



United States Department of the Interior



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IN REPLY REFER TO:  
IMR-EQ-L7617

VIA ELECTRONIC MAIL: NO HARD COPY TO FOLLOW

Larry Gore, Forest Geologist  
Geothermal EIS Project  
Santa Fe National Forest  
U.S. Forest Service  
11 Forest Lane  
Santa Fe, NM 87508

Re: NPS Scoping Comments on U.S. Forest Service Notice of Intent to Prepare an Environmental Impact Statement for Geothermal Development in the Santa Fe National Forest, New Mexico

Dear Mr. Gore,

The National Park Service (NPS) has reviewed the subject notice of intent for the preparation of an environmental impact statement (EIS) for geothermal development on approximately 139,329 acres of the Santa Fe National Forest (SFNF), New Mexico. We appreciate the opportunity to provide you with our initial thoughts and comments about how this project may affect two units of the National Park System located adjacent to the planning area.

Bandelier National Monument was proclaimed on February 11, 1916 and transferred from the U.S. Forest Service to become a unit of the NPS on February 25, 1932. The monument preserves the remains of Pueblo Indians' cliff houses and villages dating from the 1200s. The monument contains 33,676.67 acres. Wilderness was designated on 23,267 acres on October 20, 1976.

The Valles Caldera was designated a National Natural Landmark (NNL) by the Secretary of the Interior in 1975, recognizing it as one of the largest calderas in the world. The site is an excellent example of a caldera farther along the life cycle of lacustrine filling and breaching but still retaining the essential structures, including a central structural dome and more than 10 rhyolitic domes. In 2000, Congress established the Valles Caldera National Preserve to be managed by the Valles Caldera Trust, a wholly-owned government corporation overseen by a nine-member board. The Santa Fe National Forest Supervisor and the Bandelier National Monument Superintendent are ex-officio members of the board. On December 19, 2014, Public Law 113-291 established the Valles Caldera National Preserve as a unit of the NPS. The legislation called for a period of transitional management by the Valles Caldera Trust, which

ends on September 30, 2015. However, jurisdictional authority of the Valles Caldera National Preserve transferred to the NPS with the passage of P.L. 113-291.

### **Preliminary Issues of Concern**

Geothermal drilling and production operations, and connected development (roads and utilities), could adversely affect the natural, cultural and sensory resources and values of Bandelier National Monument and the Valles Caldera National Preserve. A preliminary list of issues of concern includes:

- **Drilling Operations**
  - Surface Impacts – Construction and use of pipelines, access roads, well pads, generating facilities and cooling towers and associated noise, fumes, gases, dust, and visual impacts could adversely impact on the parks. Mitigation may include locating operations away from the parks; reclamation of roads and well pads; mechanical mufflers; screens of vegetation; using air-cooled and low profile equipment; and proper selection of paint colors that match the surrounding environment.
  - Subsurface Impacts – Mixing of thermal fluids with shallow aquifers could result in contamination with heat, mercury, sulfur, and other substances. Mitigation may include maintaining integrity of drill casing and use of proper drilling techniques.
  - Impacts to Thermal Features – Fluids may migrate up fractures to the surface creating springs or fumaroles, contamination, and “robbing” of fluids and vapors needed to maintain natural thermal features. Mitigation may include maintaining integrity of drill casing and use of proper drilling techniques.
  
- **Production Operations**
  - Degradation of Thermal Features – The parks share the same watershed with the SFNF. Geothermal features in the parks may potentially be altered or destroyed by declining reservoir pressures as geothermal fluids reach the surface and are developed on the SFNF. Reservoir decline can be mitigated by using appropriate discharge rates.
  - Changes in Ground Temperature – Geothermal development can alter the heat flow by the generation of steam. The generation and movement of steam can increase heat flow and ground temperatures stressing wildlife and vegetation. Mitigation may include maintaining reservoir pressures.
  - Ground Subsidence – Fluid withdrawal reduces pore pressure in rocks resulting in compaction and surface subsidence. Subsidence may result in ground movement, building instability and instability of pipelines, drains, and well casings and impact surface and shallow groundwater systems. Mitigation may include use of binary systems that return all geothermal fluid to the ground or recharging with treated wastewater to help mitigate subsidence.
  - Surface and Groundwater – Hot wastewater released directly into an existing natural waterway would adversely impact both aquatic and terrestrial plants and animals due to the high temperatures, and toxic substances such as lithium, boron, arsenic, hydrogen sulfide/sulphuric acid (lowering pH), mercury, and ammonia, increased erosion, precipitation of minerals such as silica, and shallow groundwater contamination. Mitigation may include reinjecting all waste liquid via injection wells. Some geothermal

wells, while hot, do not have sufficient water to generate steam; hence, surface water must be pumped down the well to be heated and turned into steam to run a turbine. Using stream surface water for such purposes would decrease surface stream flows, affecting fish and wildlife populations and downstream human utilization. Also, “industrial” energy development uses surface and/or shallow ground water for other purposes (office use by humans, dust suppression, cleaning equipment, etc.), further impacting stream flows and groundwater.

