, Poland - President Barack Obama tried to convey a message of solace and unity Saturday after an extraordinary week that rubbed raw issues of police safety and racial bias in policing, saying he believes Americans will come together to find common ground.

"As painful as the week has been, I fully believe that America is not as divided as people have suggested," he said.

People of all races and backgrounds are outraged by the killing of police officers in Dallas — even those protesting the police, he said. And the same people are angered by the deaths of Alton Sterling and Philando Castile.

Sterling, 37, of Baton Rouge, Louisiana, and Castile, 32, of St. Paul, Minnesota, are both African-American men killed by police in incidents captured on video last week. Their deaths sparked nationwide protests that boiled over just as Obama left Thursday for what was supposed to be a four-day trip to Europe. But after five Dallas police officers were killed Thursday night, Obama cut his trip short and will instead return home Sunday after a one-day visit to Spain.

SUSAN WALSH/AP

Obama tried to convey a message of unity after a week that rubbed raw issues of police safety and racial bias in policing.

He will visit Dallas early next week, the White House said, and devote the rest of the week to working on issues of police safety and eliminating bias in policing.

Obama did not outline any specific steps but suggested that a starting point was the report of a commission he established after the police shooting death of Michael Brown in Ferguson, Missouri, in 2014.

"There is sorrow. There is anger. There is confusion about the next steps. But there is unity in recognizing that this is not how we want our communities to operate. This is not who we want to be as Americans," Obama said in Warsaw. It was the third time he addressed police-community relations while in Poland for a summit of NATO leaders. "You have not seen riots, and you have not seen police going after people who are protesting peacefully."

Obama declined to talk about the Dallas shooter's motives. Dallas police Chief David Brown has said former Army Reservist Micah Johnson, 25, was seeking retribution against white police officers for police-involved shootings .

"By definition, if you shoot people who are no threat to you — strangers — you have a troubled mind," he said. "We're not going to identify and eliminate every madman and troubled individual who might want to do harm against innocent people. But we can make it harder for them to do so."

"Imagine if you are a police officer, and you're trying to sort out who is shooting at you, and there are a lot of people who have guns on them," he said.

J. SCOTT APPLEWHITE/AP

Sen. Bernie Sanders says Hillary Clinton's health proposal is an important step forward in expanding access to health care.

Clinton offers health proposal sought by Sanders

NICOLE GAUDIANO
USA TODAY

WASHINGTON - Hillary Clinton announced her intention Saturday to expand investments in community health care centers, the second of two proposals in a week apparently aimed at courting supporters of Sen. Bernie Sanders ahead of his possible endorsement.

The presumptive Democratic nominee's proposal would double funding for primary care services at Federally Qualified Health Centers, which serve populations with limited access to health care. Community health care centers have been a key priority for Sanders, I-Vt., who successfully fought for the inclusion of $11 billion in funding for such centers in the Affordable Care Act of 2010.

Clinton also affirmed her commitment to giving Americans the choice of a "public-option" insurance plan — which she supported during her 2008 presidential campaign and Sanders pushed for during the ACA debate — and allowing people below Medicare age to opt into the program by offering it to those who are 55 and older.

An hour after her health care announcement, Clinton's campaign announced firm details about her Tuesday campaign event in Portsmouth, New Hampshire, where Sanders is expected to endorse his primary campaign rival. The announcement does not mention Sanders.

"We have more work to do to finish our long fight to provide universal, quality, affordable health care to everyone in America," Clinton said in a statement. "Already, the Affordable Care Act has expanded coverage to 20 million Americans. As president, I will make sure Republicans never succeed in their attempts to strip away their care and that the remaining uninsured should be able to get the affordable coverage they need to stay healthy."

Sanders, in a call after Clinton's announcement, said the proposal by Clinton — "working with our campaign" — is an important step forward in expanding access to health care and addressing a crisis in primary health care.

"It will save lives, it will ease suffering, it will improve health care in America, and it will cut health care costs," he said. "It is a significant step forward as we advance toward the goal of health care for all Americans."

The announcement follows a higher education proposal Clinton released Wednesday that Sanders called a "bold initiative" to "revolutionize the funding of higher education in America." That proposal is designed to eliminate college tuition for working families and reduce debt.

Community health centers provide care for about 25 million people in the United States, more than half of whom are Hispanic or African-Americans, according to the Clinton campaign.

Alamogordo Daily News
Serving the Tularosa Basin since 1898
Volume 119, Issue 165 Copyright2016

ALAMOGORDONEWS.COM
518 24th St., Alamogordo, NM 88310 | Published daily except Monday. | Periodicals postage paid at Alamogordo | Postmaster: Please mail returned copies and address changes to 518 24th Street, Alamogordo, NM 88310

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Managing Editor: Duane Barbati, 575-437-7120, ext. 7134

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Alamogordo (city limits)
Tuesday–Friday.....6:30 a.m.
Saturday .....8 a.m.
Boles Acres/Dog Canyon/ Holloman AFB/Dungan/ Tularosa Alamorosa/La Luz
Tuesday–Saturday ....7:30 a.m.
Sunday .....9 a.m.
High Rolls/Cloudcroft/ Mayhill
Tuesday–Saturday ....8:30 a.m.
Sunday.....9:30 a.m.

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Lotteries

SATURDAY'S DRAWINGS

Pick 3:
Day: 08-05-01
Night: Not available

PREVIOUS DRAWINGS

Roadrunner Cash:
01-06-23-29-32
Mega Millions:
08-19-20-55-73
MB: 05 **MP:** 02
($15 million jackpot)

Hot Lotto:
05-15-31-32-37
HB: 04
($4 million jackpot)
Powerball:
02-24-31-57-66
PB: 18 **PP:** 03
($288 million jackpot)

AFFIDAVIT OF PUBLICATION

ALAMOGORDO,
STATE OF NEW MEXICO
COUNTY OF OTERO. **SS.**

I, Carol Burgess, being duly sworn, on my oath say that I am the General Manager of the Alamogordo Daily News, a Newspaper of daily circulation, published and printed in the English language at the City of Alamogordo, Otero County, State of New Mexico. That the Alamogordo Daily News has been regularly published and issued for more than nine months prior to the date of the first publication hereinafter mentioned.

That the attached notice for CH2MHIL was published 1 time in 1 issue of said newspaper and not in any supplement thereof, the first publication being on July 10, 2016. That said notice was published in accordance with the laws of the State of New Mexico.

Legal# 0001128221

Carol A Burgess
General Manager

Subscribed in my presence and sworn before me this the 12 day of July, 2016.

Notary Public

My commission expires 4-30-17

OFFICIAL SEAL
ELFEGO DURAN
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires: 4-30-17

Appendix 5C

Public Meeting Materials

NSF Environmental Impact Statement and Section 106 Consultation for Proposed Changes to Sacramento Peak Observatory Operations

Sacramento Peak Observatory Operations

What is the Proposed Action?

The National Science Foundation (NSF) is conducting a scoping meeting to obtain public input on the scope of an Environmental Impact Statement (EIS) to study proposed changes to operations at the Sacramento Peak Observatory. A range of preliminary proposed alternatives is being considered for evaluation in the EIS. These preliminary proposed alternatives, which will be refined through public input, include the following:

- Continued NSF investment for science-focused operations (No-Action Alternative)
- Transition to full operations with interested parties for solar astronomy research
- Transition to partial operations with interested parties, and decommissioning or mothballing of facilities not proposed to be used
- Mothballing of facilities limited to basic maintenance
- Deconstruction and site restoration

What is NEPA?

The National Environmental Policy Act of 1969 (NEPA) requires federal agencies to consider the potential environmental consequences of proposed actions on the environment prior to making final decisions. The NEPA review process is intended to provide the public with an opportunity to comment and provide input on those issues to be analyzed during the NEPA process. On July 5, 2016, NSF announced the beginning of the scoping process and solicitation of public comments to identify issues to be analyzed in an EIS. The purpose of the public scoping process is to determine relevant issues that will influence the scope of the environmental analysis, including identification of viable alternatives. Additional opportunities for public participation will be available at other junctures during the process.

What is Section 106?

NSF also intends to initiate consultation under Section 106 of the National Historic Preservation Act (NHPA) to evaluate potential effects on historic properties as a result of the proposed action. Section 106 of the National Historic Preservation Act requires federal agencies to consult with interested parties and the State Historic Preservation Officer regarding potential effects of their proposed actions on significant historic properties.

Who owns, funds, and manages the Sacramento Peak Observatory?

Sacramento Peak is located within the Lincoln National Forest in the Sacramento Mountains (Otero County, New Mexico). Established by the U.S. Air Force via a memorandum of agreement with the U.S. Forest Service in 1950, the facility was transferred to NSF in 1976. NSF and the U.S. Forest Service executed a land use agreement, signed in 1980, to formalize this transfer and the continued use of the land for the observatory.

NSF owns and funds the Sacramento Peak Observatory and, as a federal agency, is responsible for NEPA compliance. NSF has contracted with CH2M HILL, an environmental consultant, to prepare the EIS.

EIS Timeline

Scoping comment period: July 5 through August 5, 2016

- *Public meeting July 21, 2016 at 6:00 pm at the New Mexico Museum of Space History*

Draft EIS target: Winter 2016

- *45-day public comment period on Draft EIS*
- *Public meeting on the Draft EIS*

Final EIS target: Summer 2017

NSF Record of Decision target: Fall 2017

How to Submit Comments

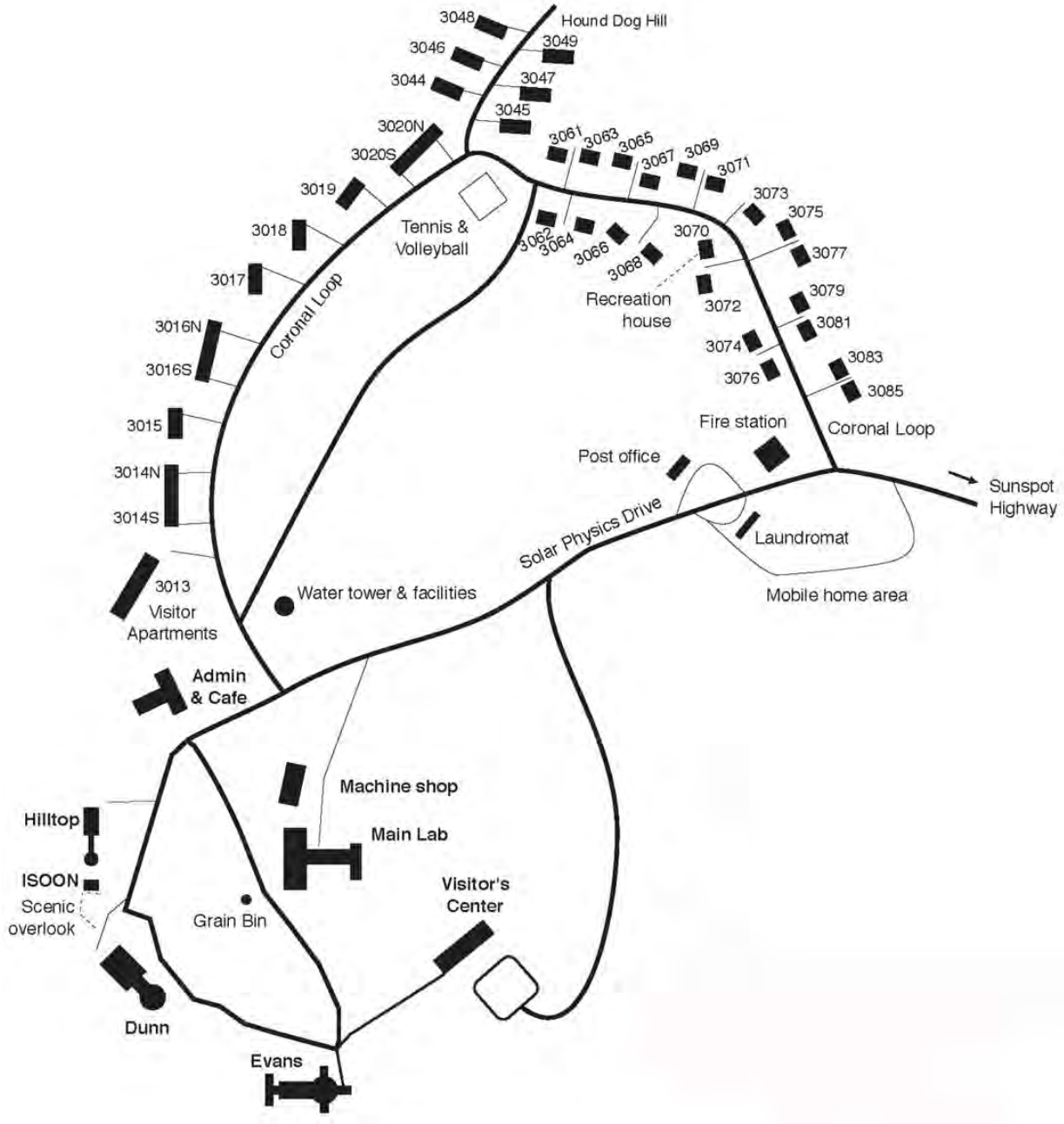
Scoping comments will be accepted through August 5, 2016 and may be submitted during the public meetings or by the following methods:

Email: envcomp-AST-sacpeak@nsf.gov

Mail: Ms. Elizabeth Pentecost, National Science Foundation, Division of Astronomical Sciences, Suite 1045, 4201 Wilson Blvd., Arlington, VA 22230.

Additional information will be posted throughout the EIS process at www.nsf.gov/AST.

Site Plan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Tennis &
Volleyball
3062
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3017
3068
Recreation
house
3072
3079
Coronal Loop
3016N
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3074
3083
3016S
3076
3085
3015
Fire station
Coronal Loop
Post office
3014N
Sunspot
Highway
3014S
Solar Physics Drive
Laundromat
3013
Visitor
Apartments
Water tower & facilities
Mobile home area
Admin
& Cafe
Machine shop
Hilltop
Main Lab
ISOON
Scenic
overlook
Visitor's
Center
Grain Bin
Dunn
Evans

Environmental Impact Statement and Section 106 Consultation for Proposed Changes to Sacramento Peak Observatory Operations

Sunspot, New Mexico

National Science Foundation

Overview:

The National Environmental Policy Act requires federal agencies to conduct an environmental review to assess the potential environmental impacts of federal actions that could significantly affect the environment.

Section 106 of the National Historic Preservation Act requires federal agencies to consult with interested parties and the State Historic Preservation Officer regarding potential effects of their proposed actions on significant historic properties.

The purpose of the public scoping process is to determine relevant issues that will influence the scope of the environmental analysis, including identification of viable alternatives. Additional opportunities for public participation will be available during the process.

Timeline for Public Involvement:

- **Scoping Comment Period:** July 5-August 5, 2016
- **Draft EIS target:** Late Fall 2016
  - *45-Day Comment Period on Draft EIS*
  - *Public meeting on Draft EIS*
- **Final EIS target:** Spring 2017
- **Record of Decision target:** Summer 2017

Submit Comments:

You may submit comments by either of the following methods:

Email to: envcomp-AST-sacpeak@nsf.gov, withsubject line "Sacramento Peak Observatory"

Mail to: Ms. Elizabeth Pentecost, RE: Sacramento Peak Observatory
National Science Foundation,
Suite 1045 4201 Wilson Blvd
Arlington, VA 22230

Project information will be posted, throughout the EIS process, at www.nsf.gov/AST.

National Science Foundation

Environmental Impact Statement and Section 106 Consultation for Proposed Changes to Sacramento Peak Observatory Operations

Sunspot, New Mexico

Alternatives to be evaluated in the EIS will be refined through public input. Preliminary proposed alternatives include the following:

- Continued NSF investment for science-focused operations (No-Action Alternative)
- Transition to full operations with interested parties for solar astronomy research
- Transition to partial operations with interested parties, and decommissioning or mothballing of facilities not proposed to be used
  - Mothballing of facilities limited to basic maintenance
  - Deconstruction and site restoration

Potential Resources to be considered:

An impact is a change or consequence that results from a proposed activity; it can be positive, negative or both. It may be mitigated to lessen or remove the impact. At present, NSF has preliminarily identified the following resource areas for analysis of potential impacts:

air quality
geological resources
biological resources
solid waste generation
health and safety
socioeconomics
traffic
cultural resources
groundwater resources

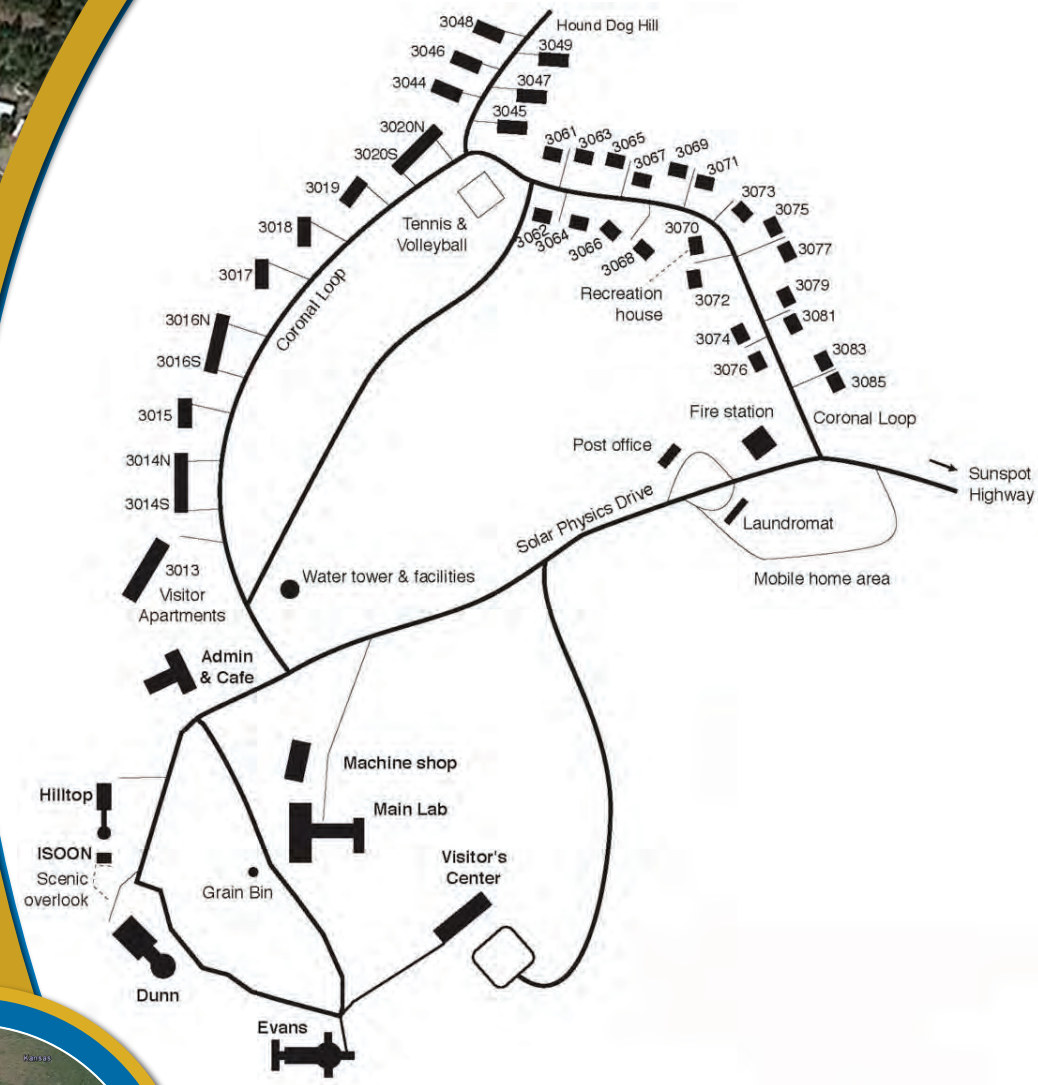
Section 106 Process for the Sacramento Peak Observatory:

In coordination with the EIS, NSF will consult with the State Historic Preservation Officer and other consulting parties on potential effects to historic properties located within the Area of Potential Effects (APE).

- NSF proposes that the APE encompass the full Sacramento Peak Observatory property.
- Consultation would be focused on identifying potential effects, if any. If there are adverse effects on National Register of Historic Places-eligible or listed historic properties, consultation with Consulting Parties would include measures to avoid, minimize, and/or mitigate those effects; often, a Memorandum of Agreement is used to formalize such measures.

