

# NATIONAL SCIENCE FOUNDATION RECORD OF DECISION

## I. INTRODUCTION

The Sacramento Peak Observatory is a National Science Foundation (NSF)-owned scientific research and education facility in Sunspot, New Mexico, within the Lincoln National Forest in the Sacramento Mountains. Sacramento Peak Observatory is located on public lands managed by the U.S. Department of Agriculture, the U.S. Forest Service (USFS), Lincoln National Forest, and Sacramento Ranger District. There are 71 NSF-owned structures on Sacramento Peak Observatory grounds, along with associated infrastructure, including utility lines, roads, sidewalks, rock walls, and fencing. Until recently, the National Solar Observatory (NSO) operated Sacramento Peak Observatory as a national user facility for NSF under a cooperative agreement between NSF and the Association of Universities for Research in Astronomy, Inc. (AURA).

The flagship telescope at Sacramento Peak Observatory is the Richard B. Dunn Solar Telescope (DST), which was constructed in 1969. The DST is an optical-wavelength solar telescope that allows solar astronomers worldwide to perform high-resolution observations of 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. In recent years, Sacramento Peak Observatory hosted approximately 15,000 visitors per year, primarily at the Visitor Center and on self-guided walking tours. 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. DKIST is slated to begin operations in 2020. In preparation for DKIST operations, NSO has been relocating employees from Sacramento Peak to their new headquarters in Boulder, Colorado. Employment at Sacramento Peak Observatory has been reduced from approximately 20 individuals to approximately 10 individuals. In addition, some facilities, such as the Visitor Center, have paused operations while NSF undertakes the current decision-making process.

NSF acknowledges that valuable science and education activities are conducted at Sacramento Peak Observatory, as evidenced by decades of substantial NSF funding of both the facility and research grants. However, NSF proposes to change the operational model for the Sacramento Peak Observatory in order to significantly decrease or eliminate NSF's funding of the Observatory in light of science priorities within the context of a constrained budgetary environment (Proposed Action). NSF now issues this Record of Decision (ROD) after consideration of science priorities, budget constraints, and the results of NSF's compliance with the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), and the National Historic Preservation Act (NHPA).

## II. THE PROPOSED ACTION

### A. 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 U.S. astronomy community, provide access to world-class research facilities following a merit review process, 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 also engages in numerous interagency and international collaborations in support of this research. 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 Mathematical and Physical Sciences (MPSAC). A number of reviews and surveys conducted by the science community have established a lower scientific priority for Sacramento Peak Observatory relative to DKIST and have recommended reduced NSF participation in Sacramento Peak Observatory.

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 Committee 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 was renamed the "Daniel K. Inouye Solar Telescope" (DKIST) in 2013] 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 National Academies conducted its sixth decadal survey in astronomy and astrophysics. In its report, *New Worlds, New Horizons in Astronomy and Astrophysics*, the National Academies committee recommended the following:

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 operations 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) commissioned a subcommittee of the MPSAC 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, *Advancing Astronomy in the Coming Decade: Opportunities and Challenges*, was released in August 2012 and included recommendations for all major AST telescope facilities. With respect to Sacramento Peak Observatory and the DST, Recommendation 9.11 of the PRC report states:

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.

The continued importance of the NSF response to the PRC Report was highlighted by the annual report of the congressionally chartered AAAC in March 2016, which recommended that “[s]trong efforts by NSF for facility divestment should continue as fast as is possible.” The divestment process was also affirmed in the August 2016 National Academies mid-decadal report, *New Worlds, New Horizons, A Midterm Assessment*. Recommendation 3-1 states:

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.

Since the scientific capability of DKIST will greatly exceed that of DST, it is expected that DKIST will take over DST’s role as the U.S. flagship solar observatory in the near future.

The Sacramento Peak Observatory is one of several NSF facilities undergoing transitions to different scopes and operational structures. Such transitions are part of the ongoing NSF evaluation of its research portfolio, and its mission to deliver forefront capabilities to the U.S. scientific community. The Proposed Action concerning the Sacramento Peak Observatory is part of a suite of divestment activities being carried out by NSF. The U.S. scientific community has been kept apprised of these activities through the following Dear Colleague Letters:

- NSF 14-022, MPS/AST Portfolio Divestment Options, December 20, 2013
- NSF 15-044, Status of MPS/AST Response to Recommendations of New Worlds, New Horizons Decadal Survey, March 4, 2015
- NSF 17-079, MPS-AST Facility Divestment Activity, April 27, 2017

For years, the Sacramento Peak Observatory has served 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 Adaptive Optics capabilities 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 the 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.

## **B. Alternatives Considered**

NSF sought input regarding viable concepts of operations that would decrease or eliminate funding of the Sacramento Peak Observatory from the public and scientific community through several meetings and discussions. For example, a scientific community meeting was 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 Town Hall presentations and discussions with the Solar Physics Division were held in 2015 and 2016. Around the same timeframe, NSF also directed its environmental contractor to conduct an engineering/feasibility study, which included a baseline environmental survey, to help AST identify potential approaches to divestment. Preliminary proposed alternatives were developed based on these community meetings and discussions, the engineering/feasibility study, as well as further conversations with NSO and university personnel, and were included in the Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) pursuant to NEPA, which was published in the *Federal Register* on July 5, 2016.

The scoping process for NSF's environmental review was initiated upon publication of the NOI and was completed on August 5, 2016. Details of this process are provided in Section 5 of the Final Environmental Impact Statement (FEIS) for the Sacramento Peak Observatory, dated November 2018, and noticed in the *Federal Register* on November 16, 2018. Input received during scoping was used to vet the Preliminary proposed alternatives presented in the NOI and to provide focus on the issues to be evaluated.

As detailed in the FEIS, four Action Alternatives, in addition to the No Action Alternative, were considered for the proposed change in operations of the Sacramento Peak Observatory:

- 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 (Agency-Preferred Alternative)
- Alternative 3: Mothballing of Facilities
- Alternative 4: Demolition and Site Restoration (Secondary Agency-Preferred Alternative)
- No Action Alternative: Continued NSF Investment for Science-focused Operations

Under each Action Alternative described herein, some level of demolition of buildings and structures could occur. Buildings and structures that could be demolished were identified only for the purpose of analysis and would not necessarily be demolished. Alternatives 1 and 2 are defined by the reduction of NSF funding and the continuance of science- and education-focused operations and not by the disposition of any one facility or structure. AST acknowledges that Alternatives 1 and 2 could only be implemented if potential collaborators and/or operators provide viable proposals for continued operations, including plans for obtaining funding to supplement that provided by NSF. Use or demolition of any particular building, structure, or instrument could not be determined unless or until a viable collaboration option were under consideration. Because reduction of NSF funding could require the mothballing or demolition of facilities, the FEIS describes the Action Alternatives under the most conservative (highest environmental impact) scenario in terms of NSF's analysis of potential changes to facilities, so

as to include the full range of potential environmental impacts. The analysis approach taken was consistent with NEPA requirements and was sufficiently broad to allow NSF to complete the analysis during planning and without regard to the specifics of a future collaboration.

The Alternatives analyzed in the FEIS are described below.

### **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<sup>1</sup> the John Evans facility, the Grain Bin Dome facility, and two Storage structures and demolishing the Residential House Trailer and Relocatable Housing, including the Recreation House (a total of 21 units). Existing utilities would be maintained.

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.

### **Alternative 2 – Transition to Partial Operations by Interested Parties with Reduced NSF Funding (Identified in the FEIS as the Agency-Preferred Alternative)**

Alternative 2 would involve the transition to partial operations of the Sacramento Peak Observatory by interested parties. Limited 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 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.

O&M activities for Alternative 2 would be less than those under Alternative 1 but would generally be comparable to current operations with regard to the types of activities carried out (i.e., scientific research and educational activities). 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.

### **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. The intent of mothballing

---

<sup>1</sup> 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. Note that if any facilities or structures that are deemed “contributing historic properties” under the NHPA are proposed to be mothballed, they would be mothballed in accordance with historic preservation standards.

is to preserve the equipment and structures so that operations could be restarted at some future date without requiring significant repairs. As discussed in the FEIS analysis, it is not known what type of operations would be implemented after the mothball period ends, but it is anticipated 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. In addition, the long-term mothballing of buildings would be contrary to the terms of the existing Land Use Agreement between NSF and the USFS for the Sacramento Peak Observatory. Selection of this Alternative would require NSF to coordinate with the USFS to develop a maintenance and security plan to protect the facilities from deterioration, vandalism, and other damage. NSF would also ensure that any historic properties would be mothballed in accordance with historic preservation standards. In the event no viable options are identified for operations to be transferred to a new operator within the mothball period, NSF would not implement Alternative 3; instead, NSF would implement Alternative 4, Demolition and Site Restoration (Secondary Agency-Preferred Alternative).

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

Under Alternative 3, NSF would retain title to the facilities during the mothball period. (Note that the option of "safe abandon" was not pursued for analysis during the environmental impact statement [EIS] process because it would be contrary to the Land Use Agreement and the USFS communicated to NSF that it would not approve a "safe abandon" option.)

#### **Alternative 4 – Demolition and Site Restoration (Identified in the FEIS as the Secondary Agency-Preferred Alternative)**

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. If the USFS or any other entity identifies a need to retain any of the buildings, NSF would work with the USFS to transfer title and all future maintenance responsibilities for those buildings to the USFS, subject to negotiation. (Note that the USFS would likely issue a Special Use Permit to any future user of such building after NSF transfers the title to the USFS.)

Under this Alternative select utilities could be kept and retained for use by the USFS or nearby entities, if necessary, and maintenance activities for these utilities would be performed by others. Equipment, furniture, supplies, and building materials would be disposed of offsite or recycled for beneficial reuse.

Operations at the Sacramento Peak Observatory would be discontinued under this Alternative. 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.

## **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 Action Alternatives (Alternatives 1 through 4) would be implemented.

### **III. ENVIRONMENTAL COMPLIANCE**

#### **A. Compliance with NEPA**

Sacramento Peak Observatory is federally owned and funded by NSF. Because NSF is considering a significant change to the operating model of the facility, which could include the demolition of historically significant properties within the site, compliance with NEPA is required. NEPA regulations require federal agencies to conduct environmental analyses with various degrees of complexity, depending on the issues associated with a particular analysis. Due to the potential for significant environmental impacts associated with the proposed Alternatives for NSF divestment of the Sacramento Peak Observatory, NSF decided to conduct the most comprehensive environmental analysis provided by NEPA regulations by preparing an EIS. Because the Sacramento Peak Observatory is located on federal land within the Lincoln National Forest, the USFS served as a Cooperating Agency throughout NSF's NEPA process.

