

# Environmental Assessment

## Drum Mountain Temperature Gradient Exploration Project



United States Department of the Interior  
Bureau of Land Management, Utah  
West Desert District  
Fillmore Field Office  
July 2010



# United States Department of the Interior Bureau of Land Management

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**Finding of No Significant Impact  
Environmental Assessment  
DOI-BLM-UT-W020-2009-028-EA**

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**July 2010**

## **Drum Mountain Temperature Gradient Exploration Project**

**Location:** The project area is located where the south end of Fish Springs Flat and the north end of Swasey Bottom, in Whirlwind Valley, come together. It is west of the Drum Mountains, north of Swasey Mountain, east of Sand Pass, and south of the Weiss Highway (Sand Pass) Road. Upper reaches of Fish Springs Wash are within the project area.

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**FINDING OF NO SIGNIFICANT IMPACT**  
**Environmental Assessment**  
***DOI-BLM-UT-W020-2009-028-EA***  
***Drum Mountain Temperature Gradient Exploration***

**INTRODUCTION:**

The Bureau of Land Management (BLM) has conducted an environmental analysis (DOI-BLM-UT-W020-2009-028-EA) for a proposed action to address temperature gradient drilling in the Swasey Bottom/Fish Springs Flat area in Juab County. The project would involve temperature gradient drilling at 18 drilling sites on BLM land and two drilling sites on SITLA sections. This would require 10 miles of access routes up to 10 feet wide with minimal blading as required to allow safe access with a drilling rig and supporting motored vehicles (pipe/water truck, fuel truck, and transportation for supporting, supervisory, and monitoring personnel). Well pad sites will have dimensions of approximately 40 feet by 60 feet each. The underlying need for the proposal would be met while accomplishing the following objectives (*this is derived from Section 1.4 of the EA Template under the Purpose for the Proposed Action*):

1. Authorize drilling of 18 temperature gradient holes (TGHs) on BLM-administered lands within the BLM Fillmore Field Office.
2. Authorize the construction of access routes on BLM-administered lands within the BLM Fillmore Field Office. One of these access routes will provide access to a proposed well pad in SITLA Section 16.

The project area for the Drum Mountain Temperature Gradient Exploration Project is located to the west of the Drum Mountains and to the north/northeast of Swasey Mountain. The main access is from the Weiss Highway (Sand Pass Road) to the north. The project area is within four geothermal leases held by Standard Steam. The total acreage for these four parcels is 15,216.46. EA#DOI-BLM-UT-W020-2009-028-EA is attached. A no action alternative and proposed action were analyzed in the EA.

**FINDING OF NO SIGNIFICANT IMPACT:**

Based upon a review of the EA and the supporting documents, I have determined that the project is not a major federal action and will not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general area. No environmental effects meet the definition of significance in context or intensity as defined in 40 CFR 1508.27 and do not exceed those effects described in the House Range RMP/FEIS. Therefore, an environmental impact statement is not needed.

This finding is based on the context and intensity of the project as described:

**Context:**

The project area is within the very southern end of the Fish Springs Flat, a largely uninhabited valley (basin) in the eastern portion of the basin and range province in western Utah of no international, national or regional importance. The eastern edge of the valley is currently impacted by a large strip mine that encompasses several hundred acres. The proposed action

would directly involve approximately 12 acres of BLM administered land and approximately 0.7 acres on two SITLA sections and would not conflict with context of the surroundings.

**Intensity:**

**The following have been considered in evaluating intensity for this proposal:**

**1. Impacts may be both beneficial and adverse.**

The proposed action would impact resources as described in the EA. Mitigating measures to reduce impacts to soil, water, and air resources, noxious weeds, Special Status Plant Species, vegetation, wildlife, and livestock grazing were incorporated in the design of the Proposed Action. Mitigating measures to eliminate impacts to cultural resources were incorporated in the design of the Proposed Action. None of the environmental effects discussed in detail in the EA and associated appendices are considered major.

**2. The degree to which the selected alternative will affect public health or safety.**

The proposed action is designed to maintain public health and safety. Conditions of Approval have been developed to protect public health and safety. The project area is a remote location with no permanent residences or structures. It is largely occupied by a few recreationists, range personnel working the sheep allotment between December and April, limited local traffic that remains on the Weiss Highway (Sand Pass Road), and infrequent visits by BLM personnel. The project will not be active between December and April. The project and its potential effects on the human environment are not highly uncertain and do not involve unique or unknown risks.

**3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farm lands, wetlands, wilderness, wild and scenic rivers, or ecologically critical areas.**

The historic and cultural resources of the area have been inventoried and potential impacts mitigated in the design of the proposed action. Proposed well pad DMX-05 and its corresponding one mile of access route were eliminated from temperature gradient testing in order to avoid crossing an area with lithic scatter.

**4. The degree to which the effects on the quality of the human environment are likely to be highly controversial.**

There is no scientific controversy over the nature of the impacts. The impacts of this type of operation are well known and easily identified. No public input has been received expressing concern about scientific controversy.

**5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.**

The proposed action is not unique or unusual. Environmental effects to the human environment are fully analyzed in Chapter 4 (Environmental Consequences) of the EA. The project area is remote and has limited and largely transitory use by human beings. There are no predicted effects on the human environment that are considered to be highly uncertain or involve unique or unknown risks.

**6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.**

The proposed action is to conduct exploration. Although the information derived from the project may lead to a proposal for the development of geothermal resources, approval of any development proposal will require additional NEPA analysis and decision. A decision to approve the exploration proposal does not set a precedent for any future development decisions.

**7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts – which include connected actions regardless of land ownership.**

Although there are other past and reasonably foreseeable actions which may be related to the proposed action, none are currently ripe for analysis. They were considered in the cumulative impact analysis section of the EA, and this project will be considered in the cumulative impact analysis of future EAs.

**8. The degree to which the action may adversely affect districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.**

The project will not adversely affect districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places, nor will it cause loss or destruction of significant scientific, cultural, or historical resources. A cultural inventory has been completed for the proposed action. Cultural resource sites were found during the cultural inventory. All known sites will be avoided. Avoidance included the elimination of one proposed well pad and its corresponding one mile of access route.

**9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973, or the degree to which the action may adversely affect: 1) a proposed to be listed endangered or threatened species or its habitat, or 2) a species on BLM's sensitive species list.**

Mitigating measures to reduce impacts to wildlife and fisheries have been incorporated into the design of the action alternatives. Although grasshopper sparrows, sage sparrows, and short-eared owls are considered to be highly likely to occur within the project area, surveys of nesting migratory birds and raptors will be completed as needed and all species of migratory birds and raptors that are found during the surveys will be protected with appropriate buffer zones. A survey for sand-loving buckwheat was completed within the project area. Several sand-loving buckwheat plants and populations were found during the survey. A new access route to well pad DMX-12 avoids a known population of sand-loving buckwheat. Known individual plants near DMX-21 on SITLA land will be avoided. There are known federally listed species under the ESA known to occur within or near the proposed action.