Environmental Impact Statement and Section 106 Consultation for Proposed Changes to Sacramento Peak Observatory Operations

Site Plan



Sunspot, New Mexico

Sacramento Peak is located within the Lincoln National Forest in the Sacramento Mountains. Established by the U.S. Air Force via a memorandum of agreement with the U.S. Forest Service in 1950, the facility was transferred to NSF in 1976. NSF and the U.S. Forest Service executed a land use agreement, signed in 1980, to formalize this transfer and the continued use of the land for the observatory. Sacramento Peak is a 175-acre site located in Otero County, New Mexico. The approximate coordinates are Latitude 32° 47'23.28"N and Longitude 105° 48' 58.32"W.

Scoping Meeting

New Mexico Museum of Space History, Alamogordo, NM, 6:00 - 8:00 PM

Sacramento Peak Observatory Environmental Impact Statement (EIS) Scoping Meeting: *Overview*

- Introduction of team members
- Background information
- The preliminary proposed alternatives and resource areas to be studied
- The EIS process
- Public Comments

The Role of NSF

- The National Science Foundation (NSF) is the federal steward for ground based astronomy and solar physics.
- NSF provides funding for national and international telescopes and facilities and provides funding for research grants that allow individuals and groups to conduct specific science investigations.

Ground-based solar astronomy

- The Sacramento Peak Observatory is operated by the National Solar Observatory (NSO) through a cooperative agreement with the Association of Universities for Research in Astronomy, Inc. (AURA).
- In fiscal year (FY) 2016, the NSF provided ~$2.1M to operate Sacramento Peak Observatory.
- NSF funding for Sacramento Peak Observatory is through the Division of Astronomical Sciences (AST).
- The NSO and AURA are currently constructing the Daniel K. Inouye Solar Telescope (DKIST; formerly known as ATST) on Haleakala, Maui, Hawaii funded by the NSF.

The future of NSF facilities

- Over the past decade NSF has received advice from external review committees.
- The 2010 decadal survey: *New Worlds, New Horizons in Astronomy and Astrophysics* stated:

  "NSF-Astronomy should complete its next senior review … so as to determine which, if any, facilities NSF-AST should cease to support in order to release funds for (1) the construction and ongoing operation of new telescopes and instruments and (2) the science analysis needed to capitalize on the results from existing and future facilities."

Solar facility recommendations

- The 2010 report's recommended review of the AST portfolio was carried out in 2012.
  - 2012 Portfolio Review: *Advancing Astronomy in the Coming Decade: Opportunities and Challenges*
- Regarding the Sacramento Peak Observatory the 2012 review stated:

  "AST and NSO should plan for the continued use of the Dunn Solar Telescope (DST) as a world-class scientific observatory, supporting the solar physics community, to within two years of ATST first light, as well as utilize it as a test bed for development of critical ATST instrumentation."

NSF plans moving forward

- Given previous community recommendations combined with current budget constraints, NSF has a need to reduce funding levels for a number of its astronomical telescopes and facilities.
- The NSF is initiating the EIS/Section 106 consultation process for the Sacramento Peak Observatory.

EIS/Section 106 Consultation

- The purpose of the EIS is to evaluate potential effects of proposed changes to operations at Sacramento Peak Observatory in Sunspot, New Mexico.
- The purpose of the EIS scoping process is to seek public input regarding relevant issues that will influence the scope of the environmental analysis, including identifying viable alternatives to be analyzed.
- The Section 106 consultation process requires federal agencies to consult with interested parties and the State Historic Preservation Officer regarding potential effects of their proposed actions on significant historic properties.

EIS Preliminary Proposed Alternatives

- Continued NSF investment for science-focused operations (No-Action Alternative);
- Transition to full operations with interested parties for solar astronomy research;
- Transition to partial operations with interested parties, and decommissioning or mothballing of facilities not proposed to be used;
- Mothballing of facilities limited to basic maintenance;
- Deconstruction and site restoration.

EIS Resource Areas to Be Analyzed

- Air quality
- Biological resources
- Cultural resources
- Geological resources
- Solid waste generation
- Health and safety
- Socioeconomics
- Traffic
- Groundwater resources.

EIS/Section 106 Process and Estimated Timeline

The EIS is a public process, and comments received during the public comment periods will be considered by NSF as part of its decision-making process

- Following the scoping period, a Draft EIS will be prepared (anticipated Winter of 2016).
  - Once released, a 45-day public comment period will occur and another public meeting will take place.
  - A Section 106 consultation meeting will also occur at this time during which any potential adverse effects on significant historic properties would be identified. If any are identified, NSF will work with Consulting Parties and the SHPO to identify measures to avoid, minimize, and/or mitigate such effects and document those measures in a Memorandum of Agreement.
- After the close of the 45-day public comment period, a Final EIS will be prepared (anticipated mid-Summer of 2017).
- A Record of Decision will be issued (target: September 2017, but subject to change).
- **No decisions have been made at this point!**

Appendix 5D

Public Meeting Transcript

NATIONAL SCIENCE FOUNDATION

PUBLIC SCOPING MEETING

FOR ENVIRONMENTAL IMPACT STATEMENT

IN RE: SACRAMENTO PEAK OBSERVATORY
LOCATED IN SUNSPOT, NEW MEXICO

THE FOLLOWING PROCEEDINGS WERE HELD AT THE
NEW MEXICO MUSEUM OF SPACE HISTORY
ALAMOGORDO, NEW MEXICO
JULY 21, 2016
6:30 p.m.to 8:01 p.m.

Job No. 5957L

MR. BISHOP: Well, thanks everybody for coming tonight. This is the scoping -- public scoping meeting for the Sacramento Peak Observatory. We just finished the open house poster presentation portion of the scoping meeting. And now we'll move to a brief presentation by NSF.

There was a sign-in sheet at the sign-in table. So if you were not able to sign that, please make sure to do so before you leave.

After the presentation portion, there will be an opportunity for the public to provide comments on the record. We have a court reporter here who will document the public comments. If you do not choose to comment publicly here tonight, there are opportunities to comment on forms in the back of the room. And there are email addresses and physical mailing addresses on the fact sheet. So if you don't have a fact sheet, there are more back there.

I think that's about it.

So we will now move to the presentation. We have Caroline Blanco with NSF, and Dave Boboltz with NSF.

Now we'll turn to the presentation. Thank you.

MR. BOBOLTZ: Okay. So I'm up first. I'm

Dave Boboltz. I'm the program officer for the National Solar Observatory. I'm going to stand in front because it's blowing on my head.

I'm the program officer for the National Solar Observatory. And the National Solar Observatory is funded by the National Science Foundation.

So I'm going to give you some background on Sacramento Peak, and where we are as far as funding of Sacramento Peak, and where we're going forward with the observatory.

So introduction of team members, we sort of did that already. There are several people from the NSF around here. If you have any questions -- you'll see the name tags -- they're willing to answer questions.

I'm going to talk about -- a little bit about some of the background information about Sacramento Peak. We're going to talk about -- and then I'm going to hand it over to Caroline. She's going to talk about some of the proposed alternatives and the EIS process. And then we're go into a public comment section.

So a little bit of background on the role of NSF. So NSF is the federal steward for all

ground-based astronomy and solar physics. So we provide funding for both national and international telescopes and facilities. So we have a facilities section. And then we also fund individual research grants for the scientists to use these facilities and get their science funded so that they can get the research out of these facilities that we have. And so we have people that -- we have primarily -- within our division, we have people primarily focused on facilities, and some that focus more on the individual investigators. I'm one of the people that focuses on the facilities.

So Sacramento Peak, like I said, is operated by the National Solar Observatory through a cooperative agreement with the Association of Universities for Research in Astronomy -- or AURA -- Incorporated. And this is because, unlike agencies like NASA or the Department of Energy, the NSF, by law, can't actually run its own observatories. It can't manage our observatories or facilities. So what we do is we have these managing organizations. And in this case AURA is the managing organization for the National Solar Observatory.

In fiscal year -- this last fiscal year, NSF provided $2.1 million for operations for

Sacramento Peak, and it's through the division I work for, which is the Division of Astronomical Sciences. And that's within a directorate called the mathematical and physical sciences directorates. And there is multiple directorates within NSF that fund things anywhere from biology to math and physics, to geosciences -- what am I missing?

MS. BLANCO: Socio --

MR. BOBOLTZ: Yeah, socioeconomic sciences.

And so the other thing is that the National Solar Observatory, in conjunction with AURA, are constructing a new telescope, a new solar telescope, called the Daniel K. Inouye Solar Telescope. And that's being constructed on a mountain called Haleakala in Maui. And this will be the world's largest solar telescope. And it's funded by the National Science Foundation.

So we, in 2010 -- every 10 years the astronomy community goes through what they call a decadal survey. And in that decadal survey what they do is they sort of try to figure out where is the field and the astronomical community going; you know, what are the new problems that need to be solved in the next decade, and what are the new facilities? And in the case of NASA, the new satellite that we're

going to use to actually accomplish those research goals.

Okay. And so one of the things that the 2010 decadal survey pointed out was that NSF should undertake a senior review. And that senior review is because -- that we should look at some of the facilities we fund, and whether or not we should possibly cease to support some of those facilities in order to build new facilities. So in a -- sort of a situation where we have limited budgets, okay, we can't build these new facilities and then keep operating the old facilities, because we have a finite amount of funding. And so the decadal survey recommended that we go through this review.

And so what we did in 2012, is we took that recommendation and we went through what we call a portfolio review. And so -- and we did this portfolio review, and made recommendations about all of our facilities, including Sacramento Peak. And so here's what the portfolio review said about the Sacramento Peak facility. And what they said was that "within two years of ATST first light," that we should think about a plan for what we would do to keep the Sacramento Peak Observatory going to "within two years of ATST first light," and then decide from

there what we're going to do with it.

ATST, which is now called DKIST, or Daniel K. Inouye Solar Telescope, is set to come online in late 2019, early 2020. And so two years prior to that is right around the end of 2017. So that's why we're starting the process now, what to do with Sacramento Peak Observatory.

And so our plans moving forward is that, you know, given these previous community recommendations, combined with some of our budget constraints within the astronomy division is, we're looking at what we need to do to reduce some of the funding levels in some of our current observatories. And so one of those observatories is Sacramento Peak. So that's why we're at where we are right now, which is to begin this Environment Impact Statement and Section 106 consultation regarding the observatory, and see what are the options that we have moving forward with Sacramento Peak.

So with that, I'll hand it over to Caroline, who is going to talk about the EIS process and where we're at with that. And I'll answer any questions you have after.

MS. BLANCO: Good evening everyone. Can you hear me okay? My name is Caroline Blanco. I'm

Assistant General Counsel at the National Science Foundation. And I oversee environmental matters, and -- including processes like this, Environment Impact Statements and Section 106 compliance with the National Historic Preservation Act. I'll give you a background of it.

So as Dave had said, we're going forward with this process now because we want early action, to be able to move this forward, and make sure that we have public participation in the process, and that we have time to consider the different alternatives that are being proposed. And ultimately, based on a variety of information, including what comes about through the Environmental Impact Statement process, also input from the scientific community, and everything that David just mentioned, there will be ultimately a decision at the end of the process.

So the purpose of this EIS process -- Environmental Impact Statement is what that stands for -- is to evaluate the proposed -- or the environmental impacts of the proposed alternatives regarding the proposed changes to Sacramento Peak operations.

The purpose of this particular meeting is -- it's called a scoping meeting. So I'll explain

a little bit about the law that this comes within. It's called the National Environmental Policy Act. And if you take a look at this fact sheet, it gives you a little bit more information on what the process is, what the law entails. NEPA is what we call it, Section 106, which looks at impacts on historic properties of significance.

So whenever a federal agency is making a decision, before it can do that, it must consider the environmental impacts associated with that decision. So that's where we're at here. And because there could be some major impacts for this proposed action, we're going through the most robust analysis, which is the Environmental Impact Statement process.

For other actions that aren't quite as significant, then there are smaller reviews that are done, less robust ones. But this one is one that we're looking at pretty closely. So what that means is there is a prescribed process pursuant to federal regulations that we need to follow.

And we filed -- we published in the Federal Register a notice of intent to initiate the Environmental Impact Statement process. That was published in July -- on July 5th of this year. And that started out the scoping process that then will

conclude on August 5th of this year. And the scoping process is designed to seek public input regarding relevant issues that will influence what we're going to study through this Environmental Impact Statement process, and take a look at potential alternatives for us to analyze in an Environmental Impact Statement.

And so we're looking for your input on proposed alternatives. We're looking at input on which resources that need to be analyzed, such as wildlife, water, air, things such as that. So that's the purpose of this meeting.

The Section 106 consultation process is pursuant to another federal environmental law called the National Historic Preservation Act. That act requires federal agencies to consider impacts of significant historic properties, including archaeological, historical, cultural properties, before a decision is made.

So if any of you -- you might have seen a sign-up sheet. But there is a box to be checked if you're interested in being a consulting party. What that basically means is, if you have an interest in the historic impacts or potential ones that may occur, and you want to be part of that process and

that discussion, then please check your name there. We'll be sure to keep you on the list so that we can make sure we are in touch with you and you're part of that process. And what we'll look at in that process is -- and again, there is a little bit of a blurb on this fact sheet about what that process is -- but we'll take a look at whether there are nationally historically significant resources in the area of the proposed action; and if so, are there any adverse impacts; and if so, how are we going to manage those impacts? Would that be through avoidance, mitigation, minimization of those impacts. And it usually, you know, wraps up in some sort of memorandum of agreement typically. So that's the purpose of that act.

So we've taken a look at some preliminary proposed alternatives that we've considered, based on a lot of information that we've been looking at over time; what might be some of the most logical ways of dealing with the situation that they've outlined. So what we have -- one is, first of all, under NEPA law, we have to consider a no-action alternative by law. And that, basically, establishes the baseline from which you analyze impacts stemming from any other proposed alternatives. So the no-action alternative

in this circumstance would be continued NSF investment for science focused operation.

Then we go to the action alternatives, which are outlined in these four bullet points. And again, they're also listed on the fact sheet. The transition to full operations with interested parties for solar research is the same pretty much; it's very similar to what is going on now, but it would be with different interested parties.

There is also a preliminary proposed alternative that would look at a transition to partial operations with interested parties, and decommissioning or mothballing of facilities that would not be necessary to be used for those partial operations.

The next one would be mothballing of the facilities limited to basic maintenance. And what that envisioned is to say it's not as though we are looking at keeping it -- keeping the facilities in such shape that somebody could move in the next day, turn on the light switch, and begin operating, but in between that and just locking the key and walking away. That's not the intent of what we're doing. It's keeping some basic maintenance going. So it's limited to that.

And the last one would include deconstruction of the site and site restoration. Deconstruction from grade level up is what we would be looking at as a preliminary proposed alternative.

So your comments during the scoping meeting and scoping time period, public comment period, through August 5th, would be really helpful to help us take a look at what your thoughts are regarding these preliminary proposed alternatives, or other alternatives you think we have to consider. And then we'll take a look at that.

And at the end of that what we're going -- and also what we'll do -- the analysis will be looking at, as I think I mentioned a little bit earlier, some of these different resource areas that we're looking at analyzing. And what that means is you take each proposed alternative, and you look at whether there are impacts on these various resource areas. Is that preliminary proposed alternative going to have an impact on air quality, biological resources, cultural resources, et cetera, down the line?

So there is a process, as I mentioned, that is required under NEPA law. And what it means is that after we're done with the scoping process, we're

going to take a look at all the comments we received during the scoping process, the public comment period, and any comments you may make today, or by email or by regular mail. We'll look at those. And then what we'll do is we'll develop a Draft Environmental Impact Statement.

And that will help -- from the scoping meeting, what we'll do is we'll refine the alternatives to be analyzed. And those will be analyzed in a Draft Environmental Impact Statement. And that will be released -- there will be notice of it, the availability will be released in the Federal Register. If you've signed up there, we'll send you an email notification that it can be found. And there is a website at the very bottom of this fact sheet that you can see: NSF.gov/AST. And all of the information that you see here on the boards, and the transcripts eventually will be in PowerPoint of this presentation and will be available on that website. And you'll also be able to see the Draft Environmental Impact Statement, will be available for people to access.

And we'll be doing things electronically. Our intent is not to mail out Draft Environmental Impact Statements unless there is a hardship and

somebody needs assistance, and of course, we'll accommodate that.

So, basically, what we'll do is, once we release the Draft Environmental Impact Statement, we'll begin a 45-day public comment period. During the public comment period, much like the scoping public comment period, you'll be invited to participate by submitting comments to us, either electronically or by mail. We'll come out again for another public meeting. We'll talk about the Draft Environmental Impact Statement at that meeting. You can provide public comments at that time. And then, after that 45-day public comment period has ended, we're going to look at all of those comments. We're going to consider everything. And then we'll issue a final Environmental Impact Statement. And then, at least 30 days, if not more, afterward, we will then issue a Record of Decision. And that decision will be based on a variety of things; not just the environmental impacts, but it will take a look at all the science reasons why a decision has been made.

Very, very importantly, no decision has been made at this juncture. We don't know what the outcome is going to be. This is a public process. We're looking forward to your comments. And any

questions that you may have, please make sure to ask us.

At this point, this is the beginning of the public comment period. So Darren will be passing around a microphone, if you signed up to give public comments. Did we have people that signed up?

MR. BISHOP: No.

MS. BLANCO: Did anybody wish to make a public comment on the record? Okay, please do. And Darren will handle this.

MR. KLAENE: My name is Mark Klaene. A couple of questions. One of the things that the slides don't address is the educational aspect, especially with the visitors and tourism. Everything mentioned in the slide has all been for research. So I'm just curious how that plays into it, because that is actually not necessarily directly related to solar research, but it's related to public education, which of course, is a whole other game. So that's one of my questions. Would you like to answer that before I go on, or do you want a followup question?

MS. BLANCO: My suggestion is that it would be really helpful if you put that in a comment or on the record right now, if you're suggesting an alternative that we consider, that would really be

helpful information to us.

MR. KLAENE: Okay. Yes. Certainly, I think the educational aspect that the Visitor's Center provides is something that needs to be addressed, if some of those options were to be enacted.

MR. BOBOLTZ: I think one of the options, one of the alternatives that we had in the study was meant to sort of be able to incorporate that. And that was the one where we didn't use it for solar physics research, but we used it for some other purpose. And I think that that could be incorporated into that. We tried to make some of these as general as possible to sort of refine where we're going from there.

MR. KLAENE: Right, I understand.

Then another question that I have, I guess, is a little bit is -- can you sort of define what you mean by socioeconomic. Because, obviously, the economic impact of some of these alternatives to the local county and city economies is severe. And so I'd like to hear how the socioeconomic part will be considered.

MS. BLANCO: Well, that is a resource area that will be looked at. And so we'll be taking a

look at information on exactly what you described. We'll look at what impacts to the local economy would any of those proposed alternatives have, if implemented. So those are exactly the kind of things, revenues that would harm people who are working up there; they're no longer working up there, how would that impact things, and so forth.

MR. BISHOP: Real quick. We need folks to say their name.

MR. KLAENE: Okay. I thought I did, sorry. Mark Klaene. I'd spell it, though my guess is you don't type it the way I spell it.

MR. DOOLING: Dave Dooling. I'm education director here at the Space Museum, and former education officer at Sunspot.

The first would echo Mark's concern about the education capability, but I was also wondering deconstruction, restoration is the worst case scenario. Is there a cost estimate for that? At Sunspot we've heard various numbers being tossed around. What is the current best estimate of what it would cost to turn that back to forest land, understanding the agreement with the Forest Service, make it disappear, what would that cost?

MR. BOBOLTZ: I'll say the NSF commission

study, on their own, looked at what the cost impact, or what would it cost to take it away. We also commissioned a study internally for NSF through CH2M. And so we know the cost. I'm not sure if I'm allowed to say the exact cost. It's an estimate, and so -- yeah, it's consistent with the NSO study that was made. So some of you already know the NSO study. Yeah, the NSO study was -- it was $14 million.

MS. BLANCO: So the study we had commissioned was consistent with that. But it's a very general, broad-based estimate with lots of leeway. That's why we're a bit hesitant.

MR. BOBOLTZ: It was plus 50 percent, minus 30 percent.

MR. DOOLING: Okay. So -- Dave Dooling again. So if someone was to step up and take over operation of Sunspot, what kind of an organization are you looking for? What kind of a proposal do you want somebody to bring to the table? Obviously, at some point you want this out of your portfolio, you're no longer paying for it, because you have to pay for the DKIST and Alma, and other things. Who do you want to see step up?

MR. BOBOLTZ: Well, we think that the observatory itself still has value as an educational

and training facility for young solar physicists, right? We're building this brand new telescope on Maui. But that telescope is going to be state of the art, and you're not going to have graduate students up there tinkering with the instrumentation itself, right? So you need -- it's good to have a place where graduates can go and tinker and do things like that. So we see value in the observatory from that respect. And so, if we could get a consortium of universities or, you know, some kind of partnership to take over the observatory, that would be the ideal scenario. But there is a liability that's associated with that. So that's a difficult one, too.