- Induced Seismicity – Geothermal development could theoretically increase the number of small earthquakes within the field caused by fluid reinjection. Mitigation may include reducing reinjection pressures to a minimum.
  - Microclimatic Effects – Discharges of warm water vapor may affect the climate and vegetation near the power plant; increased fog, clouds, or rainfall. Mitigation may include designing the power station to minimize discharges and active monitoring and control of discharges when the plant is in operation; or use of air-cooled binary plants that do not release any water vapor.
  - Hydrothermal Eruptions – In very active volcanic areas, hydrothermal eruptions are a potential hazard in high-temperature liquid-dominated geothermal fields. Eruptions occur when the steam pressure in near-surface aquifers exceeds the overlying rock pressure. Mitigation may include maintaining reservoir pressures to minimize steam formation and heat-flow increases.
- Designated critical habitat for the Jemez Mountains Salamander is located within the analysis area within the SFNF and extends into the Valles Caldera National Preserve. Much of the salamander’s life cycle occurs underground; any activity with the potential to reduce interspaces or affect subsurface channels would be of concern.
  - Suitable or potentially suitable habitat for endangered species, candidate species, sensitive species and species of interest are adjacent to or cross over from the Valles Caldera National Preserve into the analysis area in the SFNF. The list of these species is provided in Table 1 below (Mexican Spotted Owls have not been observed on the Preserve, but do inhabit SFNF lands). Geothermal exploration and development, and connected development (roads and utilities) could have direct, indirect and cumulative effects on these species and their habitats.

Table 1 – Terrestrial wildlife species designated as candidate species, species of concern, sensitive species, or species of interest with habitat in the VCNP or within the VCNP and overlapping into the analysis area.

Species		Status
Canada Lynx	<i>Lynx canadensis</i>	Candidate
Gunnison's prairie dog	<i>Cynomys gunnisoni</i>	Candidate
Jemez Mountain salamander	<i>Plethodon neomexicanus</i>	Endangered
New Mexico meadow jumping mouse	<i>Zapus hudsonius luteus</i>	Endangered
Goat Peak Pika	<i>Ochotona princeps nigrescens</i>	Species of Concern
Rio Grande cutthroat trout	<i>Oncorhynchus clarkii virginalis</i>	Candidate
Northern goshawk	<i>Accipiter gentiles</i>	Species of Concern
Pale Townsend big-eared bat	<i>Corynorhinus townsendii</i>	Species of Concern
Peregrine falcon	<i>Falco peregrinus anatum</i>	Species of Concern
American marten	<i>Martes americana origenes</i>	Sensitive

Species		Status
Bald eagle	<i>Haliaeetus leucocephalus</i>	Sensitive
Boreal owl	<i>Aegolius funereus</i>	Sensitive
Dwarf shrew	<i>Sorex nanus</i>	Sensitive
Ermine	<i>Mustela erminea muricus</i>	Sensitive
Long-tailed vole	<i>Microtus longicaudus</i>	Sensitive
Northern leopard frog	<i>Lithobates pipiens</i>	Sensitive
Southern red-backed vole	<i>Clethrionomys gapperi</i>	Sensitive
Spotted bat	<i>Euderma maculatum</i>	Sensitive
Water shrew	<i>Sorex palustris navigator</i>	Sensitive
Abert's squirrel	<i>Sciurus aberti</i>	Species of Interest
Black bear	<i>Ursus americanus</i>	Species of Interest
Dusky grouse	<i>Dendragapus obscurus</i>	Species of Interest
Bobcat	<i>Lynx rufus</i>	Species of Interest
Coyote	<i>Canis latrans</i>	Species of Interest
Elk	<i>Cervis elaphus nelsoni</i>	Species of Interest
Gray fox	<i>Urocyon cinereoargenteus</i>	Species of Interest
Merriam's Turkey	<i>Meleagris gallopavo merriami</i>	Species of Interest
Mountain lion	<i>Puma concolor</i>	Species of Interest
Mule deer	<i>Odocoileus hemionus</i>	Species of Interest