NSF notified, contacted, and/or consulted with agencies, organizations, and individuals during the development of the EIS. Public disclosure and involvement included pre-assessment notification letters to agencies, social media announcements, website updates, scientific digests and blogs, newspaper public notices, a public scoping meeting (conducted on July 21, 2016, in Alamogordo, New Mexico), and a Draft EIS (DEIS) public meeting (conducted on February 28, 2018, in Alamogordo, New Mexico). The public was encouraged to comment during the comment period associated with the scoping process and after publication of the DEIS. The DEIS was published and distributed to federal, state, local, and private agencies, organizations, and individuals for review and comment during a 45-day public comment period, and it was filed with the U.S. Environmental Protection Agency (EPA). A Notice of Availability of the DEIS was announced in the *Federal Register* on February 8, 2018. A detailed summary of the comments received during the public comment periods is presented in Section 5 of the FEIS. NSF considered public comments when developing the scope of the analyses in the DEIS and in preparing the FEIS. The final result of NSF's review and consideration of the public comments is reflected in the FEIS, which was released on November 16, 2018. The FEIS is available on NSF's website, [www.nsf.gov/ast](http://www.nsf.gov/ast), as well as in EPA's Environmental Impact Statement Database. Four public comments were received within the 30-day time period following NSF's issuance of the FEIS. Those comments, which are described more fully below, did not impact the conclusions reached in this Record of Decision.

This Record of Decision is issued after consideration of the analyses in the EIS, as presented in the FEIS, which is summarized herein. It also takes into account the need for the scientific research capabilities of the Sacramento Peak Observatory within the AST portfolio, AST budgetary requirements and constraints, the viability of potential collaborators, and the astronomy community's recommendations.

#### **1. Environmental Impacts**

The FEIS contains a detailed analysis of the environmental impacts associated with each Action Alternative and the No Action Alternative. None of the considered Action Alternatives have the

potential for measurable impacts to air quality, climate change, land use, surface waters, or utilities; therefore, these resource areas were not the focus of the environmental impacts analysis in the FEIS.

The impacts for each of the considered Alternatives have been studied in the following general categories:

- Biological Resources
- Cultural Resources
- Visual Resources
- Geology and Soils
- Groundwater
- Hazardous Materials
- Solid Waste
- Health and Safety
- Noise
- Socioeconomics
- Environmental Justice
- Traffic and Transportation

The FEIS includes the methodology used to determine impact thresholds and the factors considered to assess the impact threshold for the resource areas analyzed under each Action Alternative and the No Action Alternative. Impacts were generally classified as negligible, minor, moderate, or major, assuming that best management practices (BMPs) and identified mitigation measures are implemented. Impact thresholds were specific to each resource; for a description of impact intensity for each resource, see the “Impact Thresholds” table at the beginning of the subsection for each resource evaluated in Section 4, *Environmental Consequences*, of the FEIS. Section 4 also contains descriptions of BMPs and mitigation measures associated with each Alternative. The BMPs and mitigation measures applicable to the selected Alternative are discussed in Section III, *Decision*, of this document. The potential impacts are summarized only for the general categories where moderate or major impacts are envisioned under each Alternative. Detailed discussions of impacts and mitigation measures are provided in the FEIS.

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

**Cultural Resources:** Although Alternative 1 primarily involves continued operations of the Sacramento Peak Observatory, this Alternative does include some mothballing and demolition. 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. Stipulations were developed in a Section 106 Programmatic Agreement (PA) to address necessary mitigation for major impacts to known historic properties; details on NHPA compliance are provided in the following sections. There would be beneficial, short-term impacts to known historic properties from mothballing them during operations that would not be considered adverse under Section 106 of the NHPA. No impacts to archaeological resources would be 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.

### **Alternative 2: Transition to Partial Operations by Interested Parties with Reduced NSF Funding (Identified in the FEIS as the Agency-Preferred Alternative)**

**Cultural Resources:** Although Alternative 2 primarily involves continued partial operations of the Sacramento Peak Observatory, this Alternative does include some mothballing and demolition, and would result in more impacts to historic properties than Alternative 1. 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, although such an adverse effect would be resolved through implementation of the stipulations included in the PA. Operations would result in moderate, adverse, short-term impacts to known historic properties that, with minimization and mitigation measures, 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.

### **Alternative 3: Mothballing of Facilities**

**Cultural Resources:** Operations would result in moderate, adverse, short-term impacts to known historic properties that, with minimization and mitigation measures, would not be considered adverse under Section 106 of the NHPA. 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, however the adverse effect would be resolved through implementation of the stipulations included in the PA. There would be no impacts to archaeological resources expected during either operations or demolition 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.

### **Alternative 4: Demolition and Site Restoration (Identified in the FEIS as the Secondary Agency-Preferred Alternative)**

**Biological Resources:** During demolition, impacts to biological resources would include direct minor, adverse, short-term impacts to common vegetation, management indicator species (MIS), and Southwestern Region Regional Forrester (RF) sensitive bird species; direct minor, adverse, long-term impacts to the Peñasco least chipmunk; direct moderate, adverse, long-term impacts to common wildlife, Sacramento Mountain salamander, the Mexican spotted owl, migratory birds, and neotropical migratory birds; and no impacts to protected plant species and Southwestern Region RF sensitive bat and insect species. There would be minor, beneficial, long-term impacts to common wildlife (including MIS), listed and candidate animal species, RF sensitive species, neotropical migratory birds, and migratory birds following site restoration.

**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, although such adverse effect would be resolved through implementation of the stipulations included in the PA. 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.

**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.

### **No Action Alternative: Continued NSF Investment for Science-focused Operations**

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.

## **2. Environmentally Preferable Alternative**

The determination of the Environmentally Preferable Alternative, as required by the regulations implementing NEPA, is based on the analysis of environmental impacts presented in Section 4 of the FEIS and summarized under Section III. Environmental Impacts, herein. Also considered were the net differences in impacts among the Alternatives after applying all mitigation and monitoring measures. Based on this analysis and a comparison between the net differences in impacts among all of the Alternatives, the No Action Alternative would have the least potential for adverse impacts and, therefore, is the Environmentally Preferable Alternative. However, because the No Action Alternative does not meet the purpose and need of the Proposed Action, NSF has completed a comparison of the net impacts anticipated from the four Action Alternatives. When compared to the other Action Alternatives, Alternative 1 would result in the least amount of adverse impacts. The net impacts associated with Alternative 1 would include no moderate adverse impacts and no major adverse impacts, other than major adverse and long-term impacts on cultural resources resulting from the potential demolition of any historic properties deemed necessary by a future collaborator(s). When compared to the other Action Alternatives, Alternative 1 would result in the least net adverse impacts on cultural resources because fewer historic properties would be affected. Accordingly, NSF has determined that Alternative 1 is the Environmentally Preferable Action Alternative.

## **3. Public Comments Received After FEIS Publication**

Four public comments were received within the 30-day time period following publication of the FEIS, all of which are described in this Section. On November 20, 2018, NSF received a

comment via email from the Environmental Division of the Directorate of Public Works from the United States Army Garrison White Sands Missile Range stating that the “Environmental Division does not see any impacts to the WSMR [White Sands Missile Range] mission or need to comment.” (The commenter also indicated that the Environmental Division would defer to the G3 component of the WSMR regarding any potential impacts that they identify, however, no comments were received from “G3.”) On December 11, 2018, Region 6 of the United States Environmental Protection Agency sent a comment letter to NSF stating that they reviewed the FEIS and have no comments on NSF’s Proposed Action. On December 14, 2018, NSF received an email communication from Southern Rockies Education Centers, Inc. (SREC) which included a draft grant proposal suggesting that the Sacramento Peak Observatory be repurposed for use by SREC. The email and its attached draft grant proposal concerned the *implementation* of Alternative 2, only, and did not include any comments on the FEIS. The final comment received by NSF was a letter dated December 17, 2018 from the State of New Mexico Environment Department (NMED). In their comment letter, NMED noted that certain measures, including compliance with applicable regulations, should be put in place to address air quality, noise, ground water quality, and solid waste impacts if demolition activities were to occur during implementation. Many of these measures were already included in the FEIS, including NSF’s commitment to carry-out all activities associated with the Proposed Action in compliance with applicable statutes and regulations. NSF appreciates receipt of the comments received following publication of the FEIS and notes that, following review and consideration of the comments, no changes to the FEIS are warranted.

## **B. Compliance with Other Legal Authorities**

Concurrently with the NEPA process, NSF has carried out its compliance with Section 7 of the ESA (16 United States Code [U.S.C.] §§ 1531–1544), and the Department of the Interior and Department of Commerce regulations implementing Section 7 on interagency cooperation, which are found at 50 C.F.R. Part 402. NSF has also carried out its compliance with Section 106 of the NHPA (54 U.S.C. §306108; formerly 16 U.S.C. § 470f) (Section 106) and the implementing regulations promulgated by the Advisory Council on Historic Preservation (ACHP) found at 36 C.F.R. Part 800.

In carrying out its compliance with Section 7 and Section 106, NSF contemplated that it would need to carry out different actions to protect endangered or threatened species and historic properties depending on the Alternative ultimately selected. This Section describes in detail the potential requirements and actions for NSF under the different Action Alternatives, and NSF’s commitments associated with its selection of the Agency-Preferred Alternative.

### **1. Endangered Species Act (Section 7) Compliance**

The ESA and subsequent amendments thereto provide for the protection and conservation of threatened and endangered species (listed species) of animals and plants, and the ecosystems on which listed species depend. The ESA prohibits federal agencies from funding, authorizing, or carrying out 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 the ESA. Section 7 of the 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.

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 site. USFWS agreed

with the findings of NSF's Biological Assessment (BA) and concluded consultation under Section 7 in a letter dated July 25, 2017. 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 BA contains a determination regarding the potential effects on species identified by both USFWS and the USFS. The Mexican spotted owl (federally threatened), the Sacramento Mountains thistle (federally threatened), and the Peñasco least chipmunk (a candidate species for listing) have the potential to occur in the vicinity of the Sacramento Peak Observatory. With the implementation of mitigation measures and BMPs, none of the Action Alternatives would have an effect on the Mexican spotted owl or the Sacramento Mountains thistle. The Sacramento Peak Observatory is not located within an identified potential activity center (areas around known nests) for Mexican spotted owls, and with the implementation of seasonal restrictions, proposed demolition activities would occur outside the Mexican spotted owl's breeding season. While critical habitat would be modified, there would be no adverse modification of critical habitat because the elements that contribute to potential recovery of the species would not be altered. Similarly, with the implementation of mitigation measures and BMPs, demolition activities are not likely to adversely affect the Peñasco least chipmunk. If the Peñasco least chipmunk becomes a federally listed species, NSF would reinitiate Section 7 consultation with USFWS and would implement mitigation measures, including performing pre-demolition surveys using cameras or live traps to identify and collect individuals before the start of the proposed work. Live trapped individuals would be relocated to suitable, nearby habitats.