**10. Whether the action threatens a violation of a federal, state, local, or tribal law, regulation or policy imposed for the protection of the environment, where non-federal requirements are consistent with federal requirements.**

The project does not violate any known federal, state, local or tribal law or requirement imposed for the protection of the environment. Scoping letters were sent to officials of Juab and Millard Counties, the mayors of Delta and Hinckley, Fish Springs National Wildlife Refuge, Utah Division of Oil, Gas and Mining, and the permittee of the Swasey Knoll Grazing Allotment. Furthermore, letters were sent to all eight (8) Native American tribal organizations in Utah concerning consulting party status, and there was no response from any of the tribes. Follow up phone calls were initiated with the tribes, and it was concluded and documented that the Tribes chose not to submit any comments. In addition, the project is consistent with applicable land management plans, policies, and programs.

Randy Bechtel  
Field Manager  
Fillmore Field Office

7/21/10  
Date

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## **APPENDICES**

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**ACRONYMS****Full Phrase**

<b>ACRONYMS</b>	<b>Full Phrase</b>
AML	Appropriate Management Level
APE	Area of Potential Effect
AUM	Animal Unit Month
BLM	Bureau of Land Management
BMP	Best Management Practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
dB	decibel
dBA	A-weighted decibel
DNL	day-night average noise level
DOI	Department of the Interior
EA	environmental assessment
EDRR	Early Detection Rapid Response
EMPSi	Environmental Management and Planning Solutions, Inc.
ESA	Endangered Species Act
°F	degrees Fahrenheit
FLPMA	Federal Land Policy and Management Act of 1976
HMA	Herd Management Area
KGRA	Known Geothermal Resource Area
LLC	Limited Liability Corporation
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NOI	notice of intent
NRHP	National Register of Historic Places
OP	Operations Plan
PEIS	programmatic environmental impact statement
RMP	resource management plan
ROW	right-of-way
TGH	temperature gradient holes
US	United States
USC	United States Code
USGS	US Geological Survey
USFWS	US Fish and Wildlife Service
VRM	Visual Resource Management
WSA	Wilderness Study Area

# CHAPTER I

## PURPOSE OF AND NEED FOR ACTION

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### I.1 INTRODUCTION

This Environmental Assessment (EA) has been prepared by the Fillmore Field Office of the United States (US) Department of the Interior (DOI), Bureau of Land Management (BLM) for a proposal to drill 18 temperature gradient holes (TGHs), construct up to 10 miles of new access routes, and utilize these new and existing access routes on BLM-administered lands in the Fillmore Field Office just south of Fish Springs Flat in Juab County, Utah. This EA documents the site-specific environmental analysis from implementing the proposed action or from taking no action (termed the “no action alternative”).

In this EA, the BLM analyzes potential impacts from authorizing geothermal exploration activities that are proposed by Standard Steam Trust, LLC (Standard Steam, applicant) within an area directly south of Fish Springs Flat. Standard Steam submitted a Notice of Intent (NOI) to Conduct Geothermal Resource Exploration Operations to the BLM in April, 2009, and a revised NOI on June 23, 2009, notifying the BLM of Standard Steam’s intent to drill 20 TGHs (Temperature Gradient Holes) (18 on BLM-administered lands and 2 on Utah state lands) and to construct access routes to these holes. While BLM authorization is only required for the 18 holes on BLM-administered lands, the 2 holes on state lands are considered a connected action and are therefore also analyzed in this EA. Additionally, access to one of the holes on state lands requires new access route construction on BLM lands and thus the BLM approval for that access route is required to make that drill hole possible.

The access routes on BLM-administered lands would be “non-constructed roads and routes” as defined and described in BLM’s Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (Bureau of Land Management 2007a).

Full details on the proposed activities are discussed in Section 2.2, Proposed Action.

This EA was prepared in accordance with BLM geothermal regulations (43 Code of Federal Regulations [CFR] 3200 et. seq.); the Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) (40 CFR 1500 et. seq.); and BLM guidance on implementing NEPA, including the BLM NEPA Handbook H-1790-1 (Bureau of Land Management 2008). This EA was prepared with the assistance of Environmental Management and Planning Solutions, Inc. (EMPSi) using information gathered from the BLM, other federal, state, and local agencies, Standard Steam, and publicly available literature.

## **I.2 BACKGROUND**

Standard Steam holds geothermal leases for the lands covered in this EA (geothermal lease numbers UTU-86778, 86779, 86780, and 86781). There are four stages of geothermal resource development: 1) exploration, 2) drilling and operations, 3) utilization, and 4) reclamation and abandonment subject to the terms and conditions of the leases. Each stage requires an authorization from the BLM. This EA addresses Standard Steam's notice of intent for the drilling of TGHs and will serve as a decision-making tool as the Fillmore Field Office considers issuance of a geothermal drilling permit.

## **I.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION**

The purpose and need is for the BLM to respond to the plans and programs submitted by renewable energy project proponents and either approve, require modification, or deny these applications, under the terms of the Geothermal Steam Act and its implementing regulations (as amended and supplemented by the NEPA),

US DOI's policy, consistent with Section 2 of the Mining and Mineral Policy Act and Sections 102(a)(7), (8), and (12) of FLPMA, is to encourage the development of mineral resources, including geothermal resources, on federally-managed lands. The Secretary of the Interior has the authority and responsibility to promote renewable resource development, including geothermal exploration and leasing of the federal mineral estate for geothermal resources. The Secretary of the Interior has delegated this responsibility to the BLM.

Regulatory constraints guided by the National Energy Policy Act of 2005, the BLM's implementation strategy titled *BLM Implementation of the National Energy Policy*, federal policies that encourage the use of alternative and renewable energy, and federal laws and statutes that direct the federal government to foster and encourage private enterprise to develop alternative energy resources, within appropriate environmental constraints, include as follows:

- Geothermal Steam Act of 1970 (amended and supplemented by the National Energy Policy Act of 2005);

- Mining and Mineral Policy Act of 1970;
- Federal Land Policy and Management Act of 1976 (FLPMA); and
- National Materials and Mineral Policy, Research, and Development Act of 1980.

The goals and objectives of the proposed action are to authorize drilling of 19 TGHs and the construction of access routes on BLM-administered lands within the BLM Fillmore Field Office. The TGHs would help Standard Steam identify areas with the greatest likelihood of containing economically viable geothermal resources within the project area and help Standard Steam decide whether to conduct future exploratory drilling and determine drilling locations.