MR. DOOLING: And that would be --

MR. BOBOLTZ: The fact that they would need to have their own agreement with the U.S. Forest Service, who owns the land. And then they would have to take over liability of all the buildings that are there, which are NSF property.

MS. BLANCO: And if there is a completely different use, that would be something that -- if it's something that's inconsistent with NSF's mission, then that would be something that the Forest Service would have to approve of as well.

MR. DOOLING: Okay. Speaking of liability,

there is a lot of gasoline, fuel oil in the ground, in the civil engineering area and that would be a part of the NSF. That was an understanding I had when I was working there. But speaking more broadly, if there were some environmental liability, would NSF be willing to mitigate, minimize, whatever, those, so that the new tenant/operator would be taking over a facility that is clean, and not wind up encumbered with any risks that carry over from when someone else was operating it?

MS. BLANCO: So that's a question that deals with something that's beyond the scope of this process. If somebody else were going to take it over, that would be a negotiation process that would take place. So it's hard to speculate at that point what the arrangement would be.

But through this process what we're doing is we're taking a look at all of the environmental impacts associated with it. So we'd look at impacts dealing with hazardous waste, and so forth. So we'd have a better picture of what's out there. And then, if there is an interested party who wants to take a look at this, and possibly take it over, they would have that information from the Environmental Impact Statement. And it would be certainly more than they

would have right now. And then there could be an avenue for discussion.

MR. DOOLING: Thank you.

MS. BLANCO: Thank you for your comments.

So we will be here till 8:00. We'd be happy to talk to you about whatever we can, and answer any questions that we're able to do so. And if you have other comments that come up while you're sitting here or walking around, and you want to share some, please, by all means, do that. We'll have the court reporter here till 8:00, if you want to put those comments on the record. Or, as we pointed out, you can go ahead and submit them in writing. The material is up front at the sign-in desk for that; email them, or send them by regular mail. You can submit those comments in any way you like.

MS. RICHARDSON: I do have a question. Katie Richardson with Senator Heinrich's office. It's not a comment, it's a question. In terms of the timeline, I'm confused about the timeline is essentially my question. So how would an interested party sort of be ready to come forward to NSF relative to the EIS process?

MS. BLANCO: That's a really good question. Anybody is able to at any time. It is a totally

separate process from the Environmental Impact Statement process. Hopefully, through this process -- which is a very public one -- it will start to get the word out so people will learn more about the facilities and learn more about the potential impacts that might be associated with it. But we've already made it pretty clear to the science community that we're looking for interested parties, and so at any time they could come forward.

MS. RICHARDSON: So would that need to coalesce before a record of decision was made?

MS. BLANCO: No, it would not need to coalesce. No, if a viable proposal came to our doorstep tomorrow, and we thought that that would work, we would, of course, still need to take a look at any environmental impacts associated with it, but if it's just a different name of a different operator, then there really are no -- typically no environmental impacts associated with that, so that would be a very low level of environmental impact review that would take place. But we don't have people knocking on our doors right now. So anytime they want to, they're more than -- they should feel free to do so.

Thank you for your question.

MR. BOBOLTZ: Yeah, I'll just say we've been actively seeking partnerships for over a year now. So we had meetings in, gosh, May of last year, 2015, where we invited people from the solar community to come and see if they were interested in becoming partners. And so we've had some response there. Go ahead, Rex.

MR. HUNTER: And external people, not just solar people. There is a wide range.

MR. BOBOLTZ: Yes. That was Rex Hunter.

MS. BLANCO: He's with the National Solar Observatory.

Other questions or comments to be made? Feel free to be comfortable and walk around and enjoy this lovely facility. And we thank them very much for providing this facility to us. We'll be here till 8:00. And if anybody wants to provide comments, like I said, please do so. Thank you very much.

(A recess was taken and the record remained open.)

MS. BLANCO: We're now announcing the close of tonight's meeting, and we thank everybody for showing up. But that's pretty much it. Thank you.

(The meeting concluded at 8:01 p.m.)

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) ss
COUNTY OF BERNALILLO)

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Appendix 5E

Public Comment Matrix

Sacramento Peak Observatory - Public Comments

Comment Number	First Name	Last Name	Affiliation	Category	Comment	Comment Source	Date Comment Received
1	Deqing	Ren	Physics and Astronomy Department, California State University Northridge	Alternative Considerations	For the future of the NSO Sacramento Peak Pentecost, my "first recommendation" is: (1) Continued NSF investment for science-focused operations (No-Action Alternative). If the above option is not available, my "second recommendation" is: (2) Transition to full operations with interested parties for solar astronomy research.	Email	7/11/2016
2	Kurt	Anderson	New Mexico State University; Past Site Director - Apache Point Observatory	General	1. Any transition to partial operations involving mothballing, or deconstruction and site restoration must address certain ground-pollution issues. There are three of which I am aware. 1. "Plume" of mostly fuel and solvent below vehicle maintenance areas. 2. Likely "plume" of metallic mercury beneath the Dunn ("Tower") Telescope. 3. Miscellaneous chemicals - but particularly heavy metal (mainly silver) resulting from decades of photographic processing - most likely found in ravine below wastewater treatment plant. My concern is that any "transition" to "interested parties" Those parties be fully informed. 2. What arrangements would be made for the Sunspot Astronomy Visitor's Center (NSO is <u>not</u> the owner. It is one of several partners which include the USFS, NM Tourism, NMSU (Astronomy), and Apache Point Observatory).	Public Scoping Meeting (Written)	7/21/2016
3	Mark	Klaene	Apache Point Observatory	Alternative Considerations	My name is Mark Klaene. A couple of questions. One of the things that the slides don't address is the educational aspect, especially with the visitors and tourism.· Everything mentioned in the slide has all been for research. So I'm just curious how that plays into it, because that is actually not necessarily directly related to solar research, but it's related to public education, which of course, is a whole other game.· So that's one of my questions.· Would you like to answer that before I go on, or do you want a followup question? [See Public Meeting Transcript at Appendix 5D for follow-on discussion.]	Public Scoping Meeting (Oral)	7/21/2016
4	Dave	Dooling	Space Museum	Alternative Considerations/General	Dave Dooling.· I'm education director here at the Space Museum, and former education officer at Sunspot. The first would echo Mark's concern about the education capability, but I was also wondering deconstruction, restoration is the worst case scenario.· Is there a cost estimate for that?· At Sunspot we've heard various numbers being tossed around.· What is the current best estimate of what it would cost to turn that back to forest land, understanding the agreement with the Forest Service, make it disappear, what would that cost? [See Public Meeting Transcript at Appendix 5D for follow-on discussion.]	Public Scoping Meeting (Oral)	7/21/2016
5	Katie	Richardson	Office of Senator Heinrich	General	I do have a question. Katie Richardson with Senator Heinrich's office. It's not a comment, it's a question.· In terms of the timeline, I'm confused about the timeline is essentially my question.· So how would an interested party sort of be ready to come forward to NSF relative to the EIS process? [See Public Meeting Transcript at Appendix 5D for follow-on discussion.]	Public Scoping Meeting (Oral)	7/21/2016
6	Mark	Klaene	Apache Point Observatory	Against Closure	From the scoping meeting there seems to be a number of issues not properly addressed in the material. There are also several areas that need substantial research. 1. The loss of educational and public outreach activities that the Sunspot Visitor's center currently provides and has the potential to provide even more of would be significant to the people of the southwest from Arizona to West Texas. At over 10,000 visitor's a year plus special events this resource needs to continue especially at a time when Science and Technology are major emphasis in our school systems. This should also be expanded to night time astronomy (given Apache Point Observatory next door and many amateur observatories in the area) and public educational events. 2. There is substantial historical value in the Grain Bin, Evans telescope and the Dunn Solar Telescope. The DST was a engineering marvel when it was built being over 200 feet in the ground and the source of thousands of research papers and data. What is happening with all the original data taken from the DST? This data should be archived both from a science and historical perspective. Sunspot was built, inhabited, and operated in the early years by true pioneers. They traveled on essential dirt trails (after the blazed them) through mud and waist deep snow at times. Births occurred there due to the harsh conditions. Books have been written about the early life at Sunspot. There is major historical reference for southern NM from this observatory and in fact the town of Sunspot that exist entirely because of the observatory. 3. Loss of the observatory could impact the Apache Point Observatory next door as Sunspot provides water and other resources to them. It also provides fire and emergency medical services as well as fire fighting and livestock water to the Lincoln National Forest and local ranchers. 4. There is without a doubt a substantial economic impact to Otero County and Cloudcroft NM. During much of it's history, the Sacramento Peak Observatory has brought in >$10 million (2016 dollars) annually much of it was spent locally. Of private employers this makes it one of the largest employers in Otero County. Most importantly this brought in outside money into the state of NM and Otero County. It also provided teachers, medical professionals and volunteers through spouse and children. If the closure affects Apache Point Observatory add another $3 million dollars annually to that number. Regular visitors and observers that come and especially the student summer camps spent even more dollars in this area for food, gas, recreation, etc.. From a purely socio-economical reason the best solution is "no action". 5, New Mexico , Otero County, Cloudcroft, and Alamogordo have suffered substantially from the NSO headquarters move already in loss income and taxes. Further reduction in operations at Sunspot makes this even worse. Unlike Colorado , NM and the local area have limited resources to make up this deficit. While the move of the headquarters to Boulder was a small positive impact to Colorado's economy this was a large negative impact to NM and local areas. Complete abandonment of Sac Peak observatory will cause the town of Sunspot to cease to exist. 6. The weather logs collected and made available over the course of the observatory's existence have been used to look at global warming and fire behavior trends, and used by other research facilities in the area to evaluate performance criteria and site selection. This is perhaps the longest running complete weather database in the Sacramento Mountains. Interruption or loss of future data from this site would be a huge loss for our future. 7. NM 6563 is a federal scenic highway, it terminates at Sunspot and the Observatory. While still scenic after the observatory closes there is no need to travel this road anymore. A beautiful, peaceful travel route in the southwest will have no purpose. 8. The cost to close the facility and restore the site is substantial. Once started it is likely to increase as years of chemicals used in processing photographic plates and human habitation are uncovered. This same money could operate the facility for another quarter century at some level while producing usable scientific data in many areas. Modern observatories can operate more efficiently and require less space and infrastructure. The options for lower cost operations exist, but you must be willing to design and implement an operating model that is productive yet cost efficient in the face of shrinking budgets. And lets face it what is a significant budget reduction today could be a windfall budget in 4 years under new administration. But once the Observatory is abandoned and/or demolished there is no coming back.	Email	7/27/2016

Comment Number	First Name	Last Name	Affiliation	Category	Comment	Comment Source	Date Comment Received
7	Kevin	Reardon	National Solar Observatory	Against Closure	I am writing to provide comments to the National Science Foundation concerning their preparation of an Environmental impact statement related to proposed changes to Sacramento Peak Observatory. In particular, I am providing information related to consultation under section 106 of the National Historic Preservation Act. As you are no doubt aware, Sacramento Peak Observatory, founded in 1947, was an important scientific installation for fundamental studies of solar astrophysics as well as the impact of solar activity on terrestrial and military systems. This was a key feature within the historical context of post-war collaborations between science and military interests. The combination of scientific facilities and a social support framework in a remote location were sometimes an essential component of such outposts and these elements are well preserved at Sacramento Peak. After nearly seventy years of operation, Sacramento Peak has closely retained many of these characteristics that are representative of the historical period scientific expansion in the 1940's and 1950's. The history of the founding of Sacramento Peak has been reviewed in several expansive articles [1,2]. A more personal view of life at Sacramento Peak in the early years of operations is given in [3]. Several articles [4.5,6] detail the important scientific discoveries and technical developments that were carried out at Sacramento Peak. As part of the United States broader efforts to foster international collaborations in the post-war period, Sacramento Peak attracted scientists from around the globe due to its unique capabilities. From a historical context, I believe it is interesting to point out the role that Sacramento Peak had in evaluating and predicting a safe radiation environment, through the avoidance of periods of high solar activity, for the first US manned orbital flight of John Glenn in February, 1962 ([1]. Page 65), as well as future flights. In addition, several of the buildings at Sacramento Peak apparently had design input, if not oversight, from Walter Grobius, the well-known Bauhaus architect, and could be of cultural importance ([2], page 203). These buildings include the Main Laboratory, the Community Center, and the Officer's Quarters. There is a significant amount of primary material, including photographs, movies, and records, documenting the establishment and growth of the Sacramento Peak Observatory. I am including some sample photographs at the end of this letter. A portion of this documentation is available in digital format. I hope this information is of use to you in fully evaluating the historical significance of the Sacramento Peak site. If you feel I can provide any further information or historical documentation, or need input as a consulting party, please don't hesitate to ask. References: 1. Bushnell, D., 1962, "The Sacramento Peak Observatory 1947 – 1962,",Historical Division, Office of Information, Office of Aerospace Research. 2. Liebowitz, R.P., 2002, "Donald Menzel and the creation of the Sacramento Peak Observatory,", Journal of Historical Astronomy, v.33, pp. 193-211. 3. Ramsey, J., 1997, "In the Beginning," Morris Publishing, Kearney, NE. 4. Evans, J.W., 1962, "Sacramento Peak Observatory," Astronomical Journal, 67, pp. 781-786. 5. Cram, L.E., "Sacramento Peak Observatory," Solar Physics, v.69, pp.411–418. 6. Zirker, J., 1998, "The Sacramento Peak Observatory," Solar Physics, v.182, pp. 1–19.	Email, Letter	8/5/2016
8	Lou B.	Gilliam	Chief Observer (retired) - John W. Evans and Hilltop Facilities - Sacramento Peak Observatory	Against Closure	I attended the public meeting in Alamogordo, NM on July 21, 2016. I am very concerned about the future of the Sacramento Peak Observatory. I was employed by the observatory for 32 years (1962-1994) and have been associated with the coronal and CaK programs at the Evans Facility until October 2015. I know fully well the capabilities of the telescopes and their associated instruments. The Dunn Telescope is arguably the best solar telescope in the world. It has superb imaging capabilities, state of the art instrumentation, competent staff and a solid supporting infrastructure. The infrastructure also provides support for the Apache Point Observatory. The Evans Facility is older but is still capable of producing quality observations of the corona, prominences and moderate resolution solar disk features. In the past, many synoptic programs have been successfully run. Science programs have been somewhat limited because of staff reductions. The Nation, the state of New Mexico and local communities can be proud of the Sacramento Peak Observatory. The observatory is internationally known for its excellence in solar research capabilities. Solar images going back to approximately 1948 are stored in the film vault and are considered to be national treasures. I hope New Mexico State University (NMSU) will be able to take over the operation of the Sacramento Peak Observatory as it has had a close association with Sac Peak for at least the last 35-40 years. NMSU was one of the institutions interested in operating Sac Peak when the Air Force withdrew its support in 1976. Several of the Sac Peak scientists have been adjunct professors in the NMSU astronomy program. Also, several Sac Peak scientists were in favor of NMSU operating Sac Peak 20-25 years ago. Ties to NMSU were strengthened with the construction and subsequent operation of Apache Point Observatory. Sacramento Peak Observatory has been and still is important to the local economy, schools and the public. The museum at Sac Peak is open to the public and is an important educational facility for the schools in southern New Mexico and for future astronomers. The museum is tied to Apache Point Observatory and the US Forest Service. These organizations also use the facility for meetings and functions. Volunteers from Sac Peak and Apache Point provide fire protection and ambulance services for the observatories and the surrounding area. I think the Sacramento Peak Observatory and NMSU astronomy is a natural fit. A big plus for both institutions. Please do everything possible to secure the Sacramento Peak Observatory for future generations.	Email, Letter	8/5/2016

Appendix 5F

Cultural Resources Assessment of Effects

TECHNICAL REPORT

Proposed Changes to Sacramento Peak Observatory Operations: Historic Properties Assessment of Effects

Prepared for

National Science Foundation

October 2017

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Acronyms and Abbreviations

ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effects
ARC	Astrophysical Research Consortium
AST	Division of Astronomical Sciences
CE	Civil Engineering
C.F.R.	*Code of Federal Regulations*
DKIST	Daniel K. Inouye Solar Telescope
DST	Richard B. Dunn Solar Telescope
GRD	Geophysics Research Directorate
HAO	High Altitude Observatory
HCPI	Historic Cultural Property Inventory
ISOON	Improved Solar Observing Optical Network
MOA	Memorandum of Agreement
NCAR	National Center for Atmospheric Research
NHPA	National Historic Preservation Act
NMSU	New Mexico State University
NRHP	National Register of Historic Places
NSF	National Science Foundation
NSO	National Solar Observatory
PA	Programmatic Agreement
SHPO	State Historic Preservation Officer
SOON	Solar Observing Optical Network
TCP	Traditional Cultural Property
U.S.C.	United States Code
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
VLA	Very Large Array
WPA	Works Progress Administration

SECTION 1

Introduction

The National Science Foundation (NSF) has identified the need to divest several facilities from its portfolio to retain the balance of capabilities needed to deliver the best performance on the key science of the present decade and beyond. Sacramento Peak Observatory in Sunspot, Otero County, New Mexico, is one of the facilities identified for potential changes in operation. This technical report describes the undertaking and its proposed Alternatives, presents archaeological and architectural identifications and evaluations, and provides an assessment of effects associated with the undertaking.

1.1 Definition of Proposed Undertaking

The decision regarding the potential changes to Sacramento Peak Observatory operations is considered a federal undertaking and triggers compliance with Section 106 (54 United States Code Section [U.S.C. §] 306108) of the National Historic Preservation Act of 1966, as amended (54 U.S.C. § 300101 *et seq*.) (NHPA) and the NHPA's implementing regulations, "Protection of Historic Properties" (Title 36 *Code of Federal Regulations* [C.F.R.] Part 800). NSF initiated Section 106 consultation with the New Mexico State Historic Preservation Officer (SHPO) on August 24, 2016. Consultation with SHPO is ongoing.

1.2 Proposed Alternatives Background

The Sacramento Peak Observatory is located within the Lincoln National Forest in the Sacramento Mountains. The project area is located on National Forest System lands managed by the U.S. Department of Agriculture, U.S. Forest Service (USFS), Lincoln National Forest, and Sacramento Ranger District. Established by the U.S. Air Force via a Memorandum of Agreement (MOA) with the USFS in 1950, the facility was transferred to NSF in 1976. NSF and the USFS executed a land use agreement, signed in 1980, to formalize this transfer and the continued use of the land for the Observatory. The flagship facility at the Sacramento Peak Observatory is the Richard B. Dunn Solar Telescope (DST), previously known as the Vacuum Tower Telescope, which was completed in 1969 and is a high spatial resolution optical solar telescope, allowing solar astronomers worldwide to obtain information about the Sun. In addition to the DST, Sacramento Peak Observatory hosts the John W. Evans Solar Facility (1952; not in active use), the Hilltop Dome (1963; not in active use), the Grain Bin Dome (1950; not in active use), and the Patrol Dome, as well as various support structures.

In 2015, CH2M conducted a cultural resources survey of the architectural resources at the Sacramento Peak Observatory. A summary of the survey results is included in Section 2.2, "Determinations of Eligibility." The associated technical report, titled *Cultural Resources Evaluation, National Solar Observatory (Sacramento Peak Observatory), Sunspot, New Mexico*, was submitted to the New Mexico SHPO for review on August 24, 2016 (CH2M, 2016). The New Mexico SHPO concurred with NSF's determinations of eligibility on May 18, 2017.

1.3 Proposed Alternatives Description

NSF's Division of Astronomical Sciences (AST) is the federal steward for ground-based astronomy in the United States, funding research through awards to individual investigators and research groups and via cooperative agreements for operation of telescope facilities. These national and international telescope facilities provide observational capabilities on a competitive basis to thousands of astronomers per year. These facilities also enable scientific advances by making archived data products available to researchers. Along with funding telescope facilities and research awards, AST supports the development of advanced technologies and instrumentation. One area of research supported by AST is solar

astronomy, which is primarily managed via the National Solar Observatory (NSO). NSO-managed facilities include the Sacramento Peak Observatory.

The need for NSF to reduce its participation in the Sacramento Peak Observatory has been established through a number of reviews and surveys conducted by the science community. At present, the Sacramento Peak Observatory serves the solar physics community as the only high-resolution solar facility with extensive spectroscopic capabilities open for community access in the United States and as a development test bed for the high-order Adaptive Optics capability. The 4-meter-diameter Daniel K. Inouye Solar Telescope (DKIST) is currently under construction on Haleakalá in Maui, Hawai'i, and is planned to replace the function of DST for NSO. In a funding-constrained environment, NSF needs to maintain a balanced research portfolio. Therefore, the purpose of this proposed undertaking is to allow NSF to substantially reduce its contribution to the funding of Sacramento Peak Observatory. NSF has proposed four alternatives to address the need to substantially reduce NSF's contribution from its current level to a level that retains a balanced program overall for ground-based astronomy.