## **2. National Historic Preservation Act (Section 106) Compliance**

The implementing regulations for the NHPA are found in the Protection of Historic Properties (36 *Code of Federal Regulations* 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 National Register of Historic Places (NRHP) (54 U.S.C. § 302101). Here, the proposed changes to operations at the Sacramento Peak Observatory with reduced NSF funding constitutes an "undertaking" under the Act and, therefore, establishes the need for Section 106 compliance. The purpose of the Section 106 consultation process is to: 1) evaluate the Proposed Action's potential for adverse effects on existing historic properties, if any, and 2) consult with interested parties, including government agencies and local community associations, and the State Historic Preservation Officer (SHPO) on ways to resolve any adverse effects through avoidance, minimization, and/or mitigation. The resolution of any adverse effects is memorialized in either a Memorandum of Agreement or a Programmatic Agreement (PA).

NSF determined that the Sacramento Peak Observatory is eligible for listing on the NRHP as a historic district and that all four Action Alternatives would have the potential to result in adverse effects on historic properties due to the potential demolition of some or all components of the Sacramento Peak Observatory. Given the range of potential outcomes associated with this undertaking, as well as a lack of information regarding whether any potential collaborator(s) will be identified and the specific needs of any new collaborator(s), NSF developed a PA in compliance with 36 C.F.R. § 800.14(b)(1)(ii) to determine appropriate measures to cover the range of potential outcomes (FEIS Appendix 4A). Among more general implementing provisions, the PA specifically requires NSF to do the following:

- Avoid adverse effects, if possible, under all Alternatives, and encourage any new collaborator(s) to use as many contributing resources as practicable, provided that such use facilitates science- and education-focused operations.
- Provide historic preservation awareness training for any new collaborator(s).
- Provide documentation of any eligible property on a NRHP nomination form prior to a change in its disposition (whether it be demolition or transition to USFS ownership for other uses).
- Mothball in accordance with historic preservation standards and ensure that a cyclical maintenance plan, which includes repairs, as needed, is prepared and implemented.
- Provide a maximum of \$100,000 for an interpretive exhibit if the entire facility is to be demolished.
- Make an effort to reuse or donate historically significant equipment and artifacts.

The Section 106 compliance process was completed on August 10, 2018, with the signing of the PA by the NSF, the ACHP, the SHPO, and the USFS (FEIS Appendix 4A).

#### **IV. DECISION**

NSF has determined that it must change operations at Sacramento Peak Observatory in light of funding constraints. The scientific community's recommendations to reduce NSF's contributions to operations at Sacramento Peak Observatory and ensure a balanced portfolio led to NSF's determination that changes to operations at Sacramento Peak Observatory at a reduced funding level were necessary.

Any decision by NSF to reduce funding and change operations at the Sacramento Peak Observatory must be made with a full understanding of the environmental consequences resulting from these changes. NSF's decision was made after reviewing and considering all the analyses completed during the environmental review process, including the analyses presented in the FEIS, as summarized previously in this document, and the outcomes of the ESA and NHPA consultations. Based on the analyses contained in the FEIS, including the implementation of mitigation measures, as well as in the ESA and NHPA consultations, none of the Action Alternatives would result in impacts that would be a barrier to their selection. Therefore, the selection of a suitable alternative was predicated on three primary considerations: 1) contributions to NSF's mission of advancing science and education, 2) the impact on AST's budget, and 3) the viability of potential collaborators to support science and education activities at the facility. A discussion of NSF's decision follows.

##### **A. Alternatives Not Selected**

It is important to note that Alternatives 1 and 2 are the only action Alternatives that would continue science and education activities at the Sacramento Peak Observatory in keeping with NSF's mission.

**Alternative 1: Continued Science- and Education-focused Operations by Interested Parties with Reduced NSF Funding** would require a substantial level (approximately \$1.5 million per year) of external support by potential collaborators to be able to continue science operations at a level consistent with NSO operating the Sacramento Peak Observatory as a national user facility. During the public comment period for the development of the FEIS, and after AST's outreach to the astronomy community by way of Dear Colleague Letters (DCLs), scientific community

forums, and public meetings, no viable interest was expressed to continue the current level of operations at the Sacramento Peak Observatory. Given the lack of community interest, Alternative 1 was not considered a viable Alternative and was not selected.

**Alternative 3: Mothballing of Facilities** would negate the scientific and educational opportunities discussed previously. The cost of mothballing the Sacramento Peak Observatory, as identified in a preliminary study contracted by NSF, would be \$6.1 million<sup>2</sup> upfront and \$316,000<sup>2</sup> annually in fiscal year 2015 dollars; this estimate does not include additional costs associated with mothballing historic properties at the site in accordance with historic preservation standards. Given the cost associated with preparation and continued maintenance, AST does not view mothballing this facility as part of a viable solution for the final disposition of the Sacramento Peak Observatory. In addition, since mothballing is only a temporary solution, this Alternative would not be justified in the absence of a likely and viable collaborator able to operate the facility within a relatively short period of time from the completion of mothballing activities. As a result, an investment in mothballing is not justified and Alternative 3 was not selected.

**Alternative 4: Demolition and Site Restoration (Secondary Agency-Preferred Alternative)** permanently negates all science and educational opportunities at the Sacramento Peak Observatory. As noted previously, the partial operations of the facility (Alternative 2) can continue to support NSF's mission at a reduced cost to AST. Therefore, this Alternative is not selected at this time. However, AST recommends implementing demolition and site restoration if, after 3 years from selection of the Agency-Preferred Alternative, a viable coalition of interested parties is not able to continue limited operations under Alternative 2. If Alternative 4 becomes necessary to implement, NSF would work with the USFS to transfer title of any building or structure to the USFS in which either the USFS or another entity expresses an interest in retaining; following transfer of title to the USFS, another entity could use the building or structure subject to a Special Use Permit issued by the USFS.

**The No Action Alternative** is not viable because it does not meet the purpose and need of the Proposed Action outlined in the FEIS (i.e., the requirement to reduce NSF funding).

## **B. Alternative Selected**

**Alternative 2: Transition to Partial Operations by Interested Parties with Reduced NSF Funding (Agency-Preferred Alternative)** would meet the goals of continued scientific and educational activities at the Sacramento Peak Observatory with a reduced level of NSF funding. However, this Alternative requires participation by one or more interested and viable parties. After considerable outreach over a period of roughly 3 years, a viable consortium of collaborators has been established by New Mexico State University (NMSU) that is supportive of Alternative 2. However, it is not clear at this time whether this consortium is viable for a period longer than 3 years.

In May 2015, the NSO organized a meeting to ascertain interest in developing a consortium for the continued operation and management of the Sacramento Peak Observatory. NMSU expressed interest in leading the establishment of a consortium of interested parties. The meeting was advertised in *Solar News*, which is the community newsletter. In 2016, AST provided a \$1.2 million, 2-year award to NMSU for planning the transition of the DST and the Sacramento Peak Observatory operations from NSO to a consortium of interested parties. In April 2017, DCL

---

<sup>2</sup> This is a Class 4 estimate as defined by the Association for Advancement of Cost Engineering International and considered accurate to +50%/-30%.

NSF-079 was issued stating that the Sacramento Peak Observatory and others “do not have collaborations in place that would reduce NSF funding to the degree needed.” Since the publication of this DCL, NMSU has been able to obtain additional support from the State of New Mexico and consortium partners to ensure viable limited operations of DST and the Sacramento Peak Observatory for a 3-year period from July 2018 through July 2021. NMSU plans to use the funds remaining from the \$1.2 million transition grant for fiscal year 2019, and AST will request a proposal for the remaining 2 years of planned operations. The original plan was for the NMSU-led consortium to take over partial operations of the Sacramento Peak Observatory in FY 2018. However, due to AST budget constraints and significant upfront costs for NMSU to take over the Sacramento Peak Observatory operations, it was decided that the most cost-effective approach would be for the consortium to retain the services of experienced NSO staff in maintaining the Sacramento Peak Observatory site infrastructure, leaving the consortium to concentrate on scientific operations of the DST.

AST has determined through consultation with the astronomy community and the NSO that partial support of the DST for this 3-year period would be very desirable to aid in transitioning the ground-based solar community to full DKIST operations. DST could serve to train DKIST employees and researchers and serve as a testbed for the development of new instruments and optical systems. For the next 3 years, the NMSU-led consortium requires a working, simplified telescope and site that can operate at minimum costs and low risk, for maximum benefit to the entire solar community. Specifically, available funding would be used to provide for DST observations using the full suite of instrumentation; maintain and upgrade information technology equipment at the telescope and site; maintain and upgrade the telescope control systems; simplify and provide a backup for the telescope adaptive optics; and maintain and simplify site operations.

NSF would provide partial support for the Sacramento Peak Observatory for the next three fiscal years (FY 2019 through FY 2021). A portion of the funding would go to NSO to maintain a minimum presence (three to four full-time equivalent positions) for site infrastructure support, and the remainder would support the NMSU-led consortium for DST science operations. This amount is roughly half the total estimated cost for partial operations of the site per year, with the consortium supplying the remaining 50 percent. This level of NSF funding would represent a 75 percent reduction compared to steady-state levels of Sacramento Peak Observatory funding while being operated by NSO as a national facility. After FY 2021, NSF funding would be contingent on a successful review of a new proposal and the availability of funds. Pending post-FY 2021 funding decisions, NSF would determine whether continued implementation of Alternative 2 is appropriate. If it is not appropriate, NSF would move forward with implementation of Alternative 4, Demolition and Site Restoration (Secondary Agency-Preferred Alternative).

The intellectual merit of continued funding of the Sacramento Peak Observatory for scientific investigations is strong. In particular, continued limited operations of the DST would enhance our understanding of our Sun as our nearest star and will deliver essential space-weather data in a synoptic manner. It also provides an ideal location for the development of second generation instrumentation and adaptive optics for DKIST.

The broader impacts of continued limited operations of the Sacramento Peak Observatory also provide a strong rationale for its continued operation, at least for the next 3 years. Specifically, limited operations of the DST provide an ideal location for student training. In addition, the NMSU-led coalition would provide for an increased user-base for DKIST. The Visitor Center would also provide informal educational opportunities to the public.

Examples of specific uses by consortium partners include the following:

- The University of Colorado Boulder is planning to host students at the site for the purpose of running workshops and studying solar flares.
- California State University Northridge will provide observing opportunities for its Masters students and conduct research into quiet Sun dynamics and spectropolarimetry of active solar regions.
- The University of Hawai'i will continue to use the DST to test new instrumentation concepts similar to those being produced for DKIST (i.e., the Diffraction Limited Near-Infrared Spectropolarimeter).

Thus, of the five Alternatives (the four Action Alternatives and the No Action Alternative) analyzed in the FEIS, NSF will implement Alternative 2: Transition to Partial Operations by Interested Parties with Reduced NSF Funding (Agency-Preferred Alternative) as the way forward for Sacramento Peak Observatory.

In addition, this decision is supported by the following factors:

- The Sacramento Peak Observatory, especially the DST, can still provide significant contributions to solar science.
- The Sacramento Peak Observatory and the DST can continue to provide an important testbed for instrumentation relevant to the DKIST facility.
- The Sacramento Peak Observatory and the DST can continue to provide an important resource for the training of operations staff and young scientists in preparation for DKIST.
- The solar physics community has indicated the utility of continued operations of the DST at Sacramento Peak Observatory, despite lower funding levels, instead of closing it completely.
- Continuation of operations at Sacramento Peak Observatory will allow important science-based educational programs to continue; these programs were identified during the public comment periods as being of very high value to the people in the vicinity of Sunspot, New Mexico.
- Sacramento Peak Observatory is important to neighboring communities, New Mexico, and the United States, and it is eligible for listing in the NRHP as a historic district with 64 contributing resources, including the DST.