#### **I.4 DECISION TO BE MADE**

Based on the findings of this EA, the BLM would issue a decision on whether or not to issue a geothermal drilling permit to Standard Steam to drill 18 TGHs on BLM-administered lands within an area just south of Fish Springs Flat, and construct new access routes to those drill sites where existing routes do not exist. Standard Steam also plans to drill two TGHs on adjacent state lands and is seeking BLM approval to construct an access route to one of these additional wells. (One of the drill sites, DMX-21, lies adjacent to an existing access route and a new access route is not needed). Standard Steam would be required to obtain all necessary permits from other agencies including the Utah Department of Natural Resources and the Division of Water Rights to construct the TGHs on state land. In coordination with State regulatory agencies, Standard Steam would comply with all applicable state and Federal rules and regulations.

#### **I.5 CONFORMANCE WITH BLM LAND USE PLAN**

Issuance of the authorized NOI to Conduct Geothermal Resource Exploration Operations would be in conformance with the House Range Resource Area Resource Management Plan (RMP). The *Minerals Resources* section of the RMP states that the area in and around Drum Mountain is considered to have moderate geothermal potential. The proposed action is consistent with the goals of the mineral program in the RMP, which are stated as (1) to provide for exploration, development, and use of minerals on public land consistent with applicable laws and regulations; and (2) to require the least restrictive stipulations necessary to adequately protect other resources (Bureau of Land Management 1987; page 75).

Due to a legislative barrier, the RMP was not amended by the Geothermal Programmatic Environmental Impact Statement (PEIS) (Bureau of Land Management and US Forest Service 2008) but was covered in the area of analysis. This EA incorporates the PEIS by reference, which analyzed the impacts of the exploratory phase of development. The PEIS is kept on file at the BLM Fillmore Field Office, 35 East 500 North, Fillmore, Utah 84631.

## **I.6 RELATIONSHIP TO STATUTES, REGULATIONS, AND OTHER PLANS**

The FLMPA encourages mineral development on BLM-administered lands. Geothermal resources development is guided by the Geothermal Steam Act, as amended and supplemented by the National Energy Policy Act of 2005. These and other applicable federal, state, and local laws, regulations, policies, and plans are described below.

### **I.6.1 Geothermal Steam Act and Implementing Regulations**

The Geothermal Steam Act of 1970 (30 USC 1001-1025) gives the Secretary of the Interior the responsibility and the authority to manage geothermal operations on lands leased for geothermal resource development. The Secretary of the Interior has delegated this authority to the BLM. Pursuant to the regulations adopted to implement applicable portions of the Geothermal Steam Act (43 CFR 3261.20), the BLM will review the drilling and completion programs submitted by a federal geothermal lessee and will approve the programs if they comply with the Geothermal Steam Act, the regulations adopted pursuant to the Act (43 CFR 3200 et seq.), other directives issued by the BLM (e.g., Geothermal Resource Operational Orders, Notices to Lessees), any stipulations applicable to the federal geothermal leases, and any other applicable laws and regulations. All operations conducted on the geothermal lease by the geothermal lessee are subject to the approval of the BLM under the Geothermal Steam Act. The BLM must also comply with the requirements of NEPA prior to approving the exploration permit, Operations Plan (OP), and geothermal drilling permits.

### **I.6.2 National Energy Policy Act of 2005**

The National Energy Policy Act of 2005 encourages the leasing and development of geothermal resources on federal lands. Section 211 of the Act provides a 10-year goal for the Secretary of the Interior to seek approval of non-hydropower renewable energy projects located on federal lands with a generation capacity of at least 10,000 megawatts of electricity, including electricity from geothermal resources.

### **I.6.3 Executive Order 13212**

On May 18, 2001, the President signed Executive Order 13212, *Actions to Expedite Energy-Related Projects*, which states that “the increased production and transmission of energy in a safe and environmentally sound manner is essential.” Executive departments and agencies are directed to “take appropriate actions, to the extent consistent with applicable law, to expedite projects that will increase the production, transmission, or conservation of energy.” Executive Order 13212 further states that, “For energy-related projects, agencies shall expedite their review of permits or take other actions as necessary to accelerate the completion of such projects, while maintaining safety, public health, and environmental protections. The agencies shall take such actions to the extent permitted by law and regulation and where appropriate.”

**1.6.4 Secretarial Order 3283**

This Order facilitates the DOI's efforts to achieve the goal Congress established in Section 211 of the Energy Policy Act of 2005, which is to approve non-hydropower renewable energy projects on the public lands with a generation capacity of at least 10,000 megawatts of electricity by 2015. It also authorizes the BLM to establish coordination offices to expedite the permitting of biomass, wind, solar, and geothermal projects, along with needed electrical transmission facilities on BLM-administered lands.

**1.6.5 Climate Change Policy**

In 2002, the federal government released the Global Climate Change Initiative and Policy Book that outlines a comprehensive plan to address climate change. The plan includes a goal to reduce the greenhouse gas intensity of the US economy by 18 percent over the 10-year period from 2002 to 2012 and to provide initiatives to reduce greenhouse gas emissions, including encouraging renewable energy resources development (US Global Change Research Program 2002).

**1.6.6 Other Plans**

The project is located in Juab County, Utah. Juab County manages its lands under the Juab County Land Use Code, revised in 2007. The County Plan identifies the project area as BLM Land; therefore, the proposed action is consistent with the Juab County Land Use Code (Juab County 2007).

**1.6.7 Section 7 of the Endangered Species Act**

The Endangered Species Act of 1973 (ESA) was signed on December 28, 1973, and provides for the conservation of species that are endangered or threatened throughout all or a significant portion of their range, and the conservation of the ecosystems on which they depend.

Under Section 7(a)(2) of the ESA, federal agencies must consult with the US Fish and Wildlife Service on activities that may affect a listed species.

**1.6.8 Section 106 of the National Historic Preservation Act**

Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires federal agencies to take into account the effects of their undertakings on historic properties and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. The historic preservation review process mandated by Section 106 is outlined in regulations issued by the Advisory Council on Historic Preservation. Revised regulations, *Protection of Historic Properties* (36 CFR Part 800), became effective January 11, 2001.

# CHAPTER 2

## DESCRIPTION OF ALTERNATIVES

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### 2.1 INTRODUCTION

This chapter provides the details of the proposed action and no action alternative.

### 2.2 PROPOSED ACTION

Standard Steam proposes the drilling of 18 TGHs and the construction of access routes on BLM-administered lands covered by federal geothermal lease numbers UTU-86778, 86779, 86780, and 86781. The project is located just south of Fish Springs Flat in Juab County, Utah (Figures 2-1 and 2-2).