- Sensory Resources – Sensory resources include the aesthetic values of the parks including views, natural sounds, night skies, and overall “sense of place.” Geothermal exploration and development, and connected development (roads and utilities) could adversely affect these park resources and values. As per P.L. 113-291, the NPS is to undertake a feasibility study on the development of a trail along the rim of the caldera. Any effects to the overall sensory experience to park visitors on the caldera rim would be a concern.
- Public Access – Points of access to the parks as well as areas where no external points of access currently exist is of concern. Geothermal exploration and development, and connected development (roads and utilities) could have direct, indirect and cumulative impacts to park visitor and administrative access to the parks and create opportunities for expanding points of access.
- Cultural Landscapes – The Valles Caldera National Preserve contains cultural resources dating back to the archaic period and is an important site for studying this period. As Ancestral Pueblo populations moved into the Jemez Mountains uplands and developed large pueblos in the mesas surrounding the caldera, they continued to use the interior of the caldera in a manner similar to archaic populations. These features are part of a cultural landscape that extends into the analysis area on the SFNF. A cultural landscape embraces more than one of the property types defined in the National Historic Preservation Act: districts, buildings, structures, sites, and objects and includes resources such as traditional cultural properties and archeological sites that may not be eligible for inclusion in the National Register of Historic Places. Less than 25 percent of the Valles Caldera National Preserve has been surveyed for the presence of historic properties. It is likely that the boundaries of some archeological sites and traditional cultural properties extend across the boundary of the Valles Caldera National Preserve and into the analysis area.

Geothermal exploration and development, and connected development (roads and utilities) could have direct, indirect and cumulative impacts to the cultural landscape and specific features in the parks.

- Noxious Weeds – The parks actively manage to control and or eradicate classified noxious weeds as well as the spread of non-native invasive plants. Geothermal exploration and development, and connected development (roads and utilities), could provide a vector for the introduction of new noxious weeds or invasive plants into the parks.
- Soils and Water Resources - The parks are located within the same watershed as the SFNF. Geothermal exploration and development, and connected development (roads and utilities) could have direct, indirect and cumulative effects to soil and water resources at the landscape scale.
- Air Quality and Air Quality Related Values – The parks and the SFNF lie within the 5000-square mile Albuquerque-Mid Rio Grande Intrastate Air Quality Control Region (AQCR) 152 and smaller fire weather zone. Geothermal exploration and development, and connected development (roads and utilities) could have direct, indirect and cumulative effects to air quality and air quality related values.
- Socioeconomic Impacts – The parks lie within the socioeconomic impact analysis area. Geothermal exploration and development, and connected development (roads and utilities) could have direct, indirect and cumulative impacts to the shared socioeconomic impact area.
- Public Health and Safety – Geothermal exploration and development, and connected development (roads and utilities) could have direct, indirect and cumulative impacts to the health and safety of people accessing the parks (employees, visitors, contractors, volunteers, etc.) through increasing traffic, effects to access roads, and impacts to air quality.
- Greenhouse Gas Emissions and Climate Change – Geothermal exploration and development, and connected development (roads and utilities) could increase greenhouse gas emissions.
- Production operations include connected development such as roads and utilities. Utilities include transmission lines. Power generated by the geothermal development would need to be transmitted into the electric grid via transmission lines. Additional miles of transmission lines would increase wildland fire risk – the two most recent large fires in the Preserve (the 2011 Las Conchas Fire, and the 2013 Thompson Ridge Fire) were ignited by electric power lines after being hit by wind-blown falling trees. Transmission lines also detract from scenic values and the cultural landscape. Large-scale forest clearing for transmission lines results in habitat fragmentation, influencing wildlife distributions and movements. Mitigation could include putting all transmission lines underground.

We ask that impacts to these units of the National Park System be specifically evaluated in the EIS in a dedicated section that holistically evaluates the potential impacts on these nationally designated areas administered by the NPS. A fragmented analysis that does not directly address

impacts to national parks would make it difficult to understand the full implications of proposed development on these important national areas and their associated resources. Further, we recommend that the EIS give attention to any mitigation options necessary to avoid adverse impacts on these areas, and identify follow-up monitoring necessary to evaluate the efficacy of any mitigation measures. Including EIS sections dedicated to addressing impacts to special status areas is recommended in BLM Instruction Memorandum No. 2011-059 on National Environmental Policy Act Compliance for Utility-Scale Renewable Energy Right-of-Way Authorizations. While the EIS will address geothermal leasing, the USFS and Bureau of Land Management have the flexibility to include an analysis dedicated to park resources impacts, as requested by the NPS.

NPS provides special expertise with regards to the unique resources of national park units including cultural and historic resources, biological resources, water quality and quantity, scenic vistas, night skies, soundscapes, and air quality. Through its Organic Act, NPS is charged with protecting park resources for the enjoyment of future generations. As such, we request the opportunity to serve as a cooperating agency on this project.

We look forward to working with you in this important planning process. If you have questions, please contact Linda Dansby, Energy and Minerals Program Coordinator, at 505-988-6095, or by e-mail at [linda\\_dansby@nps.gov](mailto:linda_dansby@nps.gov). She will be working with other NPS technical experts in providing input to this process.



Melissa R. Trenchik

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