Alternative 2, as explained previously and more thoroughly in the FEIS, could result in adverse impacts on various resources. To reduce those impacts, which largely would result from demolition activities deemed necessary by a collaborator(s), NSF has committed to implementing mitigation measures. All practicable means to avoid or minimize environmental harm from Alternative 2 have been adopted.

The following is a list of those mitigation measures under Alternative 2:

### **Biological Resources**

- Equipment used during any 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.



- 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.
- 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.
- 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.
- Idle restrictions on heavy equipment would be enforced to reduce noise during demolition.
- No clearing of wooded/forested areas would occur.
- Proposed demolition work would be performed during daylight hours to avoid effects on nocturnal foraging by Mexican spotted owl.
- 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.
- 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, which would be planned to occur between October 1 and November 30.
- Disturbed areas would be re-landscaped consistent with the other maintained grounds.

### **Cultural Resources**

- Stipulations specified in the PA prepared pursuant to Section 106 of the NHPA would be implemented. These stipulations were developed to resolve adverse effects under the NHPA, but they also address the necessary mitigation for major impacts to cultural resources under NEPA. The PA was executed on August 10, 2018 (FEIS Appendix 4A). Specific mitigation measures were developed in consultation with the SHPO, ACHP, the USFS, and other consulting parties.
- A plan for handling unanticipated discoveries such as archeological resources that might be discovered during implementation of the undertaking is included in Stipulation II.D. of the PA.
- Mothballing of historic properties would be completed in accordance with the National Park Service Preservation Brief 31, "Mothballing Historic Buildings" and *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings*. In concert with any mothballing, NSF shall ensure that a cyclical maintenance plan that includes repairs, as needed, is prepared and implemented.
- To the extent that demolition or mothballing of any historic properties occurs, or transition of Sacramento Peak Observatory to the USFS for other uses occurs, prior to a change in disposition of any historic property, NSF shall prepare a NRHP nomination form for the historic district within the Area of Potential Effects.
- To the extent that demolition or mothballing of any historic properties occurs, or transition of Sacramento Peak Observatory to the USFS for other uses occurs, NSF will identify any historically significant equipment and artifacts associated with historic properties that will

not be repurposed for further scientific or educational use, and if feasible, NSF will contact relevant scientific/educational institutions for possible reuse of the equipment and artifacts, or contact an appropriate museum to determine if any of the equipment and/or artifacts can be donated to the museum's collection.

- NSF will make every effort to avoid causing adverse effects on buildings and structures that contribute to the NRHP-eligible historic district by encouraging any new collaborator(s) to use as many contributing resources as practicable, provided that such use facilitates science- and education-focused operations. If the collaborator(s) does not intend to use a contributing resource and recommends demolition of any such resource, NSF will first consider mothballing for possible future use prior to making any decision to demolish a contributing resource.
- NSF will provide a one-time historic preservation awareness training to key facility staff of any new collaborator(s).
- To the extent that demolition of the entire Sacramento Peak Observatory Historic District occurs under Alternative 4 (the Agency's Second Preferred Alternative), NSF will contribute a maximum of \$100,000 toward an interpretive exhibit and/or signage to tell the story of the Sacramento Peak Observatory.

### **Geology and Soils**

- 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 the USFS as part of the NPDES permit.
- All demolition would be completed in accordance with industry BMPs and the Special Use Permit issued by the USFS.
- Soil-disturbing activities would take place during snow-free periods 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.
- 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 areas 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 the USFS.
- 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 the commencement of soil-disturbing activities and would be maintained and remain in place until vegetation is re-established according to the approved Site Restoration Plan developed in coordination with the USFS.
- Equipment would arrive clean and free of weed propagules.
- Ground-disturbing activities would be conducted in a manner that minimizes the alteration of existing topography.

- Disturbed areas would be stabilized and revegetated to minimize the potential for erosion after demolition is completed.
- A Spill Prevention, Control, and Countermeasures (SPCC) Plan would be developed in coordination with the 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.
- Demolition stormwater controls would be implemented and maintained as required to minimize scour and soil loss from runoff.
- 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 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 (for example, 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.

## **Groundwater**

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

- 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.
- 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 (for example, blocked with sandbags and protected with baskets, nets, or filter fabric).

### **Hazardous Materials**

- Site characterization and removal or remediation of asbestos-containing material, lead-based paint (LBP), or other hazardous building materials 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, as well as curtained enclosures for containment of airborne contaminants and worker safety as required by applicable federal and/or state regulations.
- BMPs for waste management and materials pollution control would be designed to limit or reduce potential pollutants at their source before they could 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.
- Contractors would create and implement a Spill Response Plan that would be coordinated with the USFS for managing hazardous materials onsite and transporting hazardous materials.
- 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 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 the USFS.

### **Solid Waste**

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

### **Health and Safety**

- A Demolition Health and Safety Plan would be developed and implemented.
- A Traffic Management Plan would be developed in coordination with the USFS and implemented.
- Sacramento Peak Observatory personnel would comply with OSHA safety protocols.
- Fencing and signage would be installed around demolition sites.
- A maintenance and security program would be implemented by NSF for mothballed facilities.

### **Noise**

- 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.

### **Traffic and Transportation**

- A Traffic Management Plan outlining the 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.
- 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.
- Transport of materials and demolition vehicles would occur during off-peak hours when practicable.

- Further details about the demolition materials and routes to the landfill 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 the use of those bridges to move the demolition materials.

The most significant major, adverse impact from the change in operations under Alternative 2 at Sacramento Peak Observatory is the impact on historic properties associated with the historic use of Sacramento Peak Observatory. Although mitigation measures will be implemented to avoid impacts, the potential for major, adverse impacts remains if demolition is requested by a future collaborator(s) for continued operations. For this reason and in compliance with Section 106 of the NHPA, the PA was developed and implemented to address those impacts (FEIS Appendix 4A).

NSF prepared a BA to evaluate the potential impacts to listed species with the potential to occur on, or adjacent to, Sacramento Peak Observatory (FEIS Appendix 3B). The BA was submitted to USFWS as part of the informal consultation for the Proposed Action. In a letter dated July 25, 2017, USFWS concurred with the findings of the BA and the proposed mitigation measures identified previously.

It is important to note that Alternative 2 could be implemented in a manner in which NSF would retain title to the facilities of Sacramento Peak Observatory or in which NSF could transfer title interest of certain facilities to the USFS.

Of the four Action Alternatives and the No Action Alternative analyzed in the FEIS, **Alternative 2: Transition to Partial Operations by Interested Parties with Reduced NSF Funding (Agency-Preferred Alternative)** is selected as the path forward for the facility. This decision is based on several factors, including the need to reduce funding for the Sacramento Peak Observatory and the general viability of the NMSU-led consortium seeking to operate the facility on a limited basis with NSO infrastructure support. Of the viable Action Alternatives, Alternative 2 provides the greatest science return per investment dollar with minimal adverse environmental and cultural impacts. Importantly, as explained in the FEIS, implementation of Alternative 2 can occur only if the NMSU-led consortium continues to participate as a collaborating party with viable plans to provide additional non-NSF funding in support of their science- and education-focused operations. In the future, if viable external support for partial operations of the Sacramento Peak Observatory is not obtained, NSF has decided to implement **Alternative 4: Demolition and Site Restoration (Secondary Agency-Preferred Alternative)**.

  
\_\_\_\_\_  
Signature

2/25/2019  
\_\_\_\_\_  
Date

Dr. Richard F. Green  
Division of Astronomical Sciences  
National Science Foundation

ATTACHMENT A  
Programmatic Agreement Among the  
National Science Foundation, the Advisory  
Council on Historic Preservation, and the New  
Mexico State Historic Preservation Officer  
Regarding Potential Changes to Sacramento  
Peak Observatory Operations

---





PROGRAMMATIC AGREEMENT  
AMONG  
THE NATIONAL SCIENCE FOUNDATION,  
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND  
THE NEW MEXICO STATE HISTORIC PRESERVATION OFFICER  
REGARDING  
POTENTIAL CHANGES TO  
SACRAMENTO PEAK OBSERVATORY OPERATIONS

**WHEREAS**, the National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, Division of Astronomical Sciences (AST) has identified the need to divest several facilities from its portfolio to maintain the balance of assets needed to deliver cutting-edge science capability for the community and the nation. The Sacramento Peak Observatory in Sunspot, Otero County, New Mexico, is one of the facilities identified for divestment;

**WHEREAS**, the Sacramento Peak Observatory is located within the Lincoln National Forest; all of the structures and most of the buildings are NSF property (with the exception of the post office and the fire station, which are privately owned), the land under those structures is public land owned by the United States government and managed by the United States Forest Service (USFS), and the Sacramento Peak Observatory is operated pursuant to a Land Use Agreement between NSF and the USFS; the National Solar Observatory (NSO) is a federally funded research and development center (FFRDC) that currently operates the Sacramento Peak Observatory on behalf of NSF;

**WHEREAS**, the decision regarding the potential changes to operations at the Sacramento Peak Observatory with reduced NSF funding is considered a federal undertaking and triggers compliance with Section 106 (54 United States Code [U.S.C.] Section [§] 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);

**WHEREAS**, 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 the Richard B. Dunn Solar Telescope (DST) (see Attachment A for list of the contributing resources);

**WHEREAS**, the demolition of historic properties that contribute to the NRHP-eligible historic district would result in a finding of adverse effect under Section 106;

**WHEREAS**, on August 24, 2016, NSF formally initiated Section 106 consultation with New Mexico's State Historic Preservation Office (SHPO);

**WHEREAS**, on December 2, 2016, NSF initiated Section 106 consultation with the following Native American tribes: Mescalero-Apache Nation, Hopi Tribe, Pueblo of Zuni, and Fort McDowell Yavapai Nation;

**WHEREAS**, on December 12, 2016, the Hopi Tribe responded that no historic properties significant to them were affected by the project; the Pueblo of Zuni responded on May 18, 2017, that they wished to continue to receive information on the project; no other tribal responses were received;

**WHEREAS**, NSF contacted the Kiowa Tribe of Oklahoma via email and telephone in March and April 2017 to ascertain their interest in participating but received no response; thus, no further consultation with the Kiowa Tribe was done;

**WHEREAS**, the USFS was invited to participate as an Invited Signatory; additional Consulting Parties (Apache Point Observatory, NSO, Kevin Reardon, and Mr. Keith Morin) were identified for this undertaking and invited to participate in this Section 106 consultation process;

**WHEREAS**, NSF, in collaboration with the USFS and in consultation with the SHPO, established the area of potential effects (APE) as defined at 36 C.F.R. § 800.16(d), included as Attachment B, and the SHPO agreed with the APE in a letter dated July 11, 2017;