Use or demolition of any particular building or instrument cannot be determined unless or until a viable collaboration option is under consideration. Because reduction of NSF funding may require mothballing or demolition of facilities, this technical report describes these Alternatives under the most conservative (greatest effect) scenario in terms of NSF's analysis of potential changes to facilities, so that it may be inclusive of the full range of potential effects to historic properties. The four proposed Alternatives and the No-Action Alternative are described as follows:

- **Alternative 1** – **Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding**: Alternative 1 would involve the transition of site operations of the Sacramento Peak Observatory to interested parties for continued solar astronomy research. NSF would reduce funding of the Sacramento Peak Observatory and the interested parties would be responsible for future maintenance and any future upgrades. Alternative 1 would involve the least change to the current facility and the majority of the telescopes and related research and support facilities would be kept and maintained. The Residential House Trailer (a non-historic structure) and 21 Relocatable Housing units (including the Recreation House) could potentially be demolished under this proposed Alternative.
- **Alternative 2 – Transition to Partial Operations by Interested Parties with Reduced NSF Funding**: Alternative 2 would involve transition of partial operations of the Sacramento Peak Observatory to interested parties. Operations would continue to focus on scientific research and Science, Technology, Engineering, and Mathematics (STEM) education. NSF would reduce funding of the Sacramento Peak Observatory and the additional interested parties would be responsible for future maintenance and any future upgrades. Facilities not needed to meet the anticipated operational goals of the interested parties would be mothballed or demolished. The Residential House Trailer (a non-historic structure) and 21 Relocatable Housing units (including the Recreation House) could potentially be demolished under this proposed Alternative.
- **Alternative 3 – Mothballing of Facilities**: Alternative 3 would involve mothballing and preserving facilities for the purpose of maintaining operational readiness in the event a new operator is identified. This includes mothballing all buildings, with the exception of the Residential House Trailer (a non-historic structure) and 21 Relocatable Housing units (including the Recreation House), which could potentially be demolished under this proposed Alternative. Mothballing activities involve removing a facility from daily use while maintaining the general condition of equipment and structures. The intent is to preserve the equipment and structures such that operations could be restarted at some future date without requiring significant repairs. At this time, it is not known what type of operations would be implemented after the mothball period ends or the length of the mothballing period, but it is assumed that operations would be similar to the scientific research and educational activities currently occurring at the Sacramento Peak Observatory, with no major

change in land use. Mothballing would not occur indefinitely, as it is inconsistent with NSF's mission and science priorities to maintain mothballed buildings in perpetuity. If no viable options are identified for operations to be transferred to a new operator, NSF would consider other methods of disposition in coordination with USFS and would complete any additional required environmental analysis at that time, if necessary.

- **Alternative 4 – Demolition and Site Restoration**: Alternative 4 could involve the removal of all structures to a maximum of 4 feet below existing ground surface grade to enable the restoration of the ground surface topography without limiting future surface operations or activities. All above-grade structures could be removed and demolished, with below-grade structures and foundations stabilized, filled, and abandoned in place. Safe demolition of the aboveground portion of the DST would be accomplished using explosives (in the form of shaped charges, single detonation event) and conventional demolition equipment, and it would be conducted in accordance with a Blast Management Plan developed to identify and control safety risks associated with blasting. Excavated areas would be reclaimed using fill materials that are free of known contaminants.
- **No-Action Alternative – Continued NSF Investment for Science-focused Operations**: Under the No-Action Alternative, NSF would continue to fund the Sacramento Peak Observatory at current levels. None of the proposed Action Alternatives would be implemented.

These proposed Alternatives may be further refined during the compliance review process and will be informed by public comment and the Section 106 consultation process.

1.4 Area of Potential Effects

The area of potential effects (APE) for the proposed undertaking is defined as Sacramento Peak Observatory's overall property limits, which include: the main Observatory area; the Sewage Treatment Plant and associated water wells, as well as the section of Sunspot Highway that connects this area to the main Observatory; and the remains of the helicopter landing area northwest of the Observatory. The Observatory's overall property limits are defined in the land use agreement executed between NSF and USFS in 1980 as the Compound Area. SHPO proposed that the Compound Area (overall property limits) should be used as the APE and NSF agreed. The total acreage of the APE is approximately 250 acres, with approximately 83 acres developed and the remaining acreage undeveloped. The cultural resources survey was conducted in those areas where buildings or roads associated with the Sacramento Peak Observatory are present. The APE is located within U.S. Geological Survey (USGS) Topographic Quadrangle Map Sacramento Peak (2013) (Figure 1).

1.5 Methodology

1.5.1 Determinations of Eligibility

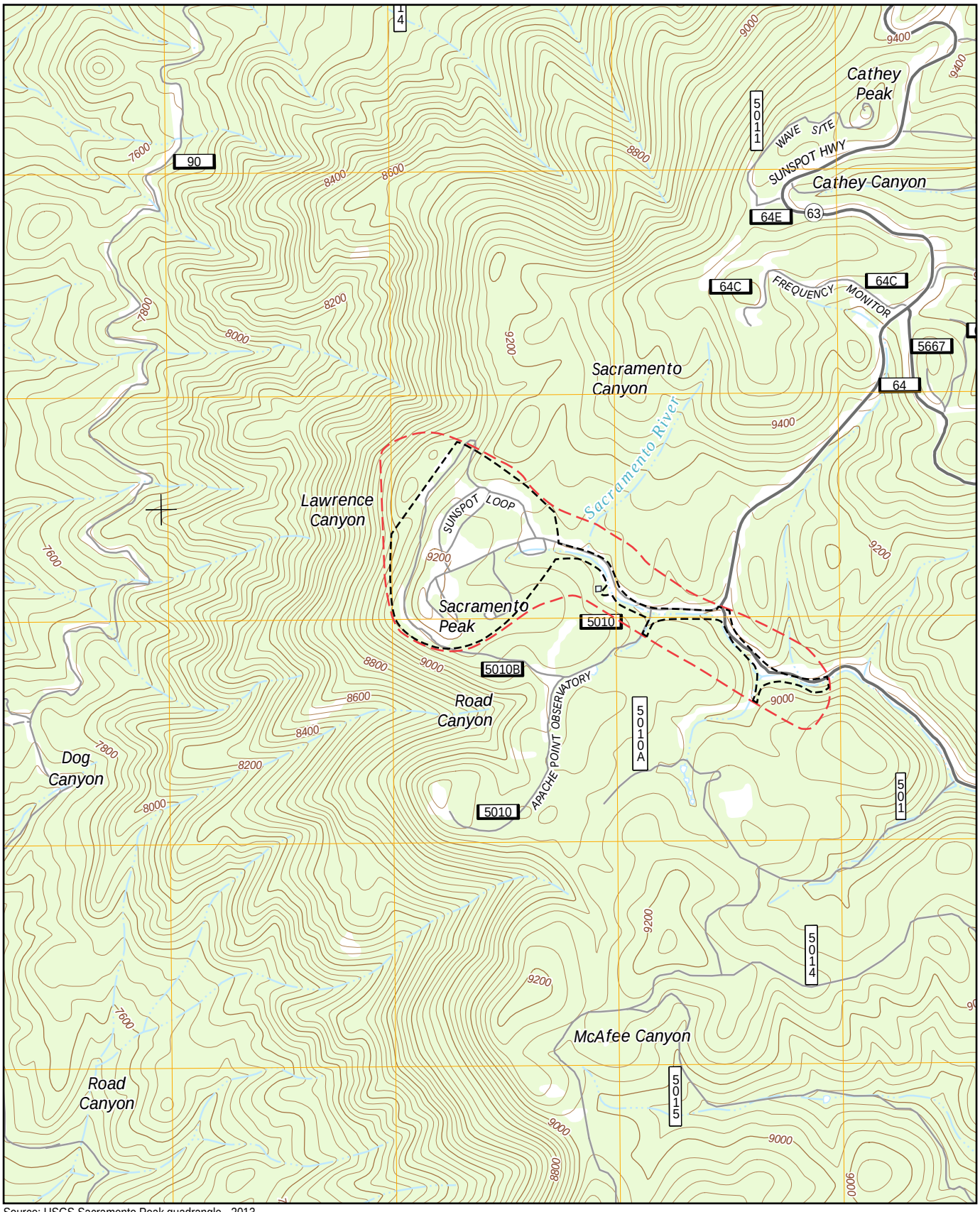
The federal historic properties database known as the National Register Information System was reviewed to identify existing historic properties within the APE. A Secretary of the Interior-qualified architectural historian conducted an intensive architectural survey at the Sacramento Peak Observatory on January 26 and 27, 2015. The survey was used to engage staff in informal interviews and to conduct archival research, including reviews of historic photographs and narratives, newspaper articles, construction records, former surveys, environmental documentation, and architectural drawings.

Historic architectural resources within the APE were evaluated for potential eligibility for listing in the National Register of Historic Places (NRHP), both individually and as a potential historic district. The evaluation included all facilities that were more than 45 years old at the time of the survey. The standard NRHP age threshold is 50 years; however, using 45 years as the cutoff allows a 5-year buffer for the execution of any proposed Alternative. Sacramento Peak Observatory contains some buildings that

were constructed after 1970, such as the visitors' center, a storage building, and some trailers; however, they are not considered to have exceptional importance and do not qualify under NRHP Criteria Consideration G, which applies to properties that have achieved significance within the last 50 years. A total of 65 built environment resources that had been constructed in or before 1970 were identified as extant within the APE, including 5 telescope structures, 35 residential buildings, 17 administrative buildings, and 8 buildings and structures associated with site infrastructure (Figure 2). Appendix A includes a table listing all the buildings and structures that were evaluated for the NRHP as part of the 2015 intensive architectural survey.

Buildings and structures that were not 45 years old at the time of the cultural resources survey and were not considered to have exceptional importance were not included in the historic district evaluation and are not listed in Appendix A. The Post Office located within the main Sacramento Peak Observatory area, which was more than 45 years old at the time of the survey, was not included in the cultural resources survey because it is not owned by NSF (the Fire Station within the Sacramento Peak Observatory is also not owned by NSF but is less than 45 years old).

NSF initiated Section 106 consultation with the New Mexico SHPO on August 24, 2016. New Mexico Historic Cultural Property Inventory (HCPI) base forms were completed for the 65 built environment resources that were surveyed. The HCPI base forms were submitted to the New Mexico SHPO for review and concurrence on December 20, 2016. Per SHPO's request, the forms were revised and resubmitted to the New Mexico SHPO on April 27, 2017. The New Mexico SHPO concurred with the determinations of eligibility on May 18, 2017.



Source: USGS Sacramento Peak quadrangle - 2013

North

0 1,000 2,000

Approximate scale in feet

LEGEND

Sacramento Peak Observatory NRHP-Eligible Historic District Boundary

Area of Potential Effects (APE)

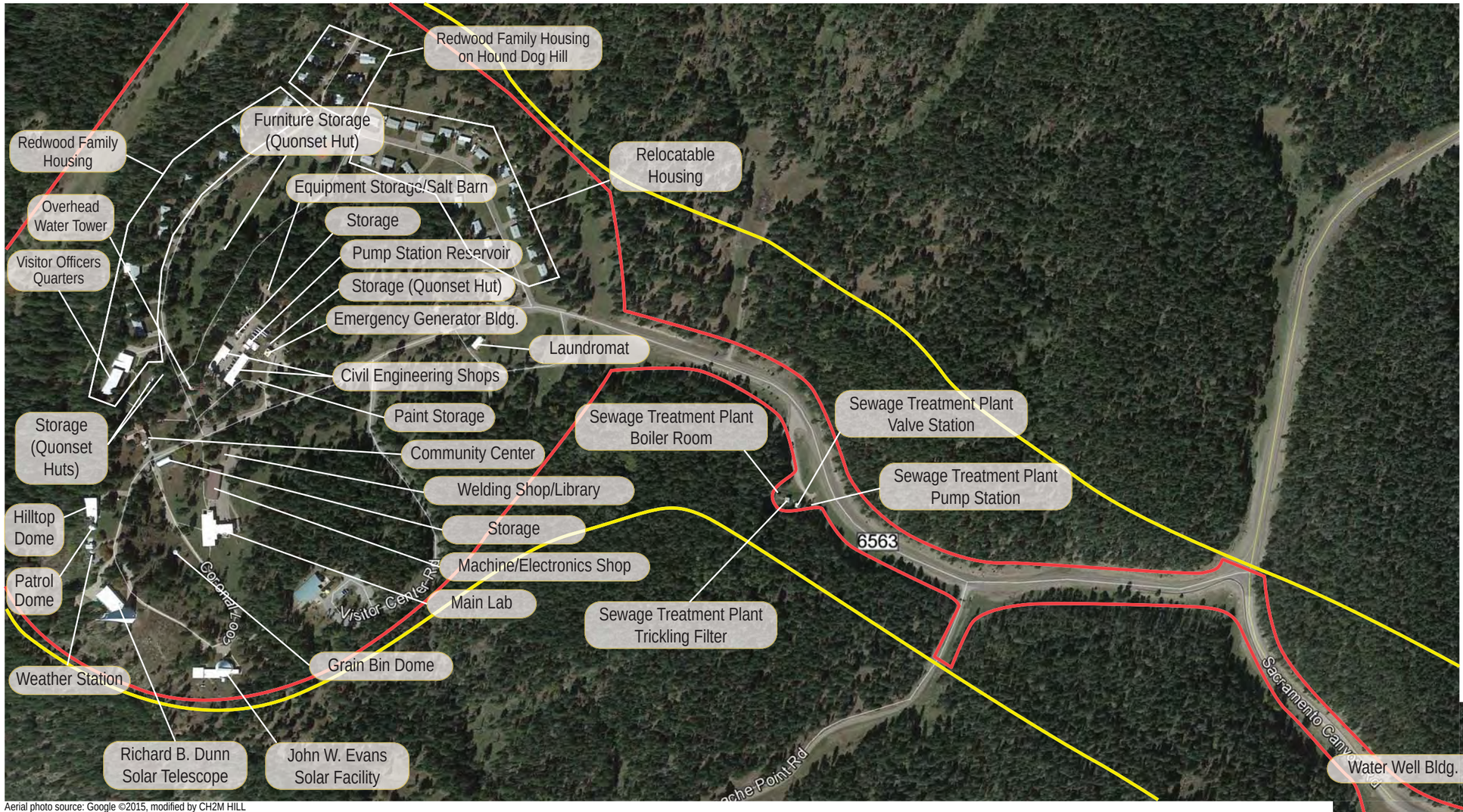
Figure_3.2-1_APE_v3 06-20-17 dash

FIGURE 1

Area of Potential Effects (APE)

Sacramento Peak Observatory

Sunspot, New Mexico



Aerial photo source: Google ©2015, modified by CH2M HILL

Building/Structure Name (Building Number)

ADMINISTRATIVE BUILDINGS

- Main Lab (3004)
- Machine/Electronics Shop (3005)
- Welding Shop/Library (3006)
- Storage (Quonset Hut) (3008)
- Community Center (former Mess Hall) (3010)
- Storage (Quonset Hut) (3011)
- Storage (Quonset Hut) (3012)
- Storage Building (3024)
- Furniture Storage (Quonset Hut) (3029)
- Civil Engineering (CE) Shop (3031)
- CE Shop (3032)
- Paint Storage (3034)
- Equipment Storage/Salt Barn (3036)
- Storage (3037)
- Emergency Generator Building (3038)
- Weather Station (3039)
- Laundromat [formerly public restrooms] (3060)

INFRASTRUCTURE

- Pump Station Reservoir (3033)
- Water Well Building (3050)
- Water Well Building (3051)
- Sewage Treatment Plant - Boiler Room (3053)
- Sewage Treatment Plant - Trickling Filter (3054)
- Sewage Treatment Plant - Valve Station (3055)
- Sewage Treatment Plant - Pump Station (3056)
- Overhead Water Tower (no building number)

Building/Structure Name (Building Number)

TELESCOPES

- Grain Bin Dome (3002)
- John W. Evans Solar Facility [housed in the Big Dome] (3000)
- Patrol Dome (ISOON Building) (3009)
- Hilltop Dome (3040)
- Richard B. Dunn Solar Telescope (formerly Vacuum Tower Telescope) (3042)

HOUSING

- Visitor Officers Quarters (VOQ) (3013)
- Redwood Family Housing (3014ns)
- Redwood Family Housing [aka Director's House] (3015)
- Redwood Family Housing (3016ns)
- Redwood Family Housing (3017)
- Redwood Family Housing (3018)
- Redwood Family Housing (3019)
- Redwood Family Housing (3020ns)
- Redwood Family Housing on Hound Dog Hill (3044)
- Redwood Family Housing on Hound Dog Hill (3045)
- Redwood Family Housing on Hound Dog Hill (3046)
- Redwood Family Housing on Hound Dog Hill (3047)
- Redwood Family Housing on Hound Dog Hill (3048)
- Redwood Family Housing on Hound Dog Hill (3049)
- Relocatable Housing (3061)
- Relocatable Housing (3062)
- Relocatable Housing (3063)
- Relocatable Housing (3064)
- Relocatable Housing (3065)
- Relocatable Housing (3066)
- Relocatable Housing (3067)
- Relocatable Housing (3068)
- Relocatable Housing (3069)
- Relocatable Housing (3070), Recreation House
- Relocatable Housing (3071)
- Relocatable Housing (3072)
- Relocatable Housing (3073)
- Relocatable Housing (3074)
- Relocatable Housing (3075)
- Relocatable Housing (3076)
- Relocatable Housing (3077)
- Relocatable Housing (3079)
- Relocatable Housing (3081)
- Relocatable Housing (3083)
- Relocatable Housing (3085)

North

0 250 500

Approximate scale in feet

LEGEND

- NRHP Contributing
- NRHP Non-Contributing
- NRHP Individually Eligible
- NRHP Not Individually Eligible
- Sacramento Peak Observatory NRHP-Eligible Historic District Boundary
- Area of Potential Effects (APE)

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FIGURE 2
Surveyed Built Environment Resources
Sacramento Peak Observatory
Sunspot, New Mexico

1.5.2 Finding of Effect

As stipulated in 36 C.F.R. 800.1(a), the goal of consultation is to identify historic properties potentially affected by the undertaking, assess the effects to them, and seek ways to avoid, minimize, or mitigate any adverse effects on historic properties. After historic properties were identified, the Criteria of Adverse Effect were applied to each proposed Alternative. These criteria are used to determine whether the proposed undertaking could change the characteristics that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Section 106 of the NHPA allows three findings for effects on historic properties:

- No Historic Properties Affected
- No Adverse Effect
- Adverse Effect

When an undertaking is found to have an adverse effect, Section 106 requires notification to the Advisory Council on Historic Preservation (ACHP) and consultation with SHPO and other interested parties regarding appropriate avoidance, minimization, or mitigation measures. Generally speaking, minimization measures might include redesigning aspects of a project to lessen the effects it has on historic properties. Mitigation may include relocating buildings or structures to move them out of the project footprint or documenting them for archival purposes. For a finding of adverse effect, the product of consultation is usually an MOA or a Programmatic Agreement (PA), per 36 C.F.R. 800.6(c), among the SHPO, federal agency, ACHP if it chooses to participate, and other consulting parties. This agreement contains stipulations specifying measures to be implemented that would avoid, minimize, or mitigate the adverse effects. For this proposed undertaking, an MOA or a PA would be drafted to resolve potential adverse effects from the proposed undertaking.

There are no known archaeological resources at the Sacramento Peak Observatory, and no archaeological survey work was conducted there as part of the Section 106 process. In addition, no traditional cultural properties (TCPs) have been identified at the Sacramento Peak Observatory. Therefore, effects to archaeological resources or TCPs are not analyzed in this technical report. An unanticipated discovery plan would be in place prior to any demolition activities associated with the selected Alternative to address archaeological resources that might be discovered during demolition.

The term mothballing is used in this technical report to refer to the process of removing a facility or structure from daily use while maintaining the general condition for a defined period and removing equipment and structures from use while keeping them in working order. The NPS guidelines for mothballing, presented in Preservation Brief 31, "Mothballing Historic Buildings," applies specifically to historic buildings instead of instruments or equipment (Park, 1993). However, since a similar approach would be used to preserve certain historic instruments and structures at the Observatory, the term mothballing is used in this technical report for historic instruments, as well as historic buildings, to indicate that they will be preserved, protected, and maintained in an operational readiness condition. Historic instruments and equipment at Sacramento Peak Observatory would be protected and preserved in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings* (Grimmer, 2017).