No right-of-way grants would be required since construction of access routes would be authorized under an approved NOI. ROW routes to two holes that would be located on State of Utah Leases would also be constructed. These would be permitted separately with the state of Utah; however, construction of the access routes is evaluated in this EA. The following sections describe the proposed activities that would be covered by approval of the NOI.

For the purpose of this document, the project area is defined as both the BLM and State of Utah lands within the area bound by the existing county roads shown in Figure 2-2.

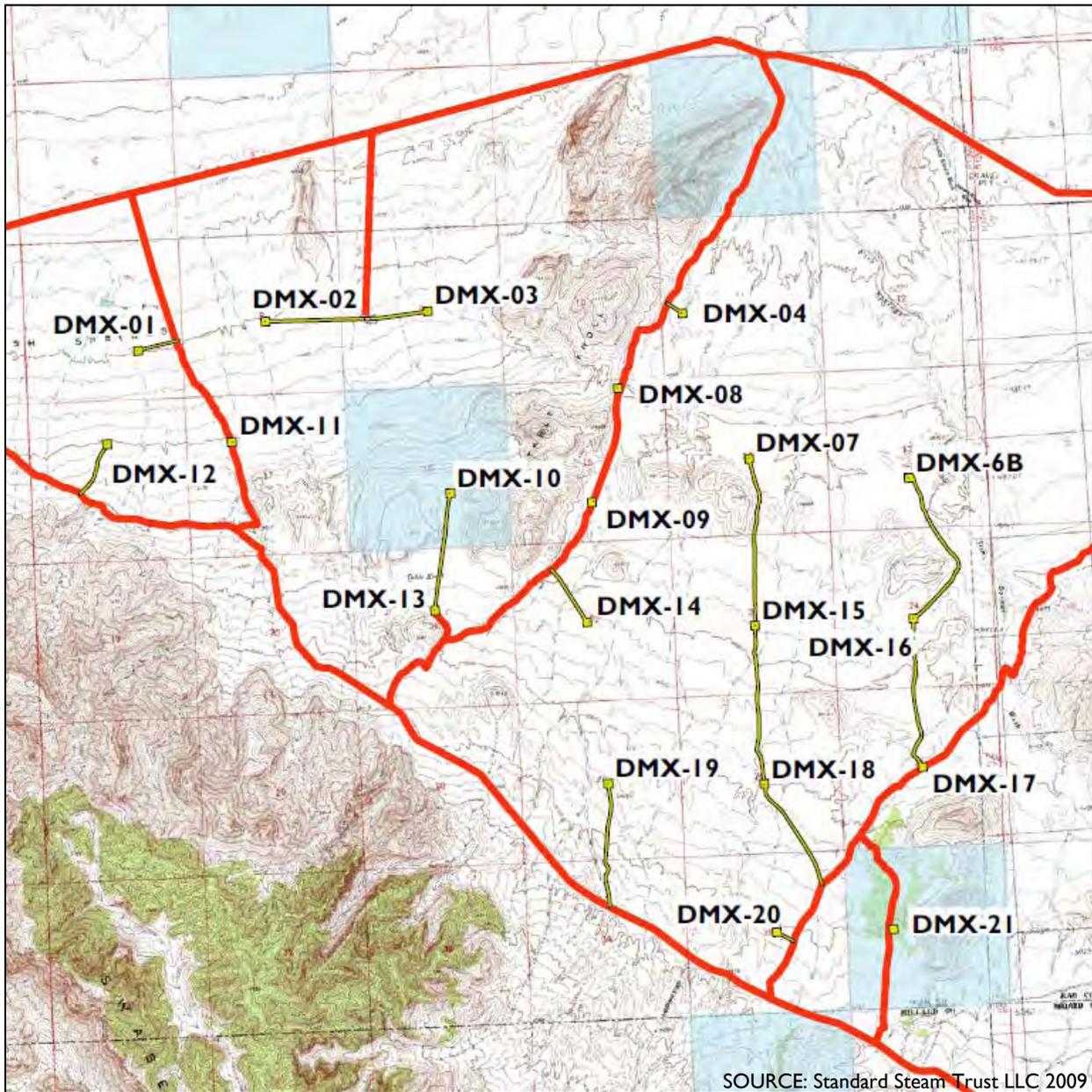


SOURCE: Standard Steam Trust LLC 2009



*Project Location*

Figure 2-1



Eighteen of the TGHs would be drilled on BLM-administered lands and two would be drilled on State of Utah (SITLA) lands.



-  Proposed drill pad location
-  Existing roadway
-  Proposed new roadway
-  SITLA lands

### Project Overview Juab County, Utah

Figure 2-2

### 2.2.1 Drill Pad and Access Route Construction

The project area and lands covered by lease numbers UTU-86778, 86779, 86780, and 86781 can be accessed by traveling northeast on paved Highway 6 out of Delta, Utah for about 11 miles, proceeding west on Brush Wellman Road, which eventually turns into an unpaved road, and then continuing onto unpaved Sand Pass Road (Weiss Highway). Access from Sand Pass Road to the drill pad sites would require construction of new, short access routes, as shown in Figure 2-2.

Construction of new access routes, as necessary to traverse the land, would occur along the routes shown in Figure 2-2 immediately prior to the construction of each drill site. Overland travel, without access route construction, would be used wherever topography allows. For those areas that require blading, access routes would be constructed at a width of no more than 10 feet. Road maintenance will retain the drainage of the road (e.g. road gradient, in slope or out slope gradient, existing drainage structures) where appropriate, to avoid erosion or the creation of a muddy, braided road. Assuming all 10 miles of new access routes would involve a 10 foot wide disturbance; this would result in a maximum disturbance scenario of 12 acres for the entire project. Access routes for 18 of the drill sites would be entirely on BLM-administered lands. Portions of the access routes to the two drill sites on state lands would be on those state lands.

Standard Steam would coordinate with Millard and Juab Counties about access on county maintained roads. Figure 2-2 shows the surface ownership (land status) of the project area. No upgrades of existing roads would be required.

As shown in Figure 2-2, many of the drill sites would be accessed via the same access route. This configuration allows for a sequential approach to constructing the access routes and drill sites. This sequential approach would require staging areas to be set up on completed drill sites while the access route and the next drill site are being constructed.