**WHEREAS**, the *Proposed Changes to Sacramento Peak Observatory Operations: Historic Properties Assessment of Effects* (CH2M HILL, 2017) was prepared on behalf of NSF and provided to the SHPO and the other Consulting Parties in October 2017;

**WHEREAS**, on November 21, 2017, the SHPO agreed to continue consultation and commence with the preparation of this Programmatic Agreement (PA);

**WHEREAS**, in accordance with 36 C.F.R. § 800.6(a)(1)(i)(C), NSF provided the Advisory Council on Historic Preservation (ACHP) the required documentation and invited it to participate in its Section 106 consultation process; the ACHP notified NSF that it would participate in the consultation via a letter dated December 22, 2017;

**WHEREAS**, NSF relies on formal processes within the scientific community (e.g., National Academies decadal surveys, senior-level reviews, and other advisory committees subject to the Federal Advisory Committee Act) to provide input on science priorities, and these formal reviews have repeatedly recommended divestment from the telescopes located at the Sacramento Peak Observatory. The Portfolio Review Committee, a subcommittee of NSF Mathematical and Physical Sciences Advisory Committee composed solely of external members of the scientific community, was charged with recommending a balanced portfolio to maximize the science recommended by National Academy of Sciences surveys of the field, which are carried out every decade. To enable NSF to better address decadal survey science, the resulting Portfolio Review Committee Report (NSF AST, 2012), released in August 2012, recommended the divestment of a number of telescopes from the federal portfolio. With respect to the Sacramento Peak Observatory, the report recommended maintaining full operations of the Sacramento Peak Observatory's DST until approximately two years prior to the completion of the Daniel K. Inouye Solar Telescope (DKIST), which is being constructed in Hawai'i and will begin scientific operations in 2020;

**WHEREAS**, based upon input from the scientific community, NSF developed preliminary alternatives to address changes to operations resulting from reduced NSF funding for the Sacramento Peak Observatory;

**WHEREAS**, given the range of potential outcomes associated with this undertaking, as well as a lack of information regarding whether any potential collaborator(s)/interested parties are identified (and any specific needs of any new collaborator(s)/interested parties), this PA has been prepared in compliance with 36 C.F.R. § 800.14(b)(1)(ii) to determine appropriate measures to cover the range of potential outcomes;

**WHEREAS**, technical terms related to the NHPA are included in Attachment C, "References and Definitions," along with references for citations in the PA and links to those references;

**WHEREAS**, NSF has conducted its Section 106 consultation process concurrently with, but separate from, its National Environmental Policy Act (42 U.S.C. §§ 4321, *et seq.*) (NEPA) review process;

**WHEREAS**, the undertaking could result in four possible outcomes, which are currently the subject of NSF's NEPA review, including continued science-and education-focused operations by interested parties with reduced NSF funding; transition to partial operations by interested parties with reduced NSF funding; mothballing of facilities; and demolition and site restoration (although if the USFS identifies for itself or others an interest in retaining any of the buildings, NSF would transfer title and all future maintenance responsibilities for those buildings to the USFS);

**WHEREAS**, under the proposed outcomes involving continued science-and education-focused operations (whether in full or in part), NSF would continue to oversee the management and operations of the Sacramento Peak Observatory and would, therefore, continue to be the entity responsible for approving any future activities requiring NSF's compliance with Section 106;

**WHEREAS**, NSF's preliminary alternatives were published in the *Federal Register* on July 5, 2017, as part of NSF's scoping process under NEPA. The notice also stated NSF's intention to initiate consultation under Section 106 of the NHPA and to evaluate potential effects on the Sacramento Peak Observatory, and provided dates to specifically initiate public involvement under Section 106 per 36 C.F.R. § 800.2(d). Letters to potentially interested parties, agencies, and New Mexico elected officials were also sent. Notification of NSF's NEPA and Section 106 processes was also given through social media announcements, website updates on the AST website, scientific digests and blogs, and newspaper public notices. A public scoping meeting was held in Alamogordo, New Mexico, on July 20, 2016, to discuss the preliminary alternatives and NSF's compliance with both NEPA and the NHPA, seek input from the public on the preliminary alternatives, and identify Consulting Parties to participate in NSF's Section 106 consultation process under the NHPA. Two individuals informed NSF that they wished to participate in NSF's Section 106 consultation process as Consulting Parties at that time and one additional individual requested to participate in NSF's process as a Consulting Party after the DEIS was issued;

**WHEREAS**, because of the presence of the NRHP-eligible historic district, NSF has determined, in consultation with the SHPO and ACHP, that all four possible outcomes for implementing the undertaking have the potential to result in adverse effects on historic properties due to the potential demolition of some or all components of the NRHP-eligible historic district;

**WHEREAS**, NSF recognizes that two of the potential outcomes – (1) continued science-and education-focused operations by interested parties with reduced NSF funding and (2) transition to partial operations by interested parties with reduced NSF funding – can be implemented only if a collaborator(s) comes forward with viable plans to provide additional non-NSF funding in support of their science- and education-focused operations; if implementation of either of these two potential outcomes is selected by NSF but a determination is later made that the selected outcome is ultimately not feasible, NSF could select one or both of the remaining potential outcomes analyzed in the NEPA process (mothballing of facilities and/or demolition and site restoration), unless the USFS identifies an interest in retaining any of the buildings or structures for itself or others;

**WHEREAS**, NSF has consulted with the SHPO, the ACHP, the USFS, and the other Consulting Parties on ways to avoid, minimize, and/or mitigate the adverse effects that the proposed undertaking could have on historic properties pursuant to the regulations implementing Section 106 of the NHPA, 36 C.F.R. Part 800;

**WHEREAS**, NSF provided the public with an opportunity to express their views on resolving potential adverse effects during the NEPA public scoping and DEIS meetings and associated public comment periods; all comments received from the public on cultural resources during the NEPA process were considered in the development of this PA;

**WHEREAS**, NSF consulted with the SHPO, ACHP, USFS, and the other Consulting Parties in the development of this PA; the SHPO and ACHP are Signatories herein; the USFS is an Invited Signatory; the other Consulting Parties have been asked to execute this PA as Concurring Parties;

**WHEREAS**, to keep the Consulting Parties informed and to communicate the process for implementing the Stipulations in this PA, NSF has committed to provide the Consulting Parties with a final copy of this PA for their records;

**NOW, THEREFORE**, NSF, the SHPO, ACHP, and USFS agree that NSF will ensure that the following Stipulations are implemented to address the potential adverse effects of the proposed undertaking on historic properties and agree that these Stipulations will govern the undertaking and all of its parts.

## STIPULATIONS

NSF will ensure that the following measures are carried out:

### I. Preservation Principles

- A. To the extent that science- and education-focused operations continue, the following stipulations shall apply:
1. **Avoidance of Adverse Effects.** NSF will make every effort to avoid adverse effects on buildings and structures that contribute to the NRHP-eligible historic district by encouraging any new collaborator(s) to use as many contributing resources as practicable, provided that such use facilitates science- and education-focused operations. If the collaborator(s) does not intend to use a contributing resource and recommends demolition of any such resource, NSF will first consider mothballing in accordance with Stipulation I.B.2., below, for possible future use prior to making any decision to demolish a contributing resource. If NSF, after considering mothballing, ultimately decides to demolish a contributing resource, NSF shall follow the requirements set forth in I.B.1., I.B.3., and I.B.4., below. NSF will remain responsible for Section 106 compliance for undertakings involving the buildings and structures as long as it retains ownership of them. USFS will remain responsible for Section 106 compliance for any activity in the future that involves ground disturbance/archaeology.
  2. **Training.** Key facility staff of any new collaborator(s) will attend a one-time historic preservation awareness training to encourage awareness of the history of the Sacramento Peak Observatory and its context and significance, to familiarize staff with activities that would require NSF's compliance with Section 106, to understand the role and responsibilities of USFS as the managers of the public land at the site, and to minimize the potential for adverse effects to historic properties. Such training, which will be provided by NSF via a qualified historic preservation professional who is familiar with, and knowledgeable about, the Sacramento Peak Observatory, will occur within 180 calendar days (or as soon as practicable thereafter) of the commencement of operations by the collaborator(s). NSF will provide the SHPO and USFS with an opportunity to comment on the content of such training.
- B. To the extent that demolition or mothballing of any historic properties occurs, or transition of Sacramento Peak Observatory to USFS for other uses occurs, the following stipulations shall apply:
1. **Required Documentation Prior to Change in Disposition of any Historic Property.** Prior to a change in disposition (whether it be demolition or transition to USFS ownership for other uses) of any historic property, NSF will ensure, in addition to the New Mexico state inventory forms previously provided to the SHPO, the preparation of a National Register nomination form, in accordance with the National Register Bulletin, "Guidelines for Completing National Register of Historic Places Form" for the historic district within the APE (NR Form). NSF shall comply with the following process in preparing the NR Form:
    - a. Within 90 days following issuance of its final agency action regarding changes to operations at Sacramento Peak Observatory, NSF will prepare a draft outline of the contents of the NR Form;
    - b. After it is completed, NSF shall provide the draft outline of the NR Form to the SHPO and USFS for a 30-day review and comment period;
      - 1) Following the close of the 30-day review and comment period referenced in Stipulation I.B.1.b., above, NSF shall address any comments received from the SHPO and USFS and

prepare a final NR Form; and

- 2) NSF shall provide a digital copy of the final NR Form to the SHPO and USFS upon completion of the document. Figures, maps, photos, and any other attachments must be provided as separate files with a resolution of 2,000 X 3,000 pixels at 300 dots-per-inch resolution or greater.
2. **Mothballing in Accordance with Historic Preservation Standards.** In the event NSF identifies the need to mothball historic properties with the intent that science- and education-focused operations would resume within 3-5 years, NSF will follow the guidance in the NPS Preservation Brief 31, "*Mothballing Historic Buildings*" and *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings*, as appropriate, with implementation of the following measures:
  - a. NSF shall prepare the NR Form described in Stipulation I.B.1., above; and
  - b. To avoid an adverse effect, NSF shall ensure that a cyclical maintenance plan that includes repairs, as needed, is prepared and implemented.
3. **NSF Funding of an Interpretive Exhibit.** In the event NSF issues a final agency decision regarding changes to operations at Sacramento Peak Observatory in which demolition of a contributing resource is included, NSF agrees to the following:
  - a. In the event of demolition of the entire Sacramento Peak Observatory, NSF will contribute a maximum of \$100,000.00 toward an interpretive exhibit and/or signage to tell the story of the Sacramento Peak Observatory. The interpretive exhibit, which could be displayed at a museum such as the New Mexico Space History Museum, and/or signage, would be based on the NR Form required under Stipulation I.B.1., above, and would be done in consultation with the SHPO and USFS; or
  - b. If the USFS requests retention of any contributing resources for itself or others, Stipulation I.B.3.a., above, shall not apply and NSF will determine, following consultation with the SHPO and USFS, what the appropriate contribution for an interpretive exhibit and/or signage would be, if any, but under no circumstances would the contribution exceed \$100,000.
4. **Effort to Reuse or Donate Historically Significant Equipment and Artifacts.** In the event that NSF issues a final agency action regarding changes to operations at Sacramento Peak Observatory in which demolition, transfer, or mothballing of historic properties occurs, NSF will identify any historically significant equipment and artifacts associated with historic properties that will not be repurposed for further scientific or educational use, and if feasible, NSF will:
  - a. Contact relevant scientific/educational institutions for possible reuse of the equipment and artifacts; or
  - b. Contact an appropriate museum to determine if any of the equipment and/or artifacts can be donated to the museum's collection.