SECTION 2

Identified Historic Properties

2.1 Historical Context

2.1.1 Origins of Solar Astronomy

The Sun – nothing can be of more basic importance. It is the core of our solar system, the life giver. Worshiped as divine throughout history. So basic to our existence that it merits a single-syllable name in many cultures – Ra, Sol, and by us, Sun. (Plymate, 2001)

The study of stars, including the Sun, and celestial objects has fascinated people for thousands of years. Early cultures around the world used the planets, the stars, the Sun, and the Moon to track the passage of time and measure physical movement across the earth's surface. These measurements were achieved through observations of the sky: "In the period before 1609, before Galileo introduced the astronomical telescope to our subject, astronomers were confined to the use of the naked eye, with its limited dark-adapted pupil diameter" (Hughes, 2004). The use of instruments that employed lenses or mirrors with increasingly large apertures by astronomers in the seventeenth century "enable[d] more light to be collected and concentrated into the eye pupil" and allowed for the observation of larger quantities of stars (Hughes, 2004). In 1609, Galileo's telescope—which he used to look at the Sun and stars—had an aperture of 1.5 centimeters, but by 1820, the "great Dorpat refractor" had an aperture of 24 centimeters (Hughes, 2004). This improvement of technology "led to an increase in stellar limiting magnitude and a huge change in the number of stars that could be detected" (Hughes, 2004).

During the 1660s, Isaac Newton demonstrated that a glass prism could be used to split sunlight into a spectrum of colors though the process of "refraction" (National Center for Atmospheric Research [NCAR], 2015). More than a century later, William Herschel discovered that invisible "rays" existed beyond the red end of the solar spectrum, which eventually became known as infrared radiation. A few years later, in the beginning of the nineteenth century, Johann Wilhelm Ritter observed ultraviolet radiation extending in rays from the violet end of the solar spectrum. Further developments in the understanding of the solar spectrum were made in 1802, when William Hyde Wollaston used a glass prism and observed dark lines between the chromatic divisions of the spectrum. Although at the time Wollaston did not consider this to be a great discovery, "this marked the first step towards solar spectroscopy, which was to revolutionize Solar Physics in the second half of the century" when the same dark lines were rediscovered in 1817 by Joseph von Fraunhofer (NCAR, 2015). It soon became clear that the dark lines could offer important information about the Sun's atmosphere. As a result of this discovery, "[s]till today, most information gathered on the Sun and stars is obtained through spectroscopic means" (NCAR, 2015).

Although important advances in the understanding of the solar spectrum occurred during the early nineteenth century, "telescopes which specialize in solar observations are fairly recent, dating from the late nineteenth century onwards" (Von der Luhe, 2009). In 1939, an instrument referred to as a coronagraph was invented by Bernard Lyot, a French astronomer. The invention solved the problem of observing the corona—the gaseous plasma that surrounds the Sun—despite the intensity of the Sun's brightness. A coronagraph essentially uses a large disk to block the Sun and feign an eclipse (NSO, 2015). This technology "enable[d] astronomers to observe the hot gas (the corona) surrounding the Sun without having to wait for total solar eclipses" and would become an important technology used at solar observatories around the world (Oppenheimer, 2003).

2.1.2 Origins of Sacramento Peak Observatory

"I am the proudest of the observatories that I have built in the West, not only the one at Climax and its Boulder headquarters, but also the Sacramento Peak Observatory…."

– Donald H. Menzel in 1961 (Bogdan, 2002)

The High Altitude Observatory (HAO), a solar observatory located on the Continental Divide at an elevation of over 11,000 feet in Climax, Colorado, was incorporated in April 1946. The observatory, which was associated with the Harvard College Observatory and the University of Colorado, had been previously established in 1940 by Walter Orr Roberts and Donald Menzel, an astrophysicist and Roberts' doctoral advisor. At the time, "it was the world's highest permanent astronomical observatory; and it was specifically designed for solar studies" (Bushnell, 1962). A Lyot coronagraph, the first of its kind to be available in the United States, was installed at the HAO. The Climax coronagraph was "larger than the original, portable version, with improved optics – and the first in the Western hemisphere" (Liebowitz, 2002). Roberts' role with the HAO was supposed to be limited to 1 year; however, his responsibilities at the Observatory were extended after the start of World War II. As the "sole observer" at the site during these years, Roberts worked with the Bureau of Standards, "forecasting radio conditions on the basis of solar observations" (NCAR, 2013; Bushnell, 1962). These studies of the upper atmosphere were useful in predicting conditions for radio communication, guided missiles, and supersonic aircraft (Liebowitz, 2002). As a result of this collaboration, solar observations "became essential to the war effort" (NCAR, 2013), and furthering the field of solar astronomy became an appealing goal for astronomers and military alike.

The Sacramento Peak Observatory "in New Mexico grew directly out of the earlier project for Climax, and it was conceived as a complementary enterprise, but it evolved in a very different direction" (Liebowitz, 2002). During the first years of operation of the HAO, Roberts had realized that "there were long periods of cloudiness, especially during the winter, when it was not possible to make observations" (Liebowitz, 2002). For this reason, it was decided that a second solar observatory should be established (Bushnell, 1962). In addition, the practical applications for solar research discovered by the military during World War II regarding the impact solar activity had on radio communication spurred the idea for a military-funded observatory. Thus, it became an important mission of the U.S. Air Force to establish a solar observatory: "after the war, when the Air Force recognized the need to organize its own long-range program of solar studies, it quite naturally turned for specialized assistance to the recently formed High Altitude Observatory (HAO)" (Sears, 1965–1966; Bushnell, 1962). In September 1947, the U.S. Air Force issued a contract to HAO and Harvard University to conduct a survey, identify an appropriate site for a new solar observatory, and determine which instruments to install (Bushnell, 1962).

Several requirements for the new site were defined: the climate needed to be "'out of phase' with the season at Climax" to double the amount of viable observation time and "the atmosphere above the new site should be exceptionally free from clouds or haze, dust and other contaminant" to allow for prime "seeing" capabilities (Bushnell, 1962). Roberts and Menzel used a plane to examine the White Sands Proving Ground (an area used as a research rocket firing range), Holloman Air Force Base located just east of White Sands, and Alamogordo, New Mexico. As a result of their investigations, Roberts and Menzel "concluded that the section of the Sacramento Mountains in which Sacramento Peak is located would be especially promising for a solar research site. Further inquiries and inspection tended to confirm this initial reaction" (Bushnell, 1962). In addition, a site in the vicinity of Holloman Air Force Base was appealing since the base "planned to supply the equipment to start the observatory, and maintain it after it was built" (Ramsey, 2002). Sacramento Peak had a number of advantages: an elevation of 9,253 feet that was high enough to have lower atmospheric dust levels, but low enough to be more accessible to researchers than Climax at 11,000 feet; a moderate amount of rainfall; a high percentage of sunshine; and a thick forested setting to help block movement and interference from rising air currents. These qualities indicated to researchers that "[p]otentially, in fact, Sac Peak

[Sacramento Peak Observatory] and Climax promised to make an excellent 'team' of research sites, the former being ideally suited for continuing day-to-day observations while the latter could properly emphasize 'special project' research requiring fine viewing conditions but only for limited durations" (Bushnell, 1962).

As a high school student, Colorado native Rudy Cook visited Climax and met Roberts, igniting in Cook an acute interest in solar astronomy. A few years later, Cook returned to Climax in the hope of finding a job there. Instead, Roberts and Dr. John "Jack" W. Evans, another student of Menzel's who would become the first director of Sacramento Peak Observatory, offered Cook a job helping them establish a new observatory. A small crew, including Cook, Roberts, Evans, and two others, traveled to Sacramento Peak and set up camp, at first in "an old railroad box car" (Ramsey, 2002). In 1947, they started collecting daily observations regarding the conditions of the site. Cook's companions returned home soon after their arrival, leaving Cook alone with his dog, Rocky. In December 1947, "Menzel and Roberts made a documented though still tentative recommendation that Sacramento Peak be chosen for the Air Force solar research site" (Bushnell, 1962). In April 1948, the Committee on Geophysical Sciences within the War Department's Research and Development Board formally "accepted the High Altitude's [sic] Observatory's [HAO] recommendation for Sacramento Peak" (Liebowitz, 2002). A contract was written, mandating that the Air Force "accomplish the creation of the observatory" (Liebowitz, 2002). The specifics of the contract called for the preparation of detailed plans for an integrated solar research facility, which would combine observational, analytical, and data-reduction activities, all on a larger scale than at any comparable observatory; design, development, and fabrication of the required optical device; and concurrently, theoretical studies of solar structure and characteristics (Bushnell, 1962). With this contract in place, the facility on Sacramento Peak started to take shape as a significant solar observatory and the burgeoning community of Sunspot began.

2.1.3 Development of Facilities at Sacramento Peak Observatory

"…[W]hile the Sac Peak program covers the entire sun, the research studies do concentrate on the solar chromosphere—the hot, transparent, intensely active layer extending several thousand miles immediately above the opaque solar disk, or photosphere." (Sears, 1965–1966)

Conditions on Sacramento Peak were difficult and lonely for Cook as the sole resident of the new Observatory during the fall of 1947. The environment was treacherous and the copious amounts of mud made travel up and down the mountain at times impossible. Several months after Cook's arrival, Roberts hired Lee Davis to join Cook on the peak and assist in the daily site condition observations. Soon after, Cook's wife Mae and their young daughter Karen joined the two men (Ramsey, 2002). By 1949, a "regular program of solar research had commenced at Sac Peak [Sacramento Peak Observatory]…centered around the idea of a 'routine solar patrol', with comprehensive monitoring and 'alerts to assist the forecasting of radio communications" (Liebowitz, 2002). Dr. Menzel visited the site regularly, but at this time in the Observatory's history, there were three full-time Harvard University/HAO resident observers along with their respective families: Rudy and Mae Cook, Lee and Rosemary Davis, and Harry and Joanne Ramsey. Joanne Ramsey wrote a book titled *New Mexico, Sunspot, Sacramento Peak Observatory in the Beginning* that presents the memories and narratives of the early residents of the Observatory. Ramsey describes how Cook and Davis, "together, they cleared more trees to improve visibility, for observing" (Ramsey, 2002). As illustrated by this description, the establishment of Sacramento Peak Observatory relied heavily on the innovation, drive, and courage of these first residents.

2.1.3.1 Early Buildings and Structures (Late 1940s and 1950s)

The first buildings at the Sacramento Peak Observatory were temporary and few. Cook and Davis constructed a Sears and Roebuck prefabricated steel garage in 1947 and used it, along with a 16-foot trailer. They installed a water tank in the garage and used the structure as a shop and office. The U.S. Air

Force supplied the trailer, which included a small kitchen with a working stove. Eventually, a small wood enclosure was constructed to connect the 16-foot trailer to the garage for weather protection. Neither the garage nor the 16-foot trailer remain extant. Cook kept a journal that marked a number of specific accomplishments that were made at the site during these first few weeks, including building a privy and garbage pit on August 19, 1947; building a shower on August 20; and marking the alignment of the new road to the mountain peak on August 29. During the following weeks, the residents started to bulldoze a road leading to the Observatory. Cook and Davis used a weapons carrier jeep, which lacked a roof, to drive up and down the mountain. Later in 1947, another 17-foot trailer was added to the Observatory. Both the 16-foot trailer and the 17-foot trailer were used as residences as needed over the next few years (Ramsey, 2002).

In 1948, the U.S. Air Force constructed the site's first "Jamesway," a Quonset hut-like structure used as a dormitory to house single men that were temporarily stationed at Sacramento Peak Observatory for research or construction. The "Jamesway" was 25 feet long, included a stove for heat and cooking, and was constructed using a plastic-type cloth that was insulated and rain proof (Ramsey, 2002). The structure, which is no longer extant, could accommodate 12 to 14 men during the summer months; during the rest of the year, it was occupied only by four or five men. A shower was rigged on top of the Sears and Roebuck garage and involved a "large tank balanced on railroad ties for water pressure" (Ramsey, 2002).

In 1948-1949, the first two prefabricated houses on Sacramento Peak Observatory were erected along with a workshop and a garage, none of which remain extant (Ramsey, 2002). The houses were long, rectangular plan residences clad in shingles, with a front gable roof. Construction on other infrastructure started soon after, including an electrical generating plant, installation of water and sewer lines, improvements to access, and the establishment of radio communication with Holloman Air Force Base (Bushnell, 1962). Originally, residents of the Observatory relied on water from the Sacramento River, which had to be pumped into a 300-gallon tank trailer and brought back to the Observatory. Eventually a pump and pipe line were installed to bring water to the peak. Other improvements were made to improve pedestrian access within the Observatory; residents laid "wide, long metal planks to walk on; hopefully to keep the mud out of the buildings" (Ramsey, 2002).

Several telescopes were installed during the late 1940s and early 1950s, though they were not housed in buildings and generally were covered with waterproof tarps at night. One of these early instruments was a "4 ¼ inch coronagraph mounted on an eight-foot equatorial spar. This was the nation's second successful Lyot-type coronagraph, having about the same aperture as the one at Climax but substantially more compact in design" (Bushnell, 1962).

Grain Bin Dome

In 1950, a 6-inch telescope that would eventually be used as a coronagraph was installed at the site and "was principally used for taking motion pictures of solar prominences through a birefringent filter," a mechanism that transmits light in a series of distinct wavelength bands (Bushnell, 1962; Photonics Media, 2015). That same year, plans started on a 16-inch coronagraph "which was to be the observatory's most important single item of equipment" (Bushnell, 1962). A twin solar telescope was also planned for installation in Climax, and together they would be the world's largest of their type (Bushnell, 1962). Design and construction of the instrument involved a number of people, including Bernard Lyot, who invented the coronagraph; Lyot "served as a consultant in selection and testing of the glass blanks (which were made in France) for the optical components," which were subsequently replaced in 1963 (Bushnell, 1962). A "flare-patrol system" which regularly recorded "solar flares (or sudden localized increases in the brightness of the luminous gas)" was established at Sacramento Peak Observatory in March 1951 (Bushnell, 1962). Within 5 months of operation, the instrument had recorded 252 solar flares, "sufficient in itself to make some definite contributions to the understanding of flare phenomena" (Bushnell, 1962). Holloman Air Force Base also used instruments at the

Observatory to track its missile/rocket testing missions (Bushnell, 1962). Use of Sacramento Peak Observatory for this purpose continued for several years.

The first telescope dome, or indoor instrument, was a 6-inch prominence telescope mounted on a 10-foot spar and placed within a silo that had been ordered from the Sears & Roebuck catalogue (Photo 1). A slit was cut in the roof of the silo for observation purposes. As Ramsey describes it in her 2002 narrative:

> The instruments needed protection from the weather, so a Grain Bin was ordered from Sears & Roebuck. A road was made through the woods and the bin was erected as the 'Dome.' It had a sensor which automatically rotated it toward the Sun. In the 'Dome,' was an instrument called a Solar Spar, which was a 10-[foot] lengthy metal box used to mount different telescopes. Mounted on the Spar were four telescopes. One had a prominence camera. It took pictures of the eruptions or gases on the edge of the Sun called prominences. Another telescope was used to look at white-light images of the Sun, called Sunspots. The third telescope was called the Hydrogen Alpha Flare Patrol. It had a narrow-band solar filter to see flares on the face of the Sun. The fourth telescope was the Coronagraph designed by Dr. Evans.

The Dome, which came to be known as the Grain Bin Dome, was used daily from 1951 to 1963, during which time it recorded flare patrol images. A trailer that is no longer extant was placed adjacent to the instrument and used as an office. Around the time of the Grain Bin Dome's construction, Sacramento Peak Observatory became directly associated with the U.S. Air Force's Geophysics Research Directorate at Cambridge and was named the Upper Air Research Observatory. Evans was appointed as superintendent (Bushnell, 1962). Subsequent telescopes were installed in the Grain Bin Dome in 1952, 1955, and 1957. In 1963, the construction of the Hilltop Dome made the Grain Bin Dome obsolete. A nighttime telescope was installed in the Sears & Roebuck structure in 1995. The structure is no longer in active use, though it remains a historical attraction for visitors and the residents of Sunspot (NSO, 2015).

Photo 1. Grain Bin Dome

The John W. Evans Solar Facility (formerly the Big Dome)

A new contract between the U.S. Air Force and Harvard University implemented a new contract in December 1951 that required Harvard to operate the large coronagraph that was still under construction (Bushnell, 1962). The design for this 16-inch coronagraph included a 26-foot equatorial spar. John Evans designed the optics for the instrument, while Westinghouse Electric Corporation was contracted for the instrument's construction (Liebowitz, 2002). The mechanics and optics of the instrument, which were assembled and mounted in 1951–1952, were placed in a "specially designed enclosure with a rotating turret" known as the "Big Dome" (Liebowitz, 2002). The large 30-foot conical dome sits on concrete walls (Photo 2). A rectangular plan, concrete block laboratory wing extends from the domed structure to the east. A small, shed-like "slide-off" building that moves on raised tracks extends from the south elevation and remains extant. After its construction, the instrument within the Big Dome was "repeatedly modified, rearranged, and added to" (Bushnell, 1962). Some changes also occurred to the exterior building structure. Circa 1961, a new laboratory wing was added to the west side of the domed structure, the mirror image of the original east wing (Air Force Missile Development Center, 1961). Two years later, circa 1963, a larger rectangular plan addition was added onto the west addition (circa 1961) (PHM, 1963).

On August 18, 1987, the Big Dome was rededicated as the John W. Evans Solar Facility. The facility's commemorative in situ plaque reads: "The John W. Evans Solar Facility: Named in honor of the first Director (1952–1975) of Sacramento Peak Observatory, who transformed a remote mountain-top observatory into a world-renowned center for solar astronomy" (1987). The John W. Evans Solar Facility was used regularly for experiments and observations starting in 1954. Currently, the facility is not in active use.

Photo 2. The John W. Evans Solar Facility (formerly the Big Dome)

Willard Carl Kruger

Willard C. Kruger is the architect who designed many of the buildings constructed during the 1950s at Sacramento Peak Observatory. Prior to his work at the Observatory, Kruger had gained some notice for his work throughout New Mexico. During the 1930s, Kruger served as the head of the New Mexico Works Progress Administration (WPA) Architectural Department. Eight of his designs in New Mexico are listed in the NRHP, including the Pueblo Revival-style Clayton Public Library and several projects in the Clayton Public Schools Historic District in Clayton; the Columbian School, Longfellow School, and Raton Junior-Senior High School in Raton; Las Vegas Municipal Building in Las Vegas; the Tierra Amarilla AFS P-8 Historic District in Tierra Amarilla; and the Carrie Tingley Hospital for Crippled Children in Truth or Consequences (Monroe, 2002). Kruger is remembered as a "prominent architect in Santa Fe…best known for designing and developing the city of Los Alamos along with designing the laboratories that housed the development of the Atomic Bomb, also known as the Manhattan Project, during World War II" (New Mexico USA Obituaries, 2016). In addition to these accomplishments, Kruger also designed the New Mexico State Capital (1966), as well as many other state, federal, commercial projects and university buildings during his 50-year career (New Mexico USA Obituaries, 2016). Kruger died in 1984.