Twenty drill pads (18 on BLM-administered lands) would be constructed to support the drilling equipment and supplies. The drill pads would each be approximately 40 feet by 60 feet, which would be of sufficient size to safely accommodate the truck-mounted drill rig, support vehicles, and supplies. Each drill pad would be oriented with its long axis parallel to the natural slope of the site to minimize cut and fill requirements. Construction of the drill pads would involve clearing vegetation, side casting topsoil for reclamation, and constructing a sump pit for the settling out of drill cuttings and collection of any water encountered during drilling.

Sumps would be dug when access routes are established and would be backfilled on completion of the drilling prior to the drill rig being moved to the next site. This approach would ensure that there would only be one sump open at a time.

Access route and pad construction would be performed by a dozer of D-6 equivalence and/or a small rubber tire backhoe. Construction of the drill pads and sumps would take place sequentially and would take approximately 1 to 2 hours per pad. Drill pads would not be fenced. The 20 proposed drill pads would result in approximately 1.1 acres of new surface disturbance on BLM-administered lands and 0.1 acre of new disturbance on state lands. The total acres of new surface disturbance from drill pad and access route construction would be approximately 13 acres.

An environmental monitor will work with the heavy equipment operator during the construction of the access routes.

### **2.2.2 Drill Pad Facilities and Equipment**

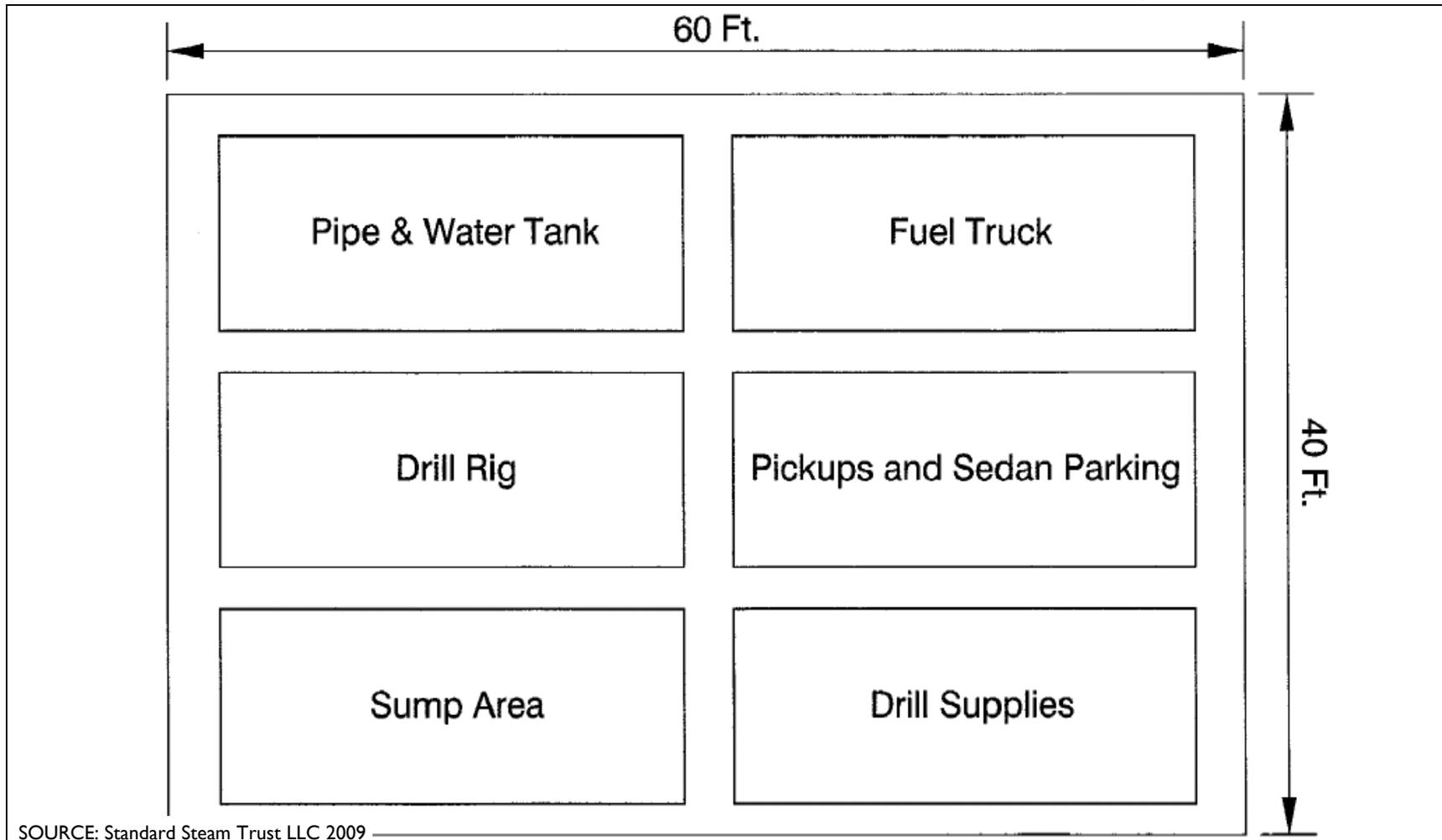
Once access to a drill pad is completed, a sump pit would be constructed on each pad for containing and temporarily storing drill cuttings and any excess mud during drilling operations. Sump pits would be dug by a rubber tire backhoe and would be within the drill pad footprints. Each sump pit would be approximately 4 to 6 feet wide, 8 to 10 feet long, and 5 to 10 feet deep. The pits would be unlined to allow water from the wells to percolate back through the soil. Figure 2-3 details the proposed drill pad layout with the location of its facilities. Figure 2-4 shows a photograph of a sump pit at another project site.

### **2.2.3 Drilling**

For any particular drill pad, drilling would commence once a sump has been dug and the truck-mounted drill rig has been brought on site (Figure 2-5). Drill rigs would be self-contained units and would not need on-site assembly. The drill rig is 13.5 feet tall with the mast down and 29.5 feet tall with the mast up. The center rail on the mast can extend an additional 18 feet as the top head is raised and lowered.

Drilling would occur 12 to 14 hours a day, up to 7 days a week. Only one truck-mounted drill rig would be at the project site, so only one well would be drilled at a time. Drilling, logging, plugging, and abandoning each hole is expected to take a total of 3 to 5 days. Drilling and logging all 20 holes, which includes the 2 holes on state lands, is estimated to take anywhere from 60 to 100 days. It is estimated that a full-time staff of up to four personnel would perform drilling. This team is expected to consist of one driller, two helpers, and one geologist. This team would perform additional roles such as operating a water/pipe truck and a fuel truck.

An estimated five vehicles per day would be used to support drilling operations. These vehicles would consist of the truck-mounted drill rig, a water/pipe truck to carry drill steel that also has large built-in water tanks, a fuel truck, and two pickup trucks. A back hoe would also be on site to dig the drill sumps and reclaim each site after completion of each TGH. Drilling staff would commute daily from the town of Delta. If make-up water is necessary for drilling purposes, Standard Steam would access water from a nearby BLM well.



*Typical 60' x 40' Drill Pad Site Layout*

Figure 2-3



Photo taken from TGH drilling operations in Idaho.

SOURCE: Standard Steam Trust LLC 2009

**Typical Temperature Gradient Hole Drill Site**  
Truck-mounted drill rig, pipe truck, pick-up truck

**Figure 2-5**



*Each sump pit would be approximately 4 to 6 feet wide, 8 to 10 feet long, and 5 to 10 feet deep. Only water with no additives would be used for drilling fluids. Water would be allowed to percolate back into the ground. Sump pits would be backfilled with soil and recontoured at the surface upon completion of drilling.*

SOURCE: Standard Steam Trust LLC 2009

***Typical Sump Pit***  
Used for disposal of drilling muds

**Figure 2-4**

The water truck has a capacity of 2,200 gallons. Standard Steam estimates that at least one truckload of water would be required for each well. The BLM has identified the following three potential water sources for the project:

- The Swasey Standpipe, located on the border of the Tatow, Little Drum and Antelope grazing allotments;
- The Swasey Well, located on the Swasey Knoll allotment; and
- Well 22, located to the east of the project area, which services the Swasey Knoll, Spor Mountain and Lady Laird allotments.

The BLM is providing Standard Steam with the option of using any of the three identified water sources above in case of unforeseen circumstances that should render any of the sources unsuitable.

TGHs would be approximately 8 inches in diameter at the surface and would narrow with depth to a diameter of 6 inches (Figure 2-6). Eighteen of the wells would be drilled up to 500 feet, and one of the wells would be drilled up to 1,000 feet. The TGHs would each be cased to a depth of approximately 40 feet and would be open hole beyond that point. Ground conditions may necessitate casing to greater depths and would be determined on a site-by-site basis. Monitoring groundwater temperature has been proposed so that once a hole reaches 100 degrees Fahrenheit (°F), further drilling operations would be halted. Since water does not flash to steam until 212 degrees Fahrenheit, 100 degrees Fahrenheit is well below the flash point, ensuring safe drilling operations.

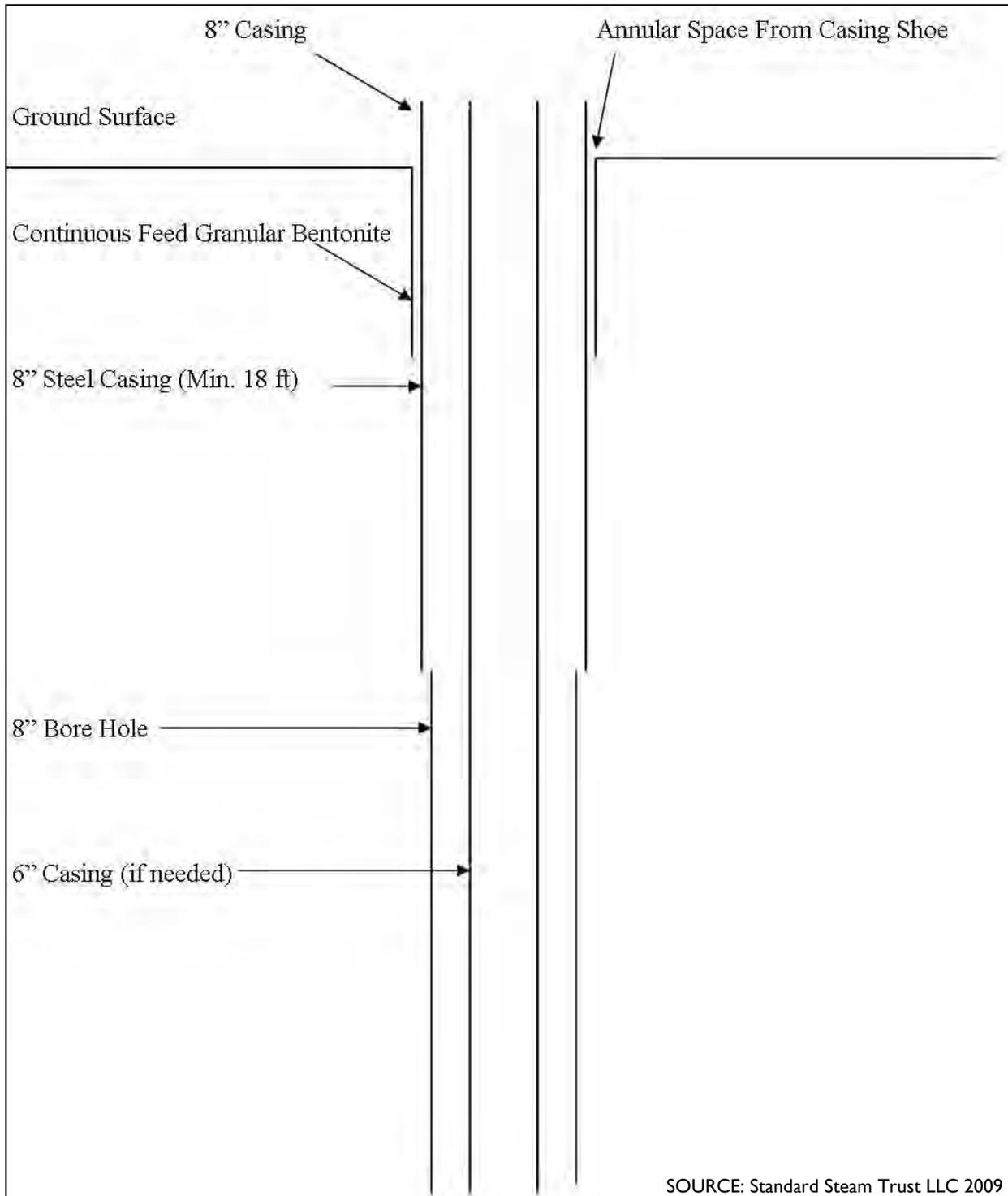
Drilling operations would involve the use of drilling additives such as mud, air, and foam. Specifically, Standard Steam proposes to use EnviroPlug, a non-hazardous drilling fluid additive that is primarily comprised of bentonite clay and a non-hazardous foaming agent. EnviroPlug is a common drilling additive for water wells, oil and gas wells, and geothermal wells. Standard Steam provided the Material Safety Data Sheet for EnviroPlug to the BLM along with the Notice of Intent.

#### **2.2.4 Design Features**

Standard Steam would comply with all state and federal requirements and with all lease stipulations attached to lease Nos. UTU-86778, 86779, 86780, and 86781. As required by 43 CFR 3261.18, the lessee must post a bond with BLM before drilling operations begin.

Standard will take the following measures to prevent unnecessary and undue degradation of the resources.

- Adherence to proposed activities in the NOI.



SOURCE: Standard Steam Trust LLC 2009

The TGHs will each be cased to a design depth of approximately 40 feet and will be open hole beyond that point.

**Proposed Drilling Schematic**

- Educating employees and contractors about safe and environmentally responsible worker practices
- Following any special guidance/stipulations recommended by agency (BLM) officials.
- Performing prompt reclamation/closure activities described in this Notice.

These stipulations are recommended by BLM officials and would be formally be adopted as conditions of approval as part of the approved NOI:

- Only disturb the minimum amount of ground necessary to carry out proposed temperature gradient testing.
  - Prior to ground disturbance, conduct a burrowing owl survey, per “Best Management Practices for Raptors and Their Associated Habitats in Utah” (Bureau of Land Management 2006).
  - Use overland travel to the maximum extent practicable, where topography and vegetation allow, minimizing the amount of blading and thereby minimizing fugitive dust emissions. For those areas that require blading, access routes would be constructed at a width of no more than 10 feet.
  - Use existing roads and routes for travel to the maximum extent feasible. At the Authorized Officer’s discretion, access may be prohibited during wet road conditions, or Standard Steam may be required to repair any ruts deeper than four inches remaining on the roads as a result of the project.
  - Avoid/minimize impacts to all burrows and drainages as much as practical to conduct operations. Roads constructed across drainages/washes must be constructed as perpendicular as possible to the channel such that the drainage is not compromised to the point that it would cause excess soil erosion.
  - Do not engage in any conduct or activity that allows a “take” (i.e. harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect) of any wildlife. Any “take” or wildlife problems are to be reported to the BLM. All wildlife is to be appreciated and given their space to carry out their biological/ecological activities.
  - Avoid/minimize any undue impacts to wildlife habitat that will degrade or reduce the function and availability of food, cover, water and space. If habitat is degraded by activities, inform the BLM so that possible mitigation measures can be developed to rehabilitate the site.
  - Conduct migratory bird and raptor surveys prior to any ground disturbance. The migratory bird surveys would be conducted

between March 15 and July 15 and no earlier than 72 hours prior to any activities. If nesting migratory birds are discovered, a 200-foot no-activity buffer will be established around the nest and will remain in place until the young have fledged or the nest has failed.

- Conduct nesting raptor surveys within 0.5 miles of any ground disturbance. If a nest is identified, a 0.5-mile no-activity spatial and temporal buffer would be established around the nest and would remain in effect until (a) the young have vacated the nest, or (b) the nest, through systematic monitoring, is suspected to have failed or has been abandoned and is no longer active. If after monitoring the nest is suspected to be non-active, a monitoring report would be submitted to the BLM biologist to make a final determination of nest status prior to any activities occurring. If at any time the nest becomes active during operations, the 0.5 mile buffer would be established. The guidelines to be followed are *BLM Best Management Practices for Raptors and their Associated Habitat in Utah 2006* and *Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances* (US Fish and Wildlife Service 2002).
- Conduct surveys for grasshopper sparrow nests, and sage sparrow nests prior to ground disturbing activities and limit development to 200 feet away from any active nests. Provide written notice of the results of these surveys to the BLM biological monitor.
- Conduct surveys for short-eared owls prior to ground disturbance for activities planned to occur during the nesting period of March 1 through August 1. If short-eared owls are nesting within 0.25 mile from a well or new access route, construction and drilling activities may not take place during this time period.
- Avoid harming the three Sand-loving buckwheat (*Eriogonum nummulare* var. *ammophilum*) plants that occur on site DMX-21.
- If fugitive dust begins to become an issue as identified by a BLM representative, the authorized officer may require the proponent to water the road surface during periods of high wind or use by heavy equipment.
- Perform biological monitoring for construction activities (road/access and sumps digging) that occur during the migratory bird nesting season (March 15-July 15). At least 72 hours prior to construction related activity that occurs within the migratory bird nesting season, employ a biological monitor to walk and clear the access/construction routes and drill sites. The biological monitor will be a qualified wildlife biologist with experience in conducting migratory bird surveys for construction projects. The biological monitor will have the latitude to halt and direct construction activities to avoid/minimize impacts to nesting birds. This biological monitor will be present until all access, drill site and sump

construction is complete. Reclamation (sump backfill and site/access grading) of these disturbances will occur only on disturbed ground so that no additional clearance should be necessary.

- Forge a Water Use Agreement with the Fillmore Field Office for use of water from one of the three wells identified in the project area. On a day-to-day basis, give first priority of use of these wells to the sheep operators who use them from November through April every year. Standard Steam shall pay the BLM a nominal charge based on the volume of water used. Standard Steam shall keep track of the volumes used.
- Develop a Spill Prevention and Response Plan identifying appropriate spill response actions, a procedure for ensuring that the spill response kits are adequately stocked at all times, and procedures for making timely notifications to authorities.
- During the autumn after temperature gradient exploration is finished, re-vegetate areas of ground disturbance with the seed mix specified in Table 2-1 unless notified of a different mix by the Authorized Officer. Soils shall be raked over the seeds after they are applied to the ground.
- Develop a fire management strategy to implement measures to minimize the potential for a human-caused fire.
- Commence reclamation after each hole is drilled.
- Plugged and abandon all drill holes following drilling and temperature testing.
- Remove all trash connected with this operation and dispose of it properly at an appropriate disposal site.
- Road maintenance will retain the drainage of the road (e.g. road gradient, in slope or out slope gradient, existing drainage structures) where appropriate, to avoid erosion or the creation of a muddy, braided road.
- In coordination with State regulatory agencies, comply with all applicable State and Federal rules and regulations.

If new extraordinary circumstances (i.e. federal species listings, new information) or other direct and indirect impacts are identified or become apparent during the exploration activities, timeframes and levels of activity may need to be reviewed and possibly adjusted accordingly.

Through preliminary analysis, it has been determined that the originally proposed well pad DMX-5 from the NOI must be eliminated from project plans to avoid impacts to cultural resources and draws, and well pad DMX-6 must be

relocated to the location denoted in Figure 2-2 as DMX-6B. Some originally proposed access routes have also been modified to avoid cultural resources and Standard Steam shall follow the new routes as identified in Figure 2-2. An alternate route to well pad DMX-12 would be used. It avoids the crossing of several ephemeral draws and a population of sand-loving buckwheat plants. A quarter mile of the access route to well pad DMX-16 has also been re-routed to avoid a double crossing of a draw. All other proposed well sites and access routes are shown in Figure 2-2.

### 2.2.5 Reclamation

Reclamation would commence after each hole is drilled. Sumps would be backfilled with fill material, contoured to match the surrounding area and covered with available topsoil. All new disturbances would be graded and/or scarified and reseeded using the re-vegetation seed mix outlined in Table 2-1, if approved by the Authorized Officer. This reseeding would take place in the autumn following completion of the grading activities. The equipment used for grading and/or scarifying the land would be the same that is proposed for construction activities (D-6 or rubber tire backhoe). Seeding would be done by hand, using a whirlybird or broadcast seeder. Soil would be raked over the seeds after they are applied to the ground.

**Table 2-1**  
**Seed Mix to be used During Reclamation of**  
**Disturbed Lands**

Species	Pounds/Acre Pure Live Seed
Indian ricegrass, variety Nezpar	4.00
Bluebunch (Snake River) wheatgrass, variety Secar	3.00
Siberian wheatgrass, variety Vavilov	2.00
Crested wheatgrass, variety Hycrest	2.00
Russian wildrye, variety Bozoisky	2.00
Shadscale (saltbush)	1.00
Forage Kochsa – variety Immigrant	1.00
Gooseberry-leaf globemallow	0.50
Sand dropseed	0.50
<i>Total</i>	<i>16.00 pounds/acre Pure Live Seed</i>

This proposed seed mix is intended for late summer to fall seeding. Prior to reclamation the BLM would confirm or revise this specific seed mix and application rate depending on the method of application. The recommended seed mix is based on application with mechanical farming drilling equipment. A heavier application is required if applied by hand, or other method that does not drill or scarify the soil as seed is applied.

The BLM would determine how long Standard Steam would have to complete reclamation after drilling activities are complete. This timeframe would take into seasonal and weather restrictions into consideration and would be included as a condition of approval of the NOI.

### **2.3 ALTERNATIVES TO THE PROPOSED ACTION**

Alternatives to the proposed action must be considered and assessed whenever there are unresolved conflicts involving alternative uses of available resources (BLM NEPA Handbook H-1790-1, page 49 [Bureau of Land Management 2008]). Applicable design features have been incorporated into the proposed action to avoid and minimize disturbance to resources present within the proposed project area. There have been no other alternatives suggested that would meet the purpose and need for the proposed action while altering the impact on the resources identified. Due to this, the Environmental Analysis only focuses on the proposed action and no action alternative.

### **2.4 NO ACTION ALTERNATIVE**

The No Action alternative is considered and analyzed to provide a baseline for comparison of the impacts of the proposed action. The no action alternative would be for the BLM to not approve the proposed geothermal NOI. Under the no action alternative, Standard Steam would not be allowed to drill TGHs on BLM-administered lands. Standard Steam would retain the right to drill TGHs on the adjacent state lands, subject to appropriate state permits and BLM access. The BLM is obligated to grant access to state lands under *State of Utah v. Andrus*; therefore, the no action alternative includes the construction of the access routes to the two wells on state lands. Implementing the no action alternative would not meet the stated purpose of, and need for, the project.

# CHAPTER 3

## AFFECTED ENVIRONMENT

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### 3.1 INTRODUCTION

The purpose of this chapter is to describe the existing or affected environment, including conditions and trends that could be affected by the Proposed Action described in Chapter 2. The affected environment also sets the foundation for understanding the environmental consequences discussed in Chapter 4.

The affected environment was considered and analyzed by an interdisciplinary team as documented in the Interdisciplinary Team Checklist, included as Appendix A. The checklist indicates which resources of concern are either not present in the project area or would not be impacted to a degree that requires detailed analysis. Resources which could be impacted to a level requiring further analysis are described in Chapter 3 and impacts on these resources are analyzed in Chapter 4 below.

### 3.2 CLIMATE AND AIR QUALITY

The principal climatic features of the area of interest are sunshine, low annual precipitation (averaging 8 inches per year), clean dry air, and average daily temperature fluctuations. Average daily maximum temperatures in Fish Springs Basin range from 39.6°F in January to 95.5°F in July. Average daily minimum temperatures range from 18°F in January to 64.5°F in July (Western Regional Climate Center 2009). The closest weather monitoring station is in Fish Springs Refuge approximately 17 miles north from the project area.

Juab County is designated as being either unclassified or in attainment for all federal and state criteria air pollutants (US Environmental Protection Agency 2009). There are non-attainment areas to the northwest of the proposed project area. While predominant weather patterns lead to these areas being down wind it has been determined that due to distance and dissipation they are not within the area of analysis for any of the alternatives.

### 3.3 GEOLOGIC RESOURCES

The project area is located within the southern edge of Fish Springs Flat, a down faulted sediment-filled valley, between four mountain ranges: the Fish Spring Range to the northwest, the Thomas Range to the northeast, the Drum Mountains to the southeast, and Swasey Mountain in the House Range to the southwest (see Figure 2-1). Within the project area there is a series of three knolls, collectively called Table Knoll, that rise above the valley floor to about 400 feet. These knolls run through a portion of the project area in a north south trend. The valley is bordered on the north by the Great Salt Lake Desert and on the south by Whirlwind Valley. The valley floor has little relief except for a few small hills of Tertiary volcanic rocks and Paleozoic sedimentary rocks along the eastern and southern margins (Oviatt 1991a).

Surficial deposits that dominate the area consist of alluvial fans, alluvium of ephemeral streams that drain the surrounding mountains, and lacustrine deposits of Lake Bonneville. Eolian sand dunes are locally important and alluvial or playa mud covers the lower parts of the valley at the north end. A prominent late-Holocene fault scarp parallels the front of the Fish Springs Range on the west side of the valley and older pediments have developed along the flank of the Thomas Range on the east (Oviatt 1991a).

The Fish Springs Flat is located within the Basin and Range geological province of western Utah. This province is characterized by steep, elongated mountain ranges alternating with long expanses of flat, dry desert, and extends from eastern California to central Utah, and from southern Idaho into the Mexican State of Sonora. Within the Basin and Range province, the earth's crust and upper mantle have been stretched up to 100 percent of their original width. The entire region has been, and continues to be, subjected to extension that thins and cracks the crust as it is pulled apart, creating large, north-south trending faults. The name Great Basin refers to the fact that the rivers and lakes have no outlet to the sea. Any precipitation that falls in the Great Basin stays in the Great Basin (US Geological Survey 2004).

The Fish Springs Flat was formed between two tilted blocks: a large structurally complex block on the east consisting of the Drum Mountains and the Thomas Ranges, and a