## II. General Provisions

- A. **Documentation of Actions Demonstrating Compliance with this PA.** So long as NSF remains the owner of the Sacramento Peak Observatory and provided this PA remains in effect, NSF will submit updates every 6 months, beginning 6 months following the effective date of this PA, regarding the progress of compliance with this PA to the SHPO, the ACHP, and the USFS. If the SHPO or USFS has any concerns regarding the implementation of this PA, Section II.H. Dispute Resolution, herein, may

be used to address those concerns. To keep the public and Consulting Parties apprised of the status of the implementation of the Stipulations in this PA, NSF will maintain a status report on the AST website with relevant information.

- B. If a Potential Outcome Is Selected by NSF in a Final Agency Action, but Implementation of It Is Later Determined Infeasible.** If one of two potential outcomes (continued science- and education-focused operations by collaborator(s)/interested parties with reduced NSF funding, or the transition to partial operations by interested parties with reduced NSF funding) is selected by NSF in a final agency action and a determination is subsequently made that the selected outcome is ultimately not feasible to implement, NSF will notify the SHPO, the ACHP, and the other Consulting Parties and will follow the provisions of I.B. of this PA.
- C. Unanticipated Effects.** If unanticipated effects on historic properties occur during implementation of the undertaking, NSF will, in compliance with 36 C.F.R. § 800.13(b)(3), determine actions that it can take to resolve potential adverse effects and notify, via phone and email, the SHPO, the USFS, and, as appropriate, the other Consulting Parties within two business days of NSF's awareness of such effects. Any such notification would describe the property, the unanticipated effect, and proposed actions to resolve any adverse effects. After receipt of such notification, the SHPO, the USFS, and the other Consulting Parties will respond with any comments within two business days of the notification by phone or email. NSF will consider any recommendations received regarding proposed actions, and then determine and implement appropriate actions. NSF will provide the SHPO, the USFS, and the other Consulting Parties, as appropriate, with a report of the actions when they are completed. This Stipulation shall not apply if NSF is no longer the owner of the Sacramento Peak Observatory.
- D. Post-agreement Discoveries.** If NSF continues to own the Sacramento Peak Observatory and it is managed by a collaborator(s)/interested party, all unanticipated discoveries of historic properties and human or burial remains within the APE revealed during any activity associated with implementation of the proposed undertaking will be addressed in the following manner:
1. The entity carrying out activities that result in unanticipated discoveries of historic properties will promptly notify NSF, who will notify the SHPO, the USFS (specifically, the Forest Archeologist for the Lincoln National Forest), and the other Consulting Parties, as appropriate, by phone or email of the discovery within two business days of NSF's awareness of the discovery.
  2. If NSF determines, in consultation with the SHPO, that the discovery is eligible for listing in the NRHP, NSF will initiate consultation with the USFS and the other Consulting Parties to draft a plan with measures that will avoid, minimize, and/or mitigate adverse effects. If an agreement is reached regarding such a plan, NSF will implement the plan. If the discovery is made during demolition activities (if any), demolition in the affected area must cease until the discovery process in this Stipulation has been concluded either through a finding that the property is not eligible for listing in the NRHP or through finalization of the plan referenced herein.
  3. If NSF, the SHPO, the USFS, and the other Consulting Parties cannot reach agreement regarding the development of a treatment or mitigation plan, then the matter will be referred to the ACHP for guidance. NSF will consider the ACHP's guidance in reaching its final decision regarding implementation of the plan.
  4. If any previously unidentified human or burial remains are discovered during implementation of the undertaking, the contractor/collaborator(s) will immediately cease any ground-disturbing work and promptly notify NSF. NSF will then notify the SHPO, the USFS (specifically, the Forest Archeologist for the Lincoln National Forest), and the other Consulting Parties, as appropriate, of

the discovery by phone or email within two business days of NSF's awareness of the discovery. All parties will adhere to applicable state and federal laws regarding the treatment of human or burial remains.

**E. Response to Emergency.** In the event NSF proposes an emergency undertaking as an essential and immediate response to a disaster or emergency declared by the President, or the Governor of New Mexico, or in response to another immediate threat to life or property, the following process will be followed:

1. NSF will notify the SHPO via telephone and email within two business days of commencing the emergency undertaking.
2. NSF will include a summary of all emergency undertakings in the status report referenced in Stipulation II.A., above.
3. This Stipulation shall apply only to undertakings that are implemented within 30 calendar days after the disaster or emergency has been formally declared by the appropriate authority, although NSF may request an extension of the period of applicability from the ACHP prior to the expiration of the 30 calendar days.
4. Immediate rescue and salvage operations conducted to preserve life or property are exempt from the provisions of Section 106 and this PA.

**F. Meetings or Conference Calls.** Meetings or conference calls regarding the undertaking and/or implementation of the Stipulations in this PA may be requested at any time by the Signatories for the duration of this PA.

**G. Transfer out of NSF Ownership.** If the Sacramento Peak Observatory is transferred out of NSF ownership, the terms of this PA shall not apply after transfer.

#### **H. Dispute Resolution**

1. **Signatories.** In the event one of the Signatories objects to the manner in which any term of this PA is implemented, the following dispute resolution process will be followed:
  - a. The objecting Signatory will notify all other Signatories to this PA, in writing, of the objection or disagreement, request written comments on the objection or disagreement within 10 business days following receipt of such notification, and then proceed to consult with the Signatories to resolve the objection. If at any time during consultation NSF determines that the objection or disagreement cannot be resolved through consultation, NSF will forward all documentation relevant to the dispute to the SHPO, or if the objection is raised by the SHPO, NSF will forward all documentation relevant to the dispute to the ACHP. Within 30 calendar days after receipt of all pertinent documentation, the SHPO or, as appropriate, the ACHP, will provide NSF with comments and recommendations, which NSF will consider in reaching its final decision regarding the dispute. Any comment provided by the SHPO or, as appropriate, the ACHP, will be understood to pertain only to the subject of the dispute. All other actions under this PA that are not the subject of the dispute will remain unchanged.
  - b. Unless all Signatories agree that the dispute warrants a cessation of work, neither NSF nor its collaborator(s)/interested parties will be required to cease work on the proposed undertaking while the dispute is being reviewed.
2. **The Public and Concurring Parties.** At any time during the implementation of the Stipulations set forth in this PA, any member of the public, including any Consulting Party who has decided

not to sign this PA as a Concurring Party, and any Concurring Party may continue to participate in the Section 106 consultation process as follows:

- a. Any member of the public may raise an objection to NSF pertaining to the treatment of a historic property associated with implementation of the proposed undertaking, provided that title to the Sacramento Peak Observatory buildings and structures is retained by NSF. In the event such an objection is raised by a member of the public, NSF will consult with the SHPO regarding the objection, and following such consultation, will provide the objecting member of the public with a decision on the objection. If NSF and the SHPO are unable to resolve the objection, they will consult with the ACHP. NSF will consider any recommendation on the objection provided by the ACHP before making its final decision on the matter. NSF will communicate its final decision to the objecting member of the public and the SHPO.
- b. Any Concurring Party may raise an objection to NSF pertaining to the treatment of a historic property associated with implementation of the proposed undertaking. In the event such an objection is raised by a Concurring Party, NSF and the SHPO will consult regarding how to resolve the objection and following such consultation, will provide the objecting Concurring Party with a decision on the objection. If NSF and the SHPO are unable to resolve the objection, they will consult with the ACHP. NSF will consider any recommendation on the objection provided by the ACHP before making its final decision on the matter. NSF will communicate its final decision to the objecting Concurring Party and the SHPO.

If an objection is made pursuant to either Stipulation II.H.1. or II.H.2., NSF, in consultation with the SHPO, will determine whether the objection warrants a cessation of work on the proposed undertaking while the objection is being reviewed.

This Stipulation (Stipulation II.H.) shall not apply if NSF is no longer the owner of the Sacramento Peak Observatory when an objection is raised.

- I. **Professional Qualifications.** All work carried out pursuant to this PA will be developed and/or implemented by or under the direct supervision of a person or persons meeting or exceeding the minimum professional qualifications, appropriate to the affected resource(s), listed in the *Secretary of the Interior's Professional Qualification Standards* (36 C.F.R. Part 61, Appendix A) and amended in 1992.
- J. **Electronic Copies.** NSF will provide the SHPO, the ACHP, the USFS, and each of the other Consulting Parties with one legible, full-color, electronic copy of the fully executed PA and its Attachments no more than 30 calendar days after full execution. If the electronic copy is too large to send via email, NSF will provide each Consulting Party with a copy of the executed PA via a CD or in any reasonable medium available.
- K. **Amendment.** Any Signatory may request that this PA be amended by informing NSF in writing of the reason for the request and providing the proposed amendment language. After receiving the request, NSF will notify all Consulting Parties of the proposed amendment and consult to reach an agreement. If agreed upon, the amendment would be effective on the date a copy signed by all the Signatories is filed by NSF with the ACHP.
- L. **Expiration.** If NSF retains ownership of the Sacramento Peak Observatory buildings and structures, this PA will expire 10 years from the Effective Date of this PA as defined in Stipulation II.O. herein. If Sacramento Peak Observatory is transferred out of NSF ownership, this PA shall expire upon the completion of the terms in Stipulation I.B.1. Prior to such expiration date,



NSF may consult with the SHPO, the ACHP, and the USFS to reconsider the terms of this PA and amend it in accordance with Stipulation II.K. If unresolved issues remain within two years of the expiration date of this PA, NSF will at that time consult with the SHPO and the ACHP regarding the progress of implementation of this PA and consider the appropriateness of developing a subsequent agreement or amendment to the PA.