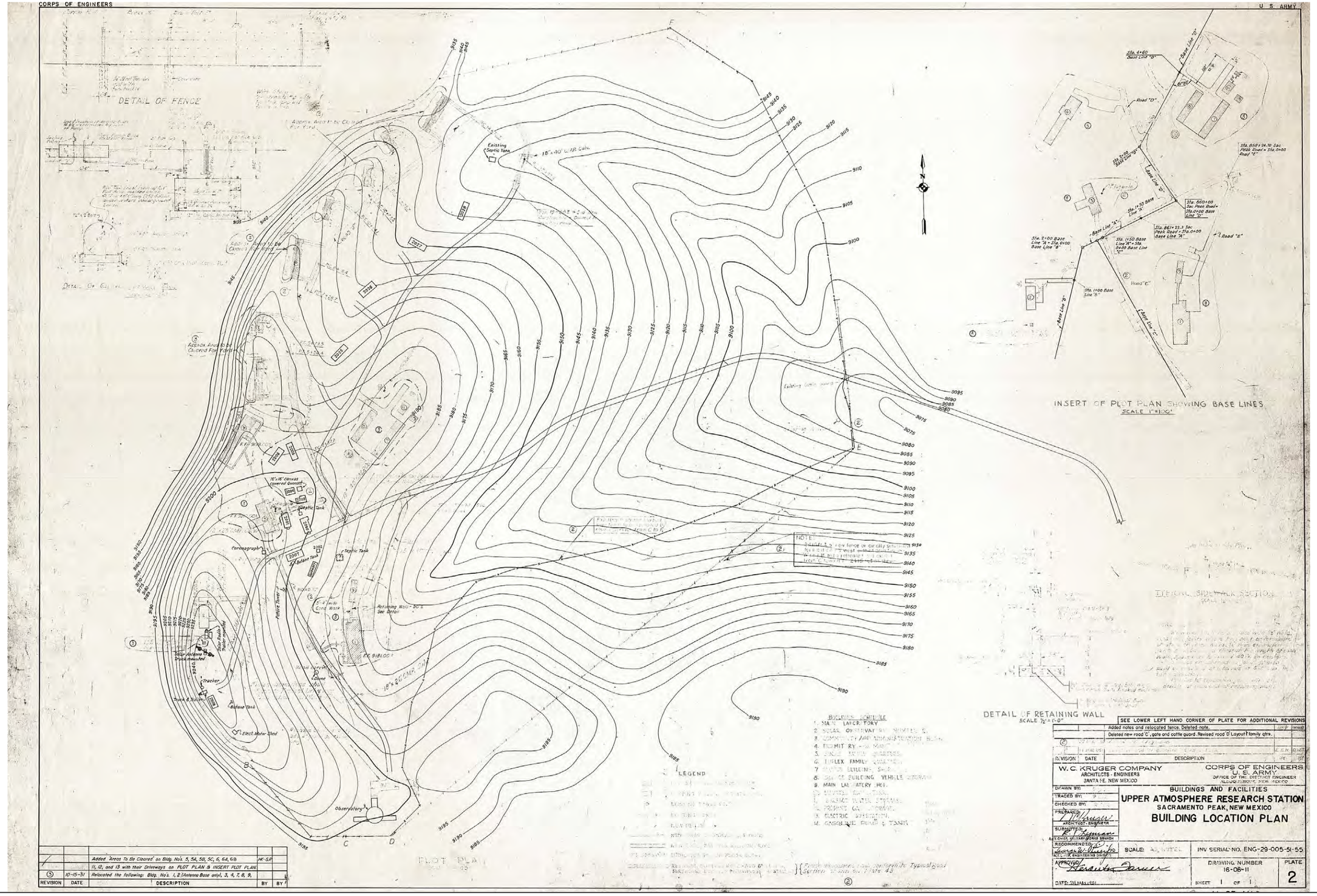
A building location plan for the Upper Air Research Observatory (the plan's title block has the Observatory's name incorrectly as the Upper Atmosphere Research Station), dated 1951 and signed by W.C. Kruger, shows 17 buildings and structures that were already in place, generally numbered with building numbers that are no longer used (Kruger, 1951a). The plan shows several more Quonset huts that were constructed in 1951 to serve various purposes, including offices, laboratories, dormitories, a kitchen, recreation space, and a library. The functions of the Quonset huts changed depending on the need at the time. The 1951 Quonset huts had metal frames and were clad in corrugated metal sheets. A total of 10 of the buildings shown as existing on the 1951 plan have been demolished; 7 remain extant. The buildings shown as existing in 1951 are listed in Table 1.

Several instruments that were not housed in buildings were also shown on the 1951 site plan, including the coronagraph located just south of the proposed Community Center and a truck-mounted solar antenna and two trailer-mounted solar radio instruments located just south of the proposed Hilltop

Laboratory. Other miscellaneous facilities are shown as existing on the 1951 site plan, including several butane tanks, septic tanks, and an electrical motor shed (Figure 3).

Table 1. Facilities Shown as Existing on the 1951 Building Location Plan

1951 Name	Current Name, Building Number	Extant?
Dome	Grain Bin Dome, Building 3002	Extant
Building 2026	Furniture Storage, Quonset Hut, Building 3029	Extant
Building 2005	Storage, Quonset Hut, Building 3011	Extant
Building 2006	Storage, Quonset Hut, Building 3012	Extant
Building 2007	Storage, Quonset Hut, Building 3008	Extant
Observatory	John W. Evans Solar Facility, Building 3000	Extant
A 16-foot by 16-foot Canvas Covered Quonset Hut	N/A	No longer extant
Building 2028	N/A	No longer extant
Building 2027	N/A	No longer extant
Building 2025	N/A	No longer extant
Building 2003	N/A	No longer extant
Building 2004	N/A	No longer extant
Building 2001	N/A	No longer extant
Building 2000	N/A	No longer extant
Building labeled “Quonset” just southeast of Building 2007	N/A	No longer extant
Building 2002	N/A	No longer extant
Building 2008	N/A	No longer extant



Source: Kruger, 1951a.

FIGURE 3
1951 Building Location Plan, W.C. Kruger
Sacramento Peak Observatory
Sunspot, New Mexico

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Between 1951 and 1952, the Observatory's built environment continued to expand. "By the end of August 1952 the original Sacramento Peak [Observatory] building program was substantially finished, with a total of 28 buildings accepted, not to mention cattle guards and utility lines" (Bushnell, 1962). Sacramento Peak Observatory, which was known at the time as the Upper Air Research Observatory, had been established as "the Air Force's leading center of solar studies" (Bushnell, 1962). According to a history of the early years of the Observatory titled *Donald Menzel and the Creation of the Sacramento Peak Observatory* by Ruth Prelowski Liebowitz, Dr. Marcus O'Day, who worked for the U.S. Air Force and collaborated with Menzel on the founding of Sacramento Peak Observatory, "wanted quality designs for the buildings, and he hired the architect Walter Gropius as a consultant" (Liebowitz, 2002). Gropius was a famous German architect that founded the Bauhaus School of architecture; however, it is unclear how involved Gropius was in the designs at Sacramento Peak Observatory, as no building plans for the project attributed to Gropius have been discovered (Bushnell, 1962).

Included among the 1952 building program were 10 Redwood Family Housing units – ranch-style houses, "well-built, permanent-type family quarters set along the rim of the mountain and looking out upon a scenic panorama of breathtaking proportions" (Bushnell, 1962) (Photo 3). Archival drawings for the Redwood Family Housing are signed by Kruger with W.C. Kruger Company, Architects and Engineers of Santa Fe, New Mexico (Kruger, 1951b). The 1951 Building Location Plan shows numerous proposed building locations, including the seven Redwood Family Housing units that would be constructed in 1952 – three duplex family quarters and four single family quarters. In addition, 12 other proposed facilities are shown such as the Community Center and the Main Lab, which were also constructed in 1952 (Figure 3). For the primary proposed buildings and structures, Kruger provided architectural plans, elevations, sections, and details, as well as plans and details for heating, plumbing, and electrical systems. The Community Center was constructed in the location of one of the original prefabricated houses; as a result, the house was relocated "over across from the meadow Quonsets" (Ramsey, 2002). The proposed facilities are listed in Table 2.

Photo 3. Building 3014, Redwood Family Housing Duplex

Table 2. Facilities Shown as Proposed on the 1951 Building Location Plan

1951 Name	Current Name, Building Number	Year Constructed
Main Laboratory	Main Lab, Building 3004	1952
Solar Observatory Number 2	Hilltop Dome, Building 3040	1963
Community and Administration Building	Community Center, Building 3010	1952
Dormitory	Visitor Officer's Quarters, Building 3013	1952
Single Family Quarters	Redwood Family Housing, Single Units	1952
Duplex Family Quarters	Redwood Family Housing, Duplex Units	1952
Service Building Shops	Civil Engineering (CE) Shop, Building 3032	1953
Service Building Vehicle Storage	CE Shop, Building 3031	1953
Main Laboratory Shop	Machine and Electronics Shop, Building 3005	1953
Elevated Water Tank	Water Tower	1952
Surface Water Storage	Pump Station Reservoir, Building 3033	1953
Propane Gas Storage	Propane Storage	Early 1950s
Electric Substation	Power System – Substation	Early 1950s
Gasoline Pump and Tank	Fuel Storage	Early 1950s

The 1951 Building Location Plan indicates the proposed landscape features in the vicinity of several proposed facilities. For example, surrounding the Main Laboratory building, the site plan indicates an approximately 50-foot-long retaining wall and a 4 to 5-foot-wide concrete sidewalk. A flagpole is proposed outside the Community Center. Small areas along the western edge of the Redwood Family Housing are labeled as the approximate areas to be cleared for yards. Several roads are also proposed to connect the various facilities and residences (Kruger, 1951a). Most of the buildings proposed by Kruger on the 1951 plan were constructed between 1952 and 1953. The Hilltop Laboratory (identified on the plan as Solar Observatory Number 2), however, was not completed until 1963 and is described later in this historical context. It appears that most of the design elements shown on the original drawings for the Hilltop Laboratory were executed when the building was subsequently constructed. However, certain aspects of the current Hilltop Dome building do not match these original drawings, such as some of the front elevation fenestration, indicating the designs were updated prior to construction (Kruger, 1951c).

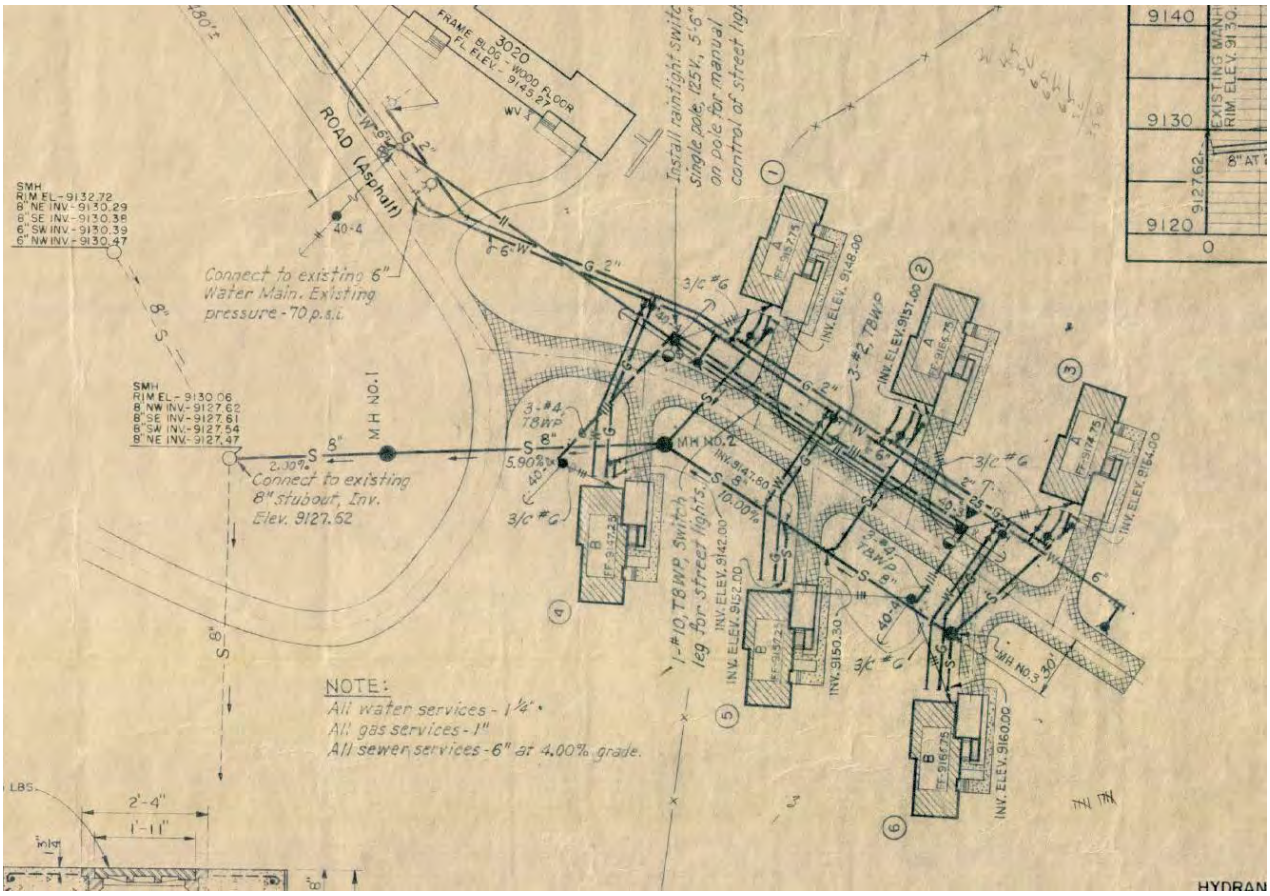
The Observatory became slightly more accessible to researchers in 1955, when the helicopter landing area was constructed:

> The peak's isolation was diminished in still another way during 1955, with the construction of a helicopter landing strip. This fulfilled a requirement for helicopter service to Sac Peak [the Observatory] which GRD [Geophysics Research Directorate] had underscored as far back as May 1951 and provided much faster access to the installation from Holloman Air Force Base both as a matter of convenience and as a safety measure

in case of snowstorms that might block road travel (or other possible emergencies). (Bushnell, 1962)

On May 1, 1956, the name of the facility was officially changed to “Sacramento Peak Observatory.” The population of the Observatory continued to increase; however, there was not enough housing to accommodate all the residents. The original Quonset huts and Redwood Family Housing units were at capacity. In response to this housing shortage, funding was provided in 1957 to construct six more Redwood Family Housing units on a hill at the northern most point of the facility, an area that became known as Hound Dog Hill. These residences were finished in 1958 (Bushnell, 1962) (Photo 4). Drawings for the residences on Hound Dog Hill were also done by W.C. Kruger, this time with W.C. Kruger and Associates. Plot plans for the six buildings show the proposed layout of Hound Dog Hill, including proposed sidewalk details, street lighting units, and a road extension connecting to the main Observatory road (Figure 4) (Kruger, 1957).

Photo 4. Building 3045, Redwood Family Housing on Hound Dog Hill



Source: W.C. Kruger, 1957; revised 1959

Figure 4. Close-up of Hound Dog Hill Layout

2.1.3.2 Continued Development at Sacramento Peak Observatory (1960s)

Patrol Dome and Hilltop Facility

The patrol instruments were among the earliest installed at Sacramento Peak Observatory. Starting in 1957, however, the original patrol instruments were "replaced by completely new instruments especially designed and built at the Observatory. These instruments brought an appreciable increase in both quantity and quality of routine coronal spectra" (Bushnell, 1962). Numerous patrol instruments were in operation during the early 1960s. A history of the site that was written in 1962 by David Bushnell states that similar to the other instruments at Sacramento Peak Observatory, "all of the present patrol instruments have, of course, undergone repeated modification and improvement since they began operation. In 1960, construction started on a small domed enclosure that would become known as the Patrol Dome, located at the site's highest elevation in the southwest section of the observatory" (Bushnell, 1962). According to Bushnell, several patrol instruments were moved into the Patrol Dome along with new instrumentation that doubled the capacity at the Observatory for such observations (Bushnell, 1962).

The Patrol Dome, which took several years to become fully operational and remains extant, is a 20-foot dome on concrete walls. The dome contains sliding doors that open to allow for observations. The dome also rotates to follow the Sun and take patrol images. In 1963, the Hilltop Laboratory, a modern, rectangular plan, concrete block building, was constructed just north of the Patrol Dome. A concrete block, enclosed corridor was subsequently added to connect the Hilltop Laboratory building to the Patrol Dome, at which point the facility became known as the Hilltop Dome and essentially replaced the Grain Bin Dome (Photo 5). Historically, the "Hilltop Dome contain[ed] several telescopes that [had] one

task only: to look at the whole Sun all the time that the Sun [was] visible" (*Mountain Times*, n.d.). The instrument was used to take "pictures of the entire sun at regular intervals…during clear daylight hours and thus to record automatically any except the very briefest of solar flares" (Bushnell, 1962). In 1974, the first Solar Observing Optical Network (SOON) was installed at the Hilltop Dome that worked with three other telescopes around the world to monitor solar activity. This instrument was later replaced in 2002 with the Improved Solar Observing Optical Network (ISOON) instrument, the objective of which was "to improve solar monitoring capabilities and to reduce operating costs via less required maintenance (design simplification compared to SOON) and the ability to analyze data from all ISOON sites at one central location" (NSO, 2011). Circa 2013, the ISOON telescope was moved to Kirtland Air Force Base (NSO, 2013). Currently, the Hilltop Dome is no longer used for solar observation; instead, it is used as an instrumentation and optical design laboratory for the DKIST, the large solar telescope currently under construction in Hawai'i (NSO, 2015).

Photo 5. The Hilltop Laboratory (right) with the Patrol Dome (left), connected by a corridor addition

Carl Koch

In 1960, the road leading up the mountain to the Observatory was paved, providing easier access to the site (Bushnell, 1962). By the mid-1960s, there were approximately 140 residents at Sacramento Peak Observatory, 70 of whom were Observatory personnel, including 10 military personnel, 28 civil service personnel, and 32 contractor personnel (Bushnell, 1962; NCAR, 1965–1966). Because of the remote location of Sacramento Peak Observatory, employees generally lived on site with their spouses and many people raised children at the Observatory.

To accommodate the growing numbers of families, 21 Relocatable Housing units were installed along the northeastern edge of the Observatory (Photo 6). The buildings were designed for the U.S. Air Force by Carl Koch of Carl Koch and Associates, Inc. *Progressive Architecture* magazine described Koch, a Harvard-trained architect, as the "grandfather of prefab" for his work as a "champion of low-cost housing who designed prefabricated homes and developed the Techcrete system" (Long, 1998). Using

this new system, Koch founded the Techbuilt Company, which manufactured Techbuilt houses. This was a "low-cost, semi-factory-built modern style house, which used modular construction" (The Techbuilt Renovation, 2015). The designs for these structurally innovative houses were "based on a consistent four-foot wide module for all major building components such as wall, floor, and roof panels. The pieces were delivered by truck and could be erected in a few days" (The Techbuilt Renovation, 2015). Although Techbuilt Houses relied on a system of standardized panels, the "variation in the type and placement of panels allowed for a variety of design while still keeping costs down" (Instant House, 2012). Prior to 1963, more than 3,000 Techbuilt Houses were sold in the United States (North Carolina Modernist Houses, 2017). Most Techbuilt Houses were characterized by simple shapes, gabled roofs, overhanging eaves, and large glass expanses on the gable-end exterior walls.

The drawings for the one-story Relocatable Housing units at Sacramento Peak Observatory are dated 1962 and incorporate several of the basic design characteristics for which Koch was known in his Techbuilt Houses, including the simple shape, gabled roof, and overhanging eaves (Koch, 1962). The one-story, ranch-style houses are simple, utilitarian designs which are all nearly identical. Their most noteworthy characteristic is their "relocatable" quality, which results from the fact that they are foldable – with hinged walls that accordion in towards the central axis of the house. Utilities for these houses, including all piping, was located down the center of the house, enclosed in the central hallway under the gable peak. Thus, the walls could be folded in and the houses could be stacked and transported on the back of a truck. Once installed at their current location in 1966, however, the Relocatable Housing units at Sacramento Peak Observatory were never moved.

Photo 6. Relocatable Housing

The firm of Flatow-Moore-Bryan-Fairburn completed the site work around the Relocatable Housing, including roadwork, grading, and siting. Drawings for the site work are dated 1963 and 1964. Other construction occurred at the Observatory during the mid-1960s. An addition was added to the John W. Evans Solar Facility and a large two-story addition was constructed, extending from the east elevation of the Main Lab (Bushnell, 1962).

Richard B. Dunn Solar Telescope (DST), formerly Vacuum Tower Telescope

The architect/engineer Charles W. Jones started designs for a Solar Vacuum Tower Telescope in 1963, although construction on the instrument, which was supervised by the U.S. Army Corps of Engineers, did

not start until 1966. Over the next 4 years, construction continued on what would become known as the DST, costing more than $3 million. The architectural firm of Roghlin and Baran, Associates worked on the project. An article written by Richard B. Dunn, for whom the instrument was dedicated, about the completion of the instrument was published in *Sky and Telescope* magazine in 1969, the year of its completion. The article explains:

> In our design we wanted most of all to eliminate problems of local seeing, which are discussed at every meeting on solar instrumentation. Solar astronomers worry about turbulence caused by the slot in the observatory dome, heating of the dome surfaces, heating of the telescope, local convection, and turbulence within the optical system…In our case, the dome was eliminated. We put a window high up on a 135-foot pyramidal tower and then evacuated the air from the entire telescope inside the tower. The latter reduces the effects of local convection and the vacuum eliminates the internal turbulence and seeing problems. Also, it provides the comfort of a heated observing room….” (Dunn, 1969)

The structure is sometimes compared to an iceberg since more than half of it is underground; the DST extends 136 feet above ground and approximately 220 feet below ground (Photo 7). The vertical vacuum tube is enclosed within a concrete tower with 3-foot-thick walls. At the top of the tower, there is an entrance window and two mirrors that deflect sunlight down the vacuum tube where it is reflected off the primary mirror, which has a diameter of 64 inches. From there the primary mirror “focuses the light and sends it back up to ground level, where it exits the vacuum tube and can be guided into the scientists’ experiments on optical benches” (NSO, 2015). The interior vacuum tube weighs more than 200 tons and is suspended by a bearing that contains 8 to 10 metric tons of mercury, allowing it to be fully rotational. A rectangular plan, concrete block lab building extends from the north side of the tower. The tower telescope was originally dedicated on October 15, 1969. On September 30, 1998, the instrument was rededicated to Richard B. Dunn as the DST. An in situ plaque at the facility reads:

> Named in honor of one of solar astronomy’s most creative instrument builders, this vacuum tower telescope is the masterpiece of [Richard B. Dunn’s] long scientific career at Sacramento Peak [Observatory]” (1998). Construction of the vacuum tower used for the DST significantly impacted future solar instruments: “So sharp were the images formed from this type of solar telescope, that almost every large solar telescope built since then has been based on the vacuum tower concept. (Plymate, 2001)

From 1975 to 1976, Richard B. Dunn briefly served as the director of Sacramento Peak Observatory, replacing Evans. In 1976, via an MOA with the USFS in 1950, the U.S. Air Force transferred Sacramento Peak Observatory to NSF. That same year, Jack B. Zirker was appointed as the new director of the facility (Bushnell, 1962).

Photo 7. The DST (formerly Vacuum Tower Telescope)

2.1.4 Landscape Elements of the NRHP-Eligible Sacramento Peak Observatory Historic District

The NRHP-eligible Sacramento Peak Observatory Historic District includes the main developed Observatory area; the Sewage Treatment Plant and associated water wells, as well as the section of Sunspot Highway that connects this area to the main Observatory; and the remains of the helicopter landing area northwest of the Observatory. There are 63 architectural resources that contribute to the Sacramento Peak Observatory Historic District. The contributing resources are a collection of Cold War-era buildings and structures primarily constructed between 1950 and 1969. The contributing resources have been documented on HCPI Base Forms that were submitted to the New Mexico SHPO via the New Mexico Cultural Resources Information System.

In addition to its primary contributing buildings and structures, the historic district includes numerous features and historic archaeological resources that are considered part of the historic district's setting. These features are visual elements that help contextualize the site's historical narrative. They include features such as the recreation court, roads, sidewalks, and the former helicopter landing area. In addition, building foundations remain for some of the original Quonset huts and prefabricated buildings that were constructed in or before 1951 and were subsequently demolished.

The Sacramento Peak Observatory is located within a predominantly undeveloped, forested area. The natural landscape is visually dominant, with tall trees creating a verdant backdrop to the Sacramento Peak Observatory. The elevation of the area provides for unobstructed views of the surrounding mountain scape while the steeply sloping and varied topography within the Observatory emphasizes the untamed natural setting. The buildings and structures are generally arranged within the natural setting based on their function: residential buildings (Redwood Family Housing, Redwood Family Housing on Hound Dog Hill, and Relocatable Housing) are arranged in a crescent along the northern edge of the property; the primary telescopes are located along the southwestern edge of the property; and the

administrative and operations buildings, including the maintenance area, are clustered in the center of the Observatory.

2.1.4.1 Roads, Walkways, Stairs, and Walls

The Sacramento Peak Observatory's primary road, Coronal Loop (parts of which are called Telescope Loop), is an extension of Sunspot Highway that makes a figure 8 shape within the Observatory, linking the residential area in the north to the telescope and operational facilities in the south. Several smaller, unnamed roads access various areas within the Observatory, including the maintenance area just north of the elevated water tank. In addition, paved walkways provide pedestrian access between individual buildings, as well as between buildings and Coronal Loop. In addition to walkways, the hilly terrain at the Observatory contains outdoor stairwells to facilitate pedestrian access in steeply sloped areas of the site. Retaining walls and decorative stone walls are other elements of the historic district that serve functional and aesthetic purposes. Photos 8 through 11 show the Observatory's roads, walls, and stairways.

Photo 8. Coronal Loop with the Main Lab and Water Tank in the distance

Photo 9. Community Center's stone wall

Photo 10. Stone wall adjacent to the John W. Evans Solar Facility

Photo 11. Outdoor stairwell near the DST

2.1.4.2 Historic Archaeological Resources: Building Foundations and Helicopter Landing Area

East of the Redwood Family Housing are several rectangular building foundations. These are likely the locations of several of the Quonset huts that were identified on Kruger's 1951 Building Location Plan. Directly south of the Observatory's recreation court are the remains of the foundation for the structure identified on the 1951 plan as Building 2028 (Photo 12). Further south, the foundations for Buildings 2027 and 2025 (both demolished) also appear to remain. The remains of a building foundation have also been observed adjacent to the Community Center. It is likely that these foundations are associated with one of the original prefabricated residences, which was relocated for the construction of the Community Center and subsequently demolished.

Photo 12. Red circle identifies the location of former Building 2028's foundation, just south of the recreation court

Northwest of the Observatory's residential area are the remains of the helicopter landing area, which was constructed in 1955. The area is a long strip of cleared land that is covered with grass and surrounded by dense trees. No pavement or architectural resources remain extant. Photo 13 shows the former helicopter landing area.

Photo 13. Remains of the helicopter landing area

2.1.5 Other Observatories in the Area

Sacramento Peak Observatory was the first of several observatories established in New Mexico during the second half of the twentieth century, which led to the region emerging as a hub for astronomical research. In 1962, the U.S. Air Force established the Cloudcroft Electro-Optical Research Facility, more commonly referred to as Cloudcroft Observatory, which was located just 20 miles north of Sacramento Peak Observatory. The observatory was situated in the Lincoln National Forest and was closed in 1982

(Henry and Sherlin, 1983). New Mexico State University (NMSU) opened the Blue Mesa Observatory in 1967, located just northwest of Las Cruces, near Socorro, New Mexico. The observatory was used by students, faculty, and visitors until 1991, when the Federal Aviation Administration acquired the property and demolished the observatory (NMSU, 2014a). Apache Point Observatory, which is located less than a mile south of Sacramento Peak Observatory, was established by the Astrophysical Research Consortium (ARC) in 1985. NMSU's Astronomy Department currently operates Apache Point Observatory for the ARC. The observatory's location was chosen because "it has excellent seeing…and is close to support facilities, an airport and NMSU" (Peterson, n.d.). Apache Point Observatory currently houses the 3.5-meter Telescope, the 2.5-meter Sloan Digital Sky Survey Telescope, the 0.5-meter Small Aperture Telescope, and NMSU's 1.0-meter Telescope (NMSU, 2014b). NMSU also has the Campus Observatory in Albuquerque, the Tombough Observatory in Las Cruces, and a 24-inch reflector on Tortugas Mountain just east of NMSU's campus (NMSU, 2014b). The Karl G. Jansky Very Large Array (VLA), which was constructed between 1972 and 1980, is located in Socorro, New Mexico, approximately 140 miles northwest of Sacramento Peak Observatory. The VLA consists of 27 radio telescopes that collect data as a unit, functioning as a much larger instrument. The Long Wavelength Array is also located in Socorro. Completed circa 2011, the instrument is a multipurpose radio telescope that covers a collecting area with an approximately 400-kilometer diameter containing approximately 13,000 antennae (Ellingson et al., 2009). With these observatories in such close proximity, Sacramento Peak Observatory holds a position within a regional network of significant astronomical research facilities.

2.2 Architectural Resources

The results of the intensive architectural survey were documented in a technical report titled *Cultural Resources Evaluation, National Solar Observatory (Sacramento Peak Observatory), Sunspot, New Mexico* (CH2M, 2016) and are summarized below.

The search in the National Register Information System showed that there are no structures or buildings located within the Sacramento Peak Observatory that are listed in the NRHP. In addition, none of the buildings or structures at the Sacramento Peak Observatory had been previously evaluated for listing in the NRHP. An environmental assessment conducted in 1995 noted that "the Sacramento Peak Solar Observatory is an historic scientific compound begun in 1947, however, the buildings have not been evaluated for historical significance" (Cartwright, 1995).

In 2015, NSF determined the Sacramento Peak Observatory is eligible for listing in the NRHP as a historic district for representing an important time in science and military history and for its significant contribution to the advancement of solar astronomy (Criterion A). SHPO concurred with NSF's determination of eligibility on May 18, 2017. The Sacramento Peak Observatory is a collection of Cold War-era buildings and structures primarily constructed between 1950 and 1969 that reflects the early history of solar astronomy in the United States. The telescopes and associated facilities have influenced other, more modern solar telescopes, and the observations have greatly expanded the understanding of the Sun. There are 63 built environment resources that are contributing elements to the Sacramento Peak Observatory historic district. Additionally, NSF determined that there are two contributing telescopes on the property that are individually eligible for listing in the NRHP: the John W. Evans Solar Facility and DST. Both are eligible under Criterion A for important associations with events that have made a significant contribution to the field of solar astronomy. DST is also eligible under Criterion C for design and engineering. Both telescopes have undergone minor additions and alterations. However, these changes have not diminished the overall integrity of the telescopes.

Figure 2 and Table 3 list the properties at the Sacramento Peak Observatory that were identified as eligible for the NRHP. Information regarding contributing and non-contributing buildings to the NRHP-eligible historic district is provided in Appendix A.

Table 3. NRHP-eligible Architectural Resources within the APE

Resource Name (Year Constructed)	Description/Significance	NRHP Eligibility Determination
Sacramento Peak Observatory Historic District (1950–1969)	Collection of solar telescopes, residential buildings, administrative buildings, and site infrastructure facilities associated with NSO and the Sacramento Peak Observatory.	Eligible (Historic District); 63 contributing elements, which includes the two individually eligible telescopes listed in this table) (see Appendix A)
John W. Evans Solar Facility, Building 3000 (1952) (housed in the Big Dome)	Dome contains two coronagraphs, the largest in the United States, and a coelostat. Consists of a 30-foot dome on concrete walls.	Contributing resource to the Sacramento Peak Observatory Historic District and also individually eligible
DST (formerly Vacuum Tower Telescope), Building 3042 (1969)	A solar telescope composed of a vacuum tube centered within a concrete tower that extends 136 feet aboveground and 220 feet below the ground surface.	Contributing resource to the Sacramento Peak Observatory Historic District and also individually eligible

2.3 Archaeological Resources

Previous environmental reviews and archaeological surveys have been conducted at the Sacramento Peak Observatory. During the 1990s, a series of surveys were conducted in preparation for the construction of the Sacramento Peak Observatory Visitor and Education Center (1992 and 1995) and before planned construction of roads and buildings at the Sacramento Peak Observatory (1994 to 1995). This included an intensive archaeological survey in 1994. The associated report indicated that no prehistoric or historic archaeological sites were identified (Shields, 1995). Therefore, there are no previously identified archaeological resources at the Sacramento Peak Observatory that are eligible for or listed in the NRHP. Several historic-era archaeological resources are located within the Sacramento Peak Observatory Historic District, including the remains of the helicopter landing area and several building foundations. These were not evaluated for the NRHP as part of the cultural resources survey for the current undertaking but are located within the NRHP-eligible historic district boundaries. At this time, there are no known archaeological resources present at the Sacramento Peak Observatory that are considered historic properties under Section 106 of the NHPA.

No additional archaeological survey work was conducted at Sacramento Peak Observatory as part of the Section 106 process for this undertaking. During a conference call on February 15, 2017, and confirmed in a follow-up summary letter from SHPO dated March 1, 2017, SHPO concurred that no further archaeological surveys would be required for this undertaking.

NSF initiated Section 106 consultation with five federally recognized tribes: Hopi Tribe, Pueblo of Zuni, Mescalero-Apache, Fort McDowell Yavapai Nation, and Kiowa Tribe. In addition to letters, NSF followed up with the tribes via telephone and email. The Hopi Tribe indicated “no historic properties significant to the Hopi Tribe affected.” The Pueblo of Zuni had no concerns and asked to be added to the project contact list. No responses were received from the other three tribes, and no TCPs have been identified.

Since no known NRHP-eligible archaeological sites or known TCPs are present, effects to archaeological sites or TCPs are not analyzed further in this technical report. However, an unanticipated discovery plan would be in place prior to demolition to address any archaeological resources that might be discovered during demolition. If previously unidentified archaeological resources were discovered during demolition, ground-disturbing activities would halt in the vicinity of the find and NSF would consult with the SHPO and other Consulting Parties as appropriate regarding eligibility for listing in the NRHP, project effects, necessary mitigation, or other treatment measures, as outlined in the unanticipated discovery plan. Additional archaeological investigations could be conducted if substantial ground disturbance is required or if work is performed in areas that are currently undisturbed.

SECTION 3

Assessment of Effects

NSF is evaluating four Action Alternatives and a No-Action Alternative as part of its National Environmental Policy Act review. This section describes potential effects to historic properties under Section 106 as a result of the undertaking for each of the alternatives under consideration. No archaeological resources or TCPs are present within the APE; therefore, archaeological resources and TCPs are not included in the assessment of effects discussion.

3.1 Alternative 1 – Continued Science and Education-focused Operations by Interested Parties with Reduced NSF Funding

3.1.1 Implementation

Alternative 1 involves the potential demolition of facilities at the Sacramento Peak Observatory that contribute to the NRHP-eligible historic district; therefore, Alternative 1 could result in adverse effects under Section 106. Table 4 lists the proposed activities that could impact historic properties under Alternative 1. Any historic property not listed in Table 4 would be kept and maintained.

Table 4. Alternative 1 – Description of Proposed Activities

Historic/NRHP-eligible Historic District Properties to be Mothballed	John W. Evans Solar Facility Grain Bin Dome Storage 3037
Historic /NRHP-eligible Historic District Properties to be Demolished	Relocatable Housing (21 buildings, including the Recreation House)

A total of 21 buildings that contribute to the NRHP-eligible historic district could be demolished under Alternative 1. The removal of NRHP-eligible buildings or contributing resources to a NRHP-eligible historic district would result in an adverse effect under Section 106.

Three properties that contribute to the NRHP-eligible historic district would be mothballed under Alternative 1; Storage Building 3024 would also be mothballed under Alternative 1, but it is not a historic property. Mothballing involves removing a building from daily use while maintaining the general condition for a defined period of time. A similar process applies to preserving structures or instruments, protecting and maintaining them in operational readiness condition. Preparing historic properties for mothballing could involve securing buildings and their associated components, turning off utilities, weatherizing, and providing adequate ventilation. These steps could involve some building treatments that would affect the historic properties, but these effects would not be adverse. Modifications to buildings required during mothballing would be compatible with the historic property's style and materials, and would be executed in accordance with the NPS Preservation Brief 31, "Mothballing Historic Buildings" (Park, 1993). Instruments and equipment would be preserved in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings* (Grimmer, 2017). If historic properties were returned to use at a future date, alterations performed as part of the mothballing process could be reversed without physical harm to the historic properties.

Although 21 contributing buildings could be demolished, Alternative 1 would retain the two individually NRHP-eligible telescopes located within the Sacramento Peak Observatory. In addition, Alternative 1 would retain 42 historic properties that contribute to the NRHP-eligible historic district, preserving a unique historical moment in the field of solar astronomy. More than half of the contributing resources would remain extant, including the historic district's primary instruments – the John W. Evans Solar Facility and DST; although the setting, feeling, and association would be altered, it would not be sufficient to render the district ineligible for the NRHP, and the historic district would retain sufficient integrity to convey its historic significance under Criterion A. Of the four proposed Alternatives, Alternative 1 would result in the least effects to historic properties compared to Alternatives 2, 3, and 4.

3.1.2 Operations

Under Alternative 1, operations would continue with an interested party. Three historic properties would be mothballed: the John W. Evans Solar Facility, the Grain Bin Dome, and Storage 3037. The John W. Evans Solar Facility, which is individually eligible for the NRHP under Criterion A, and the Grain Bin Dome are not in active use; therefore, mothballing would not alter the existing operations of the instruments or the historic district. Although they would not be used for observations or research, the equipment and structures would be protected, maintained, and kept in working order. Mothballing of historic instruments and equipment would follow guidance in *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* (Grimmer, 2017). Mothballing the instruments could result in a beneficial effect by maintaining them for future use instead of leaving them abandoned. Storage 3037 is a small concrete storage facility; mothballing the building would have a negligible effect on the operations of the historic district. Mothballing of Storage 3037 would be planned and completed in accordance with the NPS Preservation Brief 31, "Mothballing Historic Buildings" (Park, 1993). Therefore, operating the facility under Alternative 1 after the demolitions have been completed and while three historic properties are maintained through mothballing would not alter the characteristics of the remaining Sacramento Peak Observatory historic properties that qualify them as eligible for the NRHP and would result in no further adverse effects under Section 106 beyond that incurred under implementation of the alternative described in Section 3.1.1.

3.1.3 Summary of Alternative 1

Alternative 1 involves the potential demolition of historic properties that contribute to the NRHP-eligible historic district. As a result, the overall finding of effect for the Alternative is an adverse effect to historic properties.

3.2 Alternative 2 – Transition to Partial Operations by Interested Parties with Reduced NSF Funding

3.2.1 Implementation

Similar to Alternative 1, Alternative 2 involves the potential demolition of facilities at the Sacramento Peak Observatory that contribute to the NRHP-eligible historic district; therefore, Alternative 2 would result in adverse effects under Section 106. Table 5 lists the proposed activities that could affect historic properties under Alternative 2. Any historic property not listed in Table 5 would be kept in active use and maintained.

Table 5. Alternative 2 – Description of Proposed Activities

Historic/NRHP-eligible Historic District Properties to be Mothballed	John W. Evans Solar Facility

Table 5. Alternative 2 – Description of Proposed Activities

	Grain Bin Telescope
	Hilltop Dome
	ISOON Building
	Main Lab
	Storage (3 Quonset Huts)
	Storage 3037
	Machine/Electronics Shop
	Welding Shop/Library
Historic/NRHP-eligible Historic District Properties to be Demolished	Relocatable Housing (21 buildings, including the Recreation House)

Demolition activities for Alternative 2 would be similar to Alternative 1; both involve the potential demolition of 21 contributing resources to the NRHP-eligible historic district (Relocatable Housing, one of which is identified as the Recreation House) but would avoid complete demolition of the historic district. Both individually NRHP-eligible solar telescopes would be retained under Alternative 2; the John W. Evans Solar Facility would be mothballed and DST would be kept in active use and maintained.

Alternative 2 would involve mothballing more historic properties than Alternative 1. Preparations for mothballing historic properties under Alternative 2 would involve the same activities as those described for Alternative 1 and would result in no adverse effects on historic properties under Section 106. Modifications required during mothballing would follow the NPS Preservation Brief 31, “Mothballing Historic Buildings” (Park, 1993). A similar approach would be used for historic instruments and equipment, following guidance in *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* (Grimmer, 2017). If historic properties were returned to use at a future date, alterations performed as part of the mothballing process could be reversed without physical harm to the historic fabric.

Although 21 contributing buildings could be demolished and 11 historic properties could be mothballed (a total of 14 buildings and structures would be mothballed under Alternative 2, but Storage Building 3024, Storage Building 3029, and the Recreation Court are not considered historic properties), which would alter the setting, feeling, and association of the district, it would not be sufficient to render the district ineligible for the NRHP, and Alternative 2 would retain a substantial collection of contributing buildings with sufficient integrity as a group to convey significance in the field of solar astronomy. Alternative 2 would result in greater effects to historic properties than Alternative 1 and fewer significant effects to historic properties than Alternatives 3 and 4.

3.2.2 Operations

Limited site operations would continue under Alternative 2, under the management of an interested party. A total of 11 historic buildings and structures that contribute to the NRHP-eligible historic district would be mothballed, including the John W. Evans Solar Facility that is also individually eligible for listing in the NRHP. Effects to the John W. Evans Solar Facility as a result of the operation of Alternative 2 would be the same as those described for Alternative 1.

Effects to the NRHP-eligible historic district as a result of operation activities for Alternative 2 would be similar to Alternative 1 in that the historic district would retain sufficient integrity to qualify as a historic district. However, under Alternative 2, eight more historic buildings would be mothballed than under Alternative 1, including several solar instruments and administrative buildings. The Hilltop Dome is

currently decommissioned; therefore, operations with the instrument mothballed would not result in a significant change from existing conditions. As described for the John W. Evans Solar Facility and the Grain Bin Telescope under Alternative 1, preserving the Hilltop Dome as a mothballed structure could result in a beneficial effect by ensuring that it is protected, regularly maintained, and kept in working order for future use.

Operations under Alternative 2 would result in a more substantial change to the historic district use and setting than Alternative 1, because several additional properties would be mothballed and removed from active use. Historic properties at the Sacramento Peak Observatory are primarily scientific instruments or utilitarian buildings and their use is a primary component of their significance. Removing a building or structure from use would diminish the historic district's integrity of association and feeling and result in noticeable effects to the historic district. Measures could be implemented to minimize the effects of mothballing the 11 historic properties over time. These measures could include photographic documentation of historic properties, detailed conditions assessment of the historic properties, compliance with certain security and maintenance standards, and regular monitoring of the facilities onsite. Mothballing buildings would be planned and completed in accordance with the NPS Preservation Brief 31, "Mothballing Historic Buildings" (Park, 1993). A similar approach would be used to preserve historic instruments and equipment, following guidance in *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (*with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* (Grimmer, 2017). Operating the facility under Alternative 2 after the demolitions are completed and while 11 other properties are maintained and monitored through mothballing would not substantially alter the characteristics of the remaining Sacramento Peak Observatory historic properties that qualify as eligible for the NRHP and would result in no further adverse effects under Section 106 beyond that incurred under implementation of the alternative described in Section 3.2.1.

3.2.3 Summary of Alternative 2

Alternative 2 involves the potential demolition of historic properties that contribute to the NRHP-eligible historic district. As a result, the overall finding of effect for this Alternative is an adverse effect to historic properties.

3.3 Alternative 3 – Mothballing of Facilities

3.3.1 Implementation

Similar to Alternatives 1 and 2, Alternative 3 involves the potential demolition of facilities at the Sacramento Peak Observatory that contribute to the NRHP-eligible historic district; therefore, Alternative 3 would result in adverse effects under Section 106. Table 6 lists the proposed activities that could affect historic properties under Alternative 3. Any historic property not listed in Table 6 would be kept in active use and maintained.

Table 6. Alternative 3 – Description of Proposed Activities

Historic/NRHP-eligible Historic District Properties to be Mothballed	John W. Evans Solar Facility Grain Bin Telescope Hilltop Dome DST ISOON Building Main Lab Storage (3 Quonset Huts)

Table 6. Alternative 3 – Description of Proposed Activities

	CE Shops (2 Buildings) Equipment Storage/Salt Barn Storage 3037 Weather Station Machine/Electronics Shop Welding Shop/Library Community Center Paint Storage Laundromat Visitor Officers Quarters Redwood Family Housing Duplex Units (3 Buildings) Redwood Family Housing Units (10 Buildings) Emergency Generator Building and Fuel Storage Sewage Treatment Plant (4 Buildings)
Historic/NRHP-eligible Historic District Properties to be Demolished	Relocatable Housing (21 buildings, including the Recreation House)

Under Alternative 3, 38 buildings and structures that contribute to the NRHP-listed historic district, including two telescopes that are individually eligible for the NRHP, would be mothballed and 21 historic properties would be demolished. Four historic buildings and structures that contribute to the NRHP-eligible historic district would be kept in active use and maintained: the Water Tower, the Pump Station Reservoir, and the two Water Well Buildings.

Potential demolition activities for Alternative 3 would be similar to Alternatives 1 and 2, involving the potential demolition of 21 contributing resources to the NRHP-eligible historic district (Relocatable Housing, one of which is identified as the Recreation House) but would avoid complete demolition of the historic district. Both individually NRHP-eligible solar telescopes would be retained and mothballed under Alternative 3.

Alternative 3 would involve mothballing more historic properties than Alternatives 1 and 2. Preparations for mothballing historic properties under Alternative 3 would involve the same activities as those described for Alternatives 1 and 2 and would result in no adverse effects on historic properties under Section 106. Modifications required during the mothballing of buildings would follow the NPS Preservation Brief 31, “Mothballing Historic Buildings” (Park, 1993). A similar approach would be used to preserve and protect historic instruments and equipment, following the guidance in *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* (Grimmer, 2017). If historic properties were returned to use at a future date, alterations performed as part of the mothballing process could be reversed without physical harm to the historic fabric.

Although 21 contributing buildings could be demolished and 38 historic properties would be mothballed, which would alter the setting, feeling, and association of the district, it would not be sufficient to render the district ineligible for the NRHP, and Alternative 3 would retain a substantial collection of contributing buildings with sufficient integrity as a group to convey significance in the field of solar astronomy. (Note: A total of 45 resources would be mothballed under Alternative 3, but 9 of the mothballed resources are not considered historic properties.) Alternative 3 would result in more effects

to historic properties than Alternatives 1 and 2 and fewer effects to historic properties than Alternative 4.

3.3.2 Operations

Operation activities under Alternative 3 would be suspended for an undetermined time frame. However, mothballing would not occur indefinitely, as it is inconsistent with NSF's mission and science priorities. If no viable options are identified for operations to be transferred to a new operator, NSF would consider other methods of disposition and would complete any additional required environmental analysis at that time, if necessary. Under Alternative 3, the NRHP-historic district, including 38 contributing resources (2 of which are also individually NRHP-eligible telescopes), would be mothballed, which would include the removal of each facility from daily use while maintaining the general condition of historic properties for a defined period. Mothballing the primary telescopes – including the individually eligible and still in use DST – and the other contributing facilities at the Sacramento Peak Observatory would significantly alter the use and setting of the site. The John W. Evans Solar Facility and DST are both eligible under Criterion A for important associations with events that have made a significant contribution to the field of solar astronomy. DST is also eligible under Criterion C for design and engineering. Mothballing these two historic structures would not affect their design or engineering, and therefore, would not diminish DST eligibility under Criterion C. However, the structures have achieved significance through their use as tools for furthering the field of solar astronomy. The John W. Evans Solar Facility is not in active use, which has already diminished its integrity of feeling and association, so mothballing the instrument would result in a beneficial effect by maintaining it for future use and avoiding future deterioration. Mothballing the John W. Evans Solar Facility would not alter its eligibility under Criterion A. However, the DST remains in active use and as such, the structure would lose association and feeling if the individually NRHP-eligible telescope were mothballed and taken out of use.

Effects to the NRHP-eligible historic district under Alternative 3 as a result of suspended operations and mothballing historic structures would be similar to those described under Alternative 2 because of a change in use that would affect the historic district integrity of setting and feeling. However, out of the four proposed Alternatives, Alternative 3 would involve mothballing the greatest number of historic properties. The John W. Evans Solar Facility is not in active use, the Grain Bin Telescope has been abandoned, and the Hilltop Dome is decommissioned; therefore, operations with these instruments mothballed would not result in a significant change from existing conditions. As described previously, preserving the John W. Evans Solar Facility, the Grain Bin Dome, and the Hilltop Dome as mothballed structures could result in beneficial effects by ensuring that they are regularly maintained and kept in working order for future use. The temporary suspension of operations under Alternative 3 would result in a more substantial change to the historic district use and setting than Alternatives 1 and 2. Only four infrastructure-related buildings and structures that contribute to the NRHP-eligible historic district would be kept in active use and maintained. The same measures that were described for Alternative 2 could be implemented to minimize the effects on historic buildings from suspending use and mothballing (Park, 1993; Grimmer, 2017). Under Alternative 3, operations would be suspended, but this would not significantly alter characteristics of the NRHP-eligible historic district or contributing elements that qualify as eligible for the NRHP and would result in no further adverse effects under Section 106 beyond that incurred under implementation of the alternative described in Section 3.3.1.

3.3.3 Summary of Alternative 3

Alternative 3 involves the demolition of historic properties that contribute to the NRHP-eligible historic district. As a result, the overall finding of effect for this Alternative is an adverse effect to historic properties.

3.4 Alternative 4 – Demolition and Site Restoration

3.4.1 Implementation

Alternative 4 would involve the demolition of 59 historic properties that contribute to the NRHP-eligible historic district (which includes two telescopes that are also individually NRHP-eligible), resulting in adverse effects on historic properties under Section 106. Table 7 lists the proposed activities that would affect historic properties under proposed Alternative 4. Any historic property not listed in Table 7 would be kept in active use and maintained.

Table 7. Alternative 4 – Description of Proposed Activities

Historic/NRHP-eligible Historic District Properties to be Demolished	John W. Evans Solar Facility Grain Bin Telescope Hilltop Dome DST ISOON Building (Patrol Dome) Main Lab Storage (3 Quonset Huts) CE Shops (2 Buildings) Equipment Storage/Salt Barn Storage 3037 Weather Station Machine/Electronics Shop Welding Shop/Library Community Center Paint Storage Laundromat VOQ Redwood Family Housing Duplex Units (3 Buildings) Redwood Family Housing Units (10 Buildings) Relocatable Housing (21 Buildings, including the Recreation House) Emergency Generator Building and Fuel Storage Sewage Treatment Plant (4 Buildings)

Alternative 4 would involve the demolition of most of the NRHP-listed historic district, resulting in adverse effects on historic properties under Section 106. Under Alternative 4, the primary solar telescopes and administrative buildings would be demolished. Only four historic properties would remain extant: the Water Tower, two Water Well Buildings, and the Pump Station Reservoir. The four contributing buildings that would remain are part of the site infrastructure and are not defining elements of the NRHP-eligible district. As a result of the demolition of all solar instruments and research support facilities within Sacramento Peak Observatory, the historic district would lose integrity of materials, design, workmanship, feeling, association, and setting. As a result, demolition under Alternative 4 would result in a significant loss of integrity for the remaining structures, and the historic district would no longer retain sufficient integrity to be considered eligible for the NRHP. Therefore, of the four proposed Alternatives, Alternative 4 would have the greatest effects to historic properties.

3.4.2 Operations

Operations would completely cease under Alternative 4; therefore, operation of Alternative 4 would result in no further effects to historic properties beyond that incurred under implementation of the alternative described in Section 3.4.1.

3.4.3 Summary of Alternative 4

Alternative 4 involves the demolition of nearly all historic properties that contribute to the NRHP-eligible historic district. As a result, the overall finding of effect for the alternative is adverse effect to historic properties.

3.5 No-Action Alternative

Under the No-Action Alternative, current activities would continue at the Sacramento Peak Observatory, and no mothballing or demolition would occur. Current activities at the Sacramento Peak Observatory include regular maintenance of buildings and structures, and alterations to resources that are individually eligible for the NRHP or that contribute to the NRHP-eligible historic district to adapt to changes in science and technology. Therefore, maintaining the current conditions of the Sacramento Peak Observatory could involve minor alterations to historic properties to retain their utility; however, a review of proposed alterations would occur prior to action being taken to determine if there are effects on NRHP-listed properties. No proposed alterations are currently pending and, therefore, the No-Action Alternative would result in no adverse effect on historic properties.

SECTION 4

Conclusion

The Sacramento Peak Observatory is eligible for listing in the NRHP as a historic district with 63 contributing resources. Under Alternatives 1, 2, 3, and 4, historic properties that contribute to the NRHP-eligible historic district could be demolished, resulting in a finding of adverse effect under Section 106. Under the No-Action Alternative, there would be no change from the existing conditions and a finding of no adverse effect to historic properties. The finding of effect for each Alternative is summarized in Table 8.

Table 8. Summary of Effects to Historic Properties

Alternative	Finding of Effect [a]
Alternative 1	Adverse Effect
Alternative 2	Adverse Effect
Alternative 3	Adverse Effect
Alternative 4	Adverse Effect
No-Action Alternative	No Adverse Effect

[a] Pending concurrence from SHPO.

When an undertaking is found to have an adverse effect, Section 106 requires consultation with SHPO and other Consulting Parties regarding appropriate avoidance, minimization, or mitigation measures. The product of consultation would be an MOA per 36 C.F.R. §800.6(c) or a PA per 36 C.F.R. §800.14(b) between the SHPO, NSF, and possibly other Consulting Parties. NSF will continue to consult with the New Mexico SHPO and other Consulting Parties to determine the appropriate ways in which to avoid, minimize, and/or mitigate any adverse effects.

SECTION 5

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Appendix A
Evaluated Architectural Resources

Appendix A

Evaluated Architectural Resources

Surveyed Building/Structure Name (Building Number) *	Year Built	Description	Function	Alterations/Additions	NRHP Status	Contributing to Historic District?
TELESCOPES						
Grain Bin Dome (3002)	1950	First telescope dome built at Sac Peak; 25-foot grain silo, converted from a grain bin from a Sears and Roebuck catalogue	Solar telescope (not in active use)	Alterations: interior changes to accommodate various telescopes	Not Individually Eligible	Contributing
John W. Evans Solar Facility [housed in the Big Dome] (3000)	1952	30-foot dome on concrete walls, concrete block building adjacent and a "slide-off" building on raised tracks; contains a 16-inch coronograph and a 12-inch coelostat	Solar telescope (not in active use)	Alterations: interior alterations to accommodate various telescopes; dome door system changed (1959); Additions: west addition (1961), second west addition (1963), laboratory space added (1966)	Individually Eligible	Contributing
Patrol Dome (ISOON Building) (3009)	1960-1963	20-foot dome on concrete wall attached with a one-story hyphen to the Hilltop Dome	Solar telescope (not in active use)	Addition: dome was originally detached from the Hilltop building. Connecting corridor was added.	Not Individually Eligible	Contributing
Hilltop Dome (3040)	1963	Concrete block laboratory building attached to the Patrol Dome	Solar telescope (not in active use)	Addition: Hilltop building was originally detached from the Patrol Dome. Connecting corridor was added.	Not Individually Eligible	Contributing
Richard B. Dunn Solar Telescope (DST), formerly Vacuum Tower Telescope (3042)	1969	136-foot tower, 220-foot shaft below ground, concrete walls and an attached, two-story, concrete laboratory building with a thermal plastic vinyl roof	Solar telescope	Additions: small metal shed addition and larger concrete block shed addition on the rear elevation; windows have been covered with an opaque material	Individually Eligible	Contributing
HOUSING						
Visitor Officers Quarters (VOQ) (3013)	1952	Two-story wood frame apartment building with 5 apartments	Residential	Alterations: minor interior	Not Individually Eligible	Contributing
Redwood Family Housing (3014ns)	1952	One-story wood frame duplex	Residential	Alterations: minor	Not Individually Eligible	Contributing
Redwood Family Housing (also known as Director's House) (3015)	1952	One-story wood frame ranch house	Residential	Additions: expanded living room, added deck and extra bedroom	Not Individually Eligible	Contributing
Redwood Family Housing (3016ns)	1952	One-story wood frame duplex	Residential	Alterations: minor	Not Individually Eligible	Contributing
Redwood Family Housing (3017)	1952	One-story wood frame ranch house	Residential	Alterations: minor	Not Individually Eligible	Contributing
Redwood Family Housing (3018)	1952	One-story wood frame ranch house	Residential	Alterations: minor	Not Individually Eligible	Contributing
Redwood Family Housing (3019)	1952	One-story wood frame ranch house	Residential	Alterations: minor	Not Individually Eligible	Contributing
Redwood Family Housing (3020ns)	1952	One-story wood frame duplex	Residential	Alterations: minor	Not Individually Eligible	Contributing
Redwood Family Housing on Hound Dog Hill (3044)	1958	One-story wood frame ranch house	Residential	Alterations: minor	Not Individually Eligible	Contributing
Redwood Family Housing on Hound Dog Hill (3045)	1958	One-story wood frame ranch house	Residential	Alterations: minor	Not Individually Eligible	Contributing
Redwood Family Housing on Hound Dog Hill (3046)	1958	One-story wood frame ranch house	Residential	Alterations: minor	Not Individually Eligible	Contributing
Redwood Family Housing on Hound Dog Hill (3047)	1958	One-story wood frame ranch house	Residential	Alterations: minor	Not Individually Eligible	Contributing
Redwood Family Housing on Hound Dog Hill (3048)	1958	One-story wood frame ranch house	Residential	Alterations: minor	Not Individually Eligible	Contributing
Redwood Family Housing on Hound Dog Hill (3049)	1958	One-story wood frame ranch house	Residential	Alterations: minor	Not Individually Eligible	Contributing
Relocatable Housing (3061)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3062)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3063)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3064)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3065)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3066)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing

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Evaluated Architectural Resources

Surveyed Building/Structure Name (Building Number) *	Year Built	Description	Function	Alterations/Additions	NRHP Status	Contributing to Historic District?
Relocatable Housing (3067)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3068)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3069)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3070) (also known as the Recreation House)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3071)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3072)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3073)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3074)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3075)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3076)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3077)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3079)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3081)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3083)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
Relocatable Housing (3085)	1966	One-story, "foldable," ranch house	Residential	N/A	Not Individually Eligible	Contributing
ADMINISTRATIVE BUILDINGS						
Main Lab (3004)	1952	Irregular plan, one-story, concrete block building with a two-story, concrete block addition	Office space, computing facility, library	Alterations: door replacements; minor alterations to several windows Addition: Two-story laboratory space added (1966)	Not Individually Eligible	Contributing
Machine/Electronics Shop (3005)	1953	Rectangular plan, metal building	Machine/electronics shop	Alterations: original flat roof replaced with a gabled roof. Additions: north addition and full length addition to east elevation	Not Individually Eligible	Contributing
Welding Shop/Library (3006)	1962	Rectangular plan, metal building	Welding shop/library annex	Addition: library at the north end of the building was an addition to the welding shop	Not Individually Eligible	Contributing
Storage (Quonset Hut) (3008)	1951	Quonset hut on concrete slab	Electronics storage	N/A	Not Individually Eligible	Contributing
Community Center (former Mess Hall) (3010)	1952	One-story, wood frame building	Kitchen, office space, community center (originally contained the post office, officer's club, and dining facilities)	N/A	Not Individually Eligible	Contributing
Storage (Quonset Hut) (3011)	1951	Quonset hut on concrete slab	Facilities maintenance storage	Alterations: several windows have been replaced	Not Individually Eligible	Contributing
Storage (Quonset Hut) (3012)	1951	Quonset hut on concrete slab	Community shop, storage	Alterations: several windows have been replaced or covered with metal	Not Individually Eligible	Contributing
Storage Building (3024)	1958	Metal frame shed	Storage	N/A; poor condition	Not Individually Eligible	Non Contributing
Furniture Storage (Quonset Hut) (3029)	1951	Quonset hut on concrete slab	Furniture storage	Alterations: side windows have been covered with opaque boards; some siding has been replaced; poor condition	Not Individually Eligible	Non Contributing

Appendix A
Evaluated Architectural Resources

Surveyed Building/Structure Name (Building Number) *	Year Built	Description	Function	Alterations/Additions	NRHP Status	Contributing to Historic District?
Civil Engineering (CE) Shop (3031)	1953	One-story concrete block and plywood building with flat roof	Carpentry, welding, electrical shops	Alterations: Open front elevation was enclosed at an unknown date	Not Individually Eligible	Contributing
CE Shop (3032)	1953	Long, one-story, concrete block building	Facilities shops	Addition; one bay garage added for firetruck storage along with a small rear apartment	Not Individually Eligible	Contributing
Paint Storage (3034)	1959	Small concrete block building	Paint/hazardous waste storage	Alterations: replacement doors	Not Individually Eligible	Contributing
Equipment Storage/Salt Barn (3036)	1961	Wood frame, metal shed, dirt floor	Equipment storage	N/A	Not Individually Eligible	Contributing
Storage (3037)	1953	Concrete block	Facilities maintenance storage	N/A	Not Individually Eligible	Contributing
Emergency Generator Building (3038)	1962	Concrete block building on a raised concrete foundation	Emergency generator room	Alterations: two windows on front elevation have been replaced with louvered metal vents	Not Individually Eligible	Contributing
Weather Station (3039)	1955	One-story, square plan, concrete block building with a flat roof	Weather station/storage	Alterations: several window panes have been replaced with opaque materials	Not Individually Eligible	Contributing
Laundromat [formerly public restrooms] (3060)	circa late 1950s	One-story concrete block building	Laundromat, custodial storage	Alterations: minor interior alterations; two windows replaced	Not Individually Eligible	Contributing
INFRASTRUCTURE						
Pump Station Reservoir (3033)	1953	Concrete block building with two 10,000-gallon concrete, ground-level storage tanks	Reservoir	Addition: metal shed	Not Individually Eligible	Contributing
Water Well Building (3050)	1953	Metal frame sheds with aluminum siding	Water well	N/A	Not Individually Eligible	Contributing
Water Well Building (3051)	1953	Metal frame sheds with aluminum siding	Water well	N/A	Not Individually Eligible	Contributing
Sewage Treatment Plant - Boiler Room (3053)	1953	Small concrete block building clad in wide, wood drop siding, mineral surface roof	Treatment plant	Alterations: replacement of a window and some exterior materials	Not Individually Eligible	Contributing
Sewage Treatment Plant - Trickling Filter (3054)	1957	Small concrete block shed with a corrugated metal gable roof	Trickling filter	Alterations: replacement window	Not Individually Eligible	Contributing
Sewage Treatment Plant - Valve Station (3055)	1961	Metal frame building with a corrugated metal roof	Valve station	N/A	Not Individually Eligible	Contributing
Sewage Treatment Plant - Pump Station (3056)	1966	Small metal frame building with a corrugated metal roof	Pump station	N/A	Not Individually Eligible	Contributing
Overhead Water Tower (no building number)	1952	120-foot tall, 25,000-gallon steel elevated water tank	Water tower	Alterations: internally recoated in the last 5 years	Not Individually Eligible	Contributing

* This table only includes resources that were inventoried as part of the 2015 cultural resources survey. Buildings and structures that were not 45 years old at the time of the cultural resources survey, were not considered to have exceptional importance, or were not owned by NSF were not included in the historic district evaluation.