- M. Compliance with Applicable Law and Anti-Deficiency Act Provision.** This PA will be carried out in a manner consistent with all applicable federal and state laws. No provision of this PA will be implemented in a manner that would violate the Anti-Deficiency Act. NSF shall make reasonable and good faith efforts to secure the necessary funds to implement this PA in its entirety. All obligations on the part of NSF will be subject to the availability and allocation of appropriated funds for such purposes. Nothing in this PA may be construed to obligate NSF to any current or future expenditure of resources in advance of the availability of appropriations. Should NSF be unable to fulfill the terms of this PA due to funding constraints or priorities, NSF will immediately notify and consult with the SHPO, the ACHP, and the USFS to determine whether to amend or terminate this PA.
- N. Termination.** If any Signatory to this PA determines that the terms of this PA will not or cannot be carried out, that Signatory will immediately consult with the other Signatories to develop an amendment to this PA pursuant to Stipulation II.K. If this PA is not amended following that consultation, then it may be terminated by any Signatory through written notice to the other Signatories. Within 30 calendar days following any such termination and prior to work continuing on the undertaking, NSF will notify the SHPO, the ACHP, and the USFS whether it will initiate consultation to execute a new PA under 36 C.F.R. § 800.14(b)(1)(ii) or request and consider the comments of the ACHP under 36 C.F.R. § 800.7 and proceed accordingly.
- O. Effective Date.** This PA will be executed in counterparts, with a separate page for each Signatory, and NSF will ensure that each Signatory is provided with a fully executed copy. This PA will become effective upon obtaining the signatures of NSF, the SHPO, the ACHP, and the USFS.


**Execution** of this PA by NSF, the SHPO, the ACHP, and the USFS is evidence that NSF has taken into account the effects of this proposed undertaking on historic properties and has afforded the ACHP with an opportunity to comment on the proposed undertaking.

**SIGNATORY PAGE**

PROGRAMMATIC AGREEMENT  
AMONG  
THE NATIONAL SCIENCE FOUNDATION,  
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND  
THE NEW MEXICO STATE HISTORIC PRESERVATION OFFICER  
REGARDING  
POTENTIAL CHANGES TO  
SACRAMENTO PEAK OBSERVATORY OPERATIONS

Signatory:

National Science Foundation



Richard F. Green, Ph.D., Division Director  
Division of Astronomical Sciences

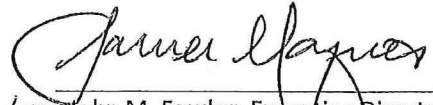
Date 3 Aug 2018

**SIGNATORY PAGE**

PROGRAMMATIC AGREEMENT  
AMONG  
THE NATIONAL SCIENCE FOUNDATION,  
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND  
THE NEW MEXICO STATE HISTORIC PRESERVATION OFFICER  
REGARDING  
POTENTIAL CHANGES TO  
SACRAMENTO PEAK OBSERVATORY OPERATIONS

Signatory:

Advisory Council on Historic Preservation

  
for John M. Fowler, Executive Director

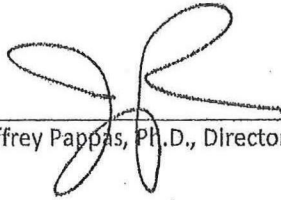
Date 8-10-2018

**SIGNATORY PAGE**

PROGRAMMATIC AGREEMENT  
AMONG  
THE NATIONAL SCIENCE FOUNDATION,  
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND  
THE NEW MEXICO STATE HISTORIC PRESERVATION OFFICER  
REGARDING  
POTENTIAL CHANGES TO  
SACRAMENTO PEAK OBSERVATORY OPERATIONS

Signatory:

New Mexico State Historic Preservation Office



Jeffrey Pappas, Ph.D., Director

Date

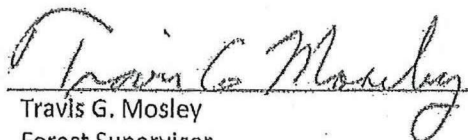
8/2/18

**INVITED SIGNATORY PAGE**

PROGRAMMATIC AGREEMENT  
AMONG  
THE NATIONAL SCIENCE FOUNDATION,  
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND  
THE NEW MEXICO STATE HISTORIC PRESERVATION OFFICER  
REGARDING  
POTENTIAL CHANGES TO  
SACRAMENTO PEAK OBSERVATORY OPERATIONS

Invited Signatory:

United States Forest Service



Travis G. Mosley  
Forest Supervisor  
Lincoln National Forest

Date

8/3/18

**CONCURRING PARTY SIGNATURE PAGE**

PROGRAMMATIC AGREEMENT  
AMONG  
THE NATIONAL SCIENCE FOUNDATION,  
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND  
THE NEW MEXICO STATE HISTORIC PRESERVATION OFFICER  
REGARDING  
POTENTIAL CHANGES TO  
SACRAMENTO PEAK OBSERVATORY OPERATIONS

Concurring Party:

Association of Universities for Research in Astronomy



Mattias Mountain, Ph.D., President

Date

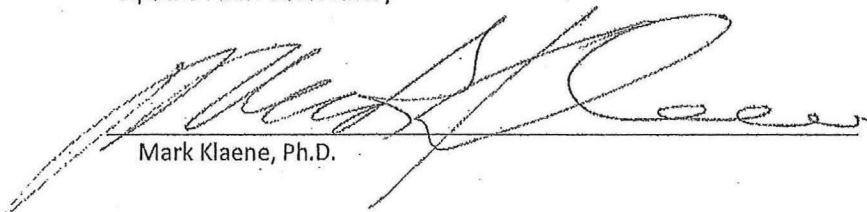
8/29/18

**CONCURRING PARTY SIGNATURE PAGE**

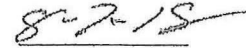
PROGRAMMATIC AGREEMENT  
AMONG  
THE NATIONAL SCIENCE FOUNDATION,  
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND  
THE NEW MEXICO STATE HISTORIC PRESERVATION OFFICER  
REGARDING  
POTENTIAL CHANGES TO  
SACRAMENTO PEAK OBSERVATORY OPERATIONS

Concurring Party:

Apache Point Observatory

  
Mark Klaene, Ph.D.

Date



**CONCURRING PARTY SIGNATURE PAGE**

PROGRAMMATIC AGREEMENT  
AMONG  
THE NATIONAL SCIENCE FOUNDATION,  
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND  
THE NEW MEXICO STATE HISTORIC PRESERVATION OFFICER  
REGARDING  
POTENTIAL CHANGES TO  
SACRAMENTO PEAK OBSERVATORY OPERATIONS

Concurring Party:

*Kevin Reardon*

Kevin Reardon, Ph.D.

\_\_\_\_\_  
Date \_\_\_\_\_



**CONCURRING PARTY SIGNATURE PAGE**

PROGRAMMATIC AGREEMENT  
AMONG  
THE NATIONAL SCIENCE FOUNDATION,  
THE ADVISORY COUNCIL ON HISTORIC PRESÉRVATION, AND  
THE NEW MEXICO STATE HISTORIC PRESÉRVATION OFFICER  
REGARDING  
POTENTIAL CHANGES TO  
SACRAMENTO PEAK OBSERVATORY OPERATIONS

Concurring Party:

  
\_\_\_\_\_

Mr. Keith Morin

Date 8/20/18

---

Attachment A  
Evaluated Resources

### Evaluated Architectural Resources at Sacramento Peak Observatory

Surveyed Building/Structure Name (Building Number) <sup>1</sup>	Year Built	Description	Function	Contributing to NRHP <sup>2</sup> -eligible Historic District?
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)	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 coronagraph and a 12-inch coelostat	Solar telescope (not in active use)	Contributing <sup>3</sup>
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)	Contributing
Hilltop Dome (3040)	1963	Concrete block laboratory building attached to the Patrol Dome	Solar telescope (not in active use)	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	Contributing <sup>3</sup>
Visitor Officers Quarters (VOQ) (3013)	1952	Two-story wood frame apartment building with 5 apartments	Residential	Contributing
Redwood Family Housing (3014ns)	1952	One-story wood frame duplex	Residential	Contributing
Redwood Family Housing (also known as Director's House) (3015)	1952	One-story wood frame ranch house	Residential	Contributing
Redwood Family Housing (3016ns)	1952	One-story wood frame duplex	Residential	Contributing
Redwood Family Housing (3017)	1952	One-story wood frame ranch house	Residential	Contributing
Redwood Family Housing (3018)	1952	One-story wood frame ranch house	Residential	Contributing
Redwood Family Housing (3019)	1952	One-story wood frame ranch house	Residential	Contributing
Redwood Family Housing (3020ns)	1952	One-story wood frame duplex	Residential	Contributing
Redwood Family Housing on Hound Dog Hill (3044)	1958	One-story wood frame ranch house	Residential	Contributing

Redwood Family Housing on Hound Dog Hill (3045)	1958	One-story wood frame ranch house	Residential	Contributing
Redwood Family Housing on Hound Dog Hill (3046)	1958	One-story wood frame ranch house	Residential	Contributing
Redwood Family Housing on Hound Dog Hill (3047)	1958	One-story wood frame ranch house	Residential	Contributing
Redwood Family Housing on Hound Dog Hill (3048)	1958	One-story wood frame ranch house	Residential	Contributing
Redwood Family Housing on Hound Dog Hill (3049)	1958	One-story wood frame ranch house	Residential	Contributing
Relocatable Housing (3061)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3062)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3063)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3064)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3065)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3066)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3067)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3068)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3069)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3070) (also known as the Recreation House)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3071)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3072)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3073)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3074)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3075)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3076)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3077)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3079)	1966	One-story, "foldable," ranch house	Residential	Contributing

Relocatable Housing (3081)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3083)	1966	One-story, "foldable," ranch house	Residential	Contributing
Relocatable Housing (3085)	1966	One-story, "foldable," ranch house	Residential	Contributing
Main Lab (3004)	1952	Irregular plan, one-story, concrete block building with a two-story, concrete block addition	Office space, computing facility, library	Contributing
Machines/Electronics Shop (3005)	1953	Rectangular plan, metal building	Machine/electronics shop	Contributing
Welding Shop/Library (3006)	1962	Rectangular plan, metal building	Welding shop/library annex	Contributing
Storage (Quonset Hut) (3008)	1951	Quonset hut on concrete slab	Electronics storage	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)	Contributing
Storage (Quonset Hut) (3011)	1951	Quonset hut on concrete slab	Facilities maintenance storage	Contributing
Storage (Quonset Hut) (3012)	1951	Quonset hut on concrete slab	Community shop, storage	Contributing
Storage Building (3024)	1958	Metal frame shed	Storage	Non Contributing
Furniture Storage (Quonset Hut) (3029)	1951	Quonset hut on concrete slab	Furniture storage	Non Contributing
Civil Engineering (CE) Shop (3031)	1953	One-story concrete block and plywood building with flat roof	Carpentry, welding, electrical shops	Contributing
CE Shop (3032)	1953	Long, one-story, concrete block building	Facilities shops	Contributing
Paint Storage (3034)	1959	Small concrete block building	Paint/hazardous waste storage	Contributing
Equipment Storage/Salt Barn (3036)	1961	Wood frame, metal shed, dirt floor	Equipment storage	Contributing
Storage (3037)	1953	Concrete block	Facilities maintenance storage	Contributing
Emergency Generator Building (3038)	1962	Concrete block building on a raised concrete foundation	Emergency generator room	Contributing
Weather Station (3039)	1955	One-story, square plan, concrete block building with a flat roof	Weather station/storage	Contributing
Laundromat [formerly public restrooms] (3060)	circa late	One-story concrete block building	Laundromat, custodial storage	Contributing

	1950s			
Post Office (no building number)	1953	One-story wood framed building composed of two attached units	Post Office and Post Master's residence	Contributing <sup>4</sup>
Pump Station Reservoir (3033)	1953	Concrete block building with two 10,000-gallon concrete, ground-level storage tanks	Reservoir	Contributing
Water Well Building (3050)	1953	Metal frame sheds with aluminum siding	Water well	Contributing
Water Well Building (3051)	1953	Metal frame sheds with aluminum siding	Water well	Contributing
Sewage Treatment Plant - Boiler Room (3053)	1953	Small concrete block building clad in wide, wood drop siding, mineral surface roof	Treatment plant	Contributing
Sewage Treatment Plant - Trickling Filter (3054)	1957	Small concrete block shed with a corrugated metal gable roof	Trickling filter	Contributing
Sewage Treatment Plant - Valve Station (3055)	1961	Metal frame building with a corrugated metal roof	Valve station	Contributing
Sewage Treatment Plant - Pump Station (3056)	1966	Small metal frame building with a corrugated metal roof	Pump station	Contributing
Overhead Water Tower (no building number)	1952	120-foot tall, 25,000-gallon steel elevated water tank	Water tower	Contributing

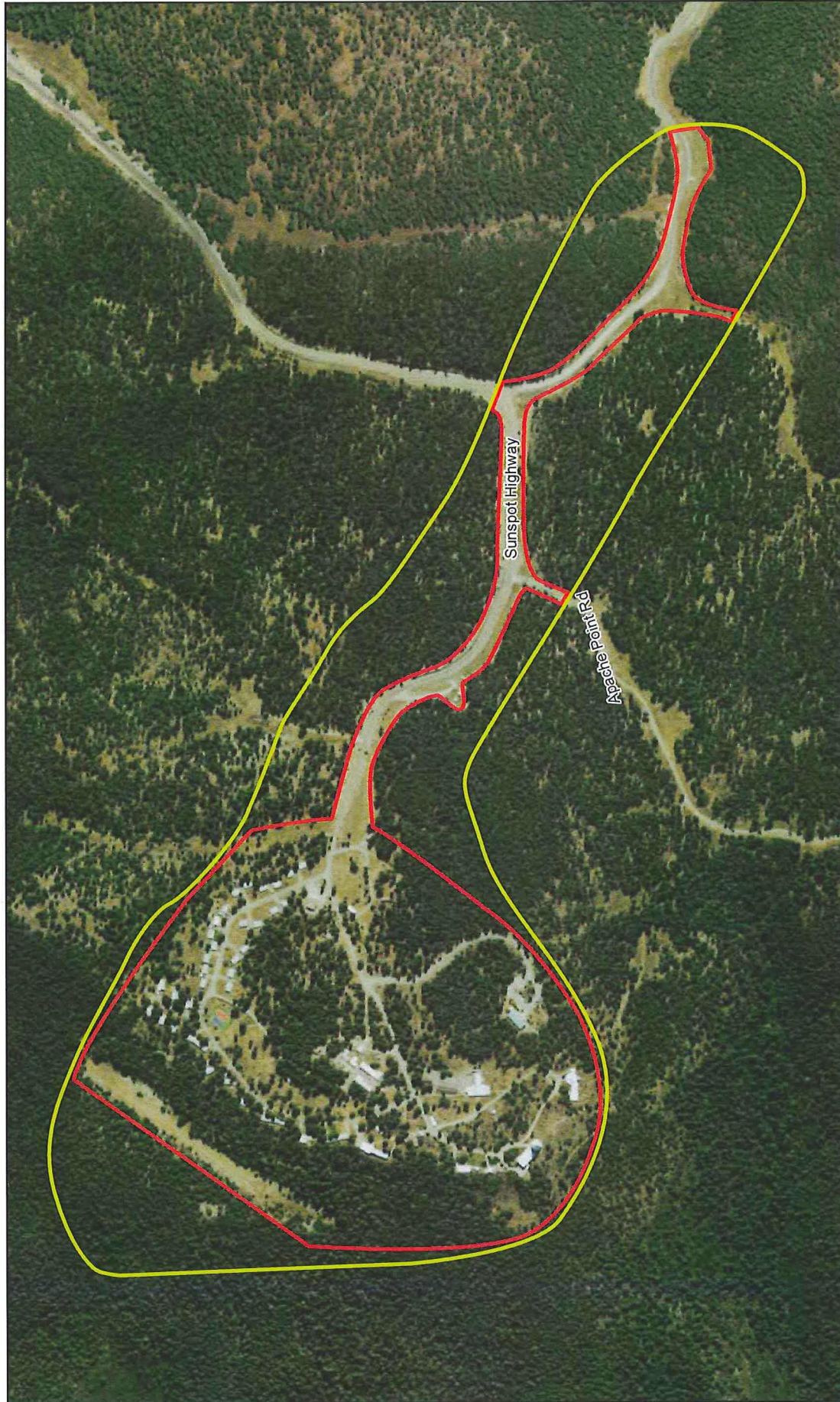
<sup>1</sup> This table only includes resources that were inventoried as part of the 2015 cultural resources survey. Buildings and structures that were not 45 years old at the time of the cultural resources survey, were not considered to have exceptional importance, or were not owned by NSF were not included in the historic district evaluation.

<sup>2</sup> NRHP: National Register of Historic Places

<sup>3</sup> Also considered individually eligible for listing on the NRHP

<sup>4</sup> The Post Office was evaluated later in the process, and was therefore not included in the list of 63 contributing resources that NSF submitted to the SHPO for concurrence in May 2017.

Attachment B  
Area of Potential Effects Map



Aerial Source: National Agriculture Imagery Program (NAIP), 2016

**Legend**

- Sacramento Peak Observatory Historic District Boundary
- Area of Potential Effects (APE)



Sacramento Peak Observatory  
Sunspot, New Mexico



Attachment C  
References and Definitions

## PA References:

- Proposed Changes to Sacramento Peak Observatory Operations: Historic Properties Assessment of Effects* (CH2M HILL; 2017).  
[https://www.nsf.gov/mps/ast/env\\_impact\\_reviews/sacpeak/section106/Historic\\_Properties\\_Assessment\\_of\\_Effects\\_Report.pdf](https://www.nsf.gov/mps/ast/env_impact_reviews/sacpeak/section106/Historic_Properties_Assessment_of_Effects_Report.pdf)
- Park, Sharon C. 1993. *Preservation Brief 31: Mothballing Historic Buildings*, U.S. Department of the Interior, National Park Service. September. <https://www.nps.gov/tps/how-to-preserve/briefs/31-mothballing.htm>
- Grimmer, Anne E. 2017. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings*. U.S. Department of the Interior, National Park Service, Technical Preservation Services, Washington, D.C. <https://www.nps.gov/tps/standards/treatment-guidelines-2017.pdf>
- National Park Service, U.S. Department of the Interior. 2016. Historic American Buildings Survey (HABS)/Historic American Engineering Record (HAER)/Historic American Landscapes Survey (HALS) Standards and Guidelines. <https://www.nps.gov/hdp/standards/index.htm>
- Gaume, Ralph A. and James S. Ulvestad. 2017. National Science Foundation NSF 17-079 Dear Colleague Letter: MPS-AST Facility Divestment Activity. April 27.  
<https://www.nsf.gov/pubs/2017/nsf17079/nsf17079.jsp>
- National Academies of Sciences, Engineering, and Medicine (NAEM). 2016. *New Worlds, New Horizons: A Midterm Assessment*. Washington, DC: The National Academies Press.  
<https://doi.org/10.17226/23560>
- National Science Foundation (NSF) Division of Astronomical Sciences (AST). 2006. *From the Ground Up: Balancing the NSF Astronomy Program* (Senior Review Committee Report). Prepared by the Senior Review Committee. October 22.  
[https://www.nsf.gov/mps/ast/seniorreview/sr\\_report\\_mpsac\\_updated\\_12-1-06.pdf](https://www.nsf.gov/mps/ast/seniorreview/sr_report_mpsac_updated_12-1-06.pdf)
- National Science Foundation (NSF) Division of Astronomical Sciences (AST). 2012. *Advancing Astronomy in the Coming Decade: Opportunities and Challenges* (Portfolio Review Committee Report). Prepared by the Portfolio Review Committee. August 14.  
[https://www.nsf.gov/mps/ast/portfolioreview/reports/ast\\_portfolio\\_review\\_report.pdf](https://www.nsf.gov/mps/ast/portfolioreview/reports/ast_portfolio_review_report.pdf)

## PA Definitions:

**Adverse Effect:** a change to the characteristics that qualify a historic 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 (36 CFR 800.5(a)).

**Area of Potential Effects (APE):** 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. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking (36 CFR 800.16(d)). It is important to understand that the effects pertain to the effects on physical historic properties (eligible for or listed in the National Register of Historic Places [NRHP]) in a specific area.

**Concurring Party:** Any consulting party that has been invited by the federal agency (NSF) to concur in the PA. Concurring parties have the same rights with regard to seeking amendment or termination of the PA as other signatories. The refusal of any party invited to concur in the PA does not invalidate the document (36 CFR 800.16(d)).

**Consultation:** the process of seeking, discussing, and considering the views of other participants, and, where feasible, seeking agreement with them regarding matters arising in the Section 106 process (36 CFR 800.16(f)).

**Consulting Party:** Section 106 term that refers to organizations and/or individuals with a demonstrated interest in the undertaking due to the nature of their legal or economic relation to the undertaking or affected properties, or their concern with the undertaking's effects on historic properties. The participation of consulting parties is subject to approval by the federal agency (in this case, NSF). Consulting parties are actively informed of and able to participate in the Section 106 process, including consultation meetings. The views of consulting parties are actively sought by NSF during the Section 106 consultation process. (36 CFR 800.2(c)(5))

**Effect:** an alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the NRHP (36 CFR 800.16(i)).

**Historic Property:** Any resource, such as a building, structure, or historic district, included in or eligible for inclusion in the NRHP, maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the NRHP criteria (36 CFR 800.16(l)).

**Invited Signatory:** Any party that is assigned a responsibility under the PA and is invited by the federal agency (NSF) to sign the PA. Any invited signatory that signs the PA has the same rights with regard to seeking amendment or termination of the PA as other signatories. The refusal of any party invited to become a signatory to a PA does not invalidate the document (36 CFR 800.6(c)(2)).

**Signatory:** Signatories include the federal agency (NSF), PR SHPO, and ACHP, and they have the sole authority to execute, amend, or terminate the PA (36 CFR 800.6(c)(1)).

**Programmatic Agreement (PA):** A document that records the terms and conditions agreed upon to resolve the potential adverse effects of a federal agency program or complex undertaking. For this undertaking, a PA is used to document the ways in which adverse effects are addressed because the result of the 2017 solicitation for new collaborators is undetermined and the needs of any new collaborator(s) are unknown (36 CFR 800.14(b)).

**Undertaking:** A project, activity, or program funded in whole or in part by a federal agency (36 CFR 800.16(y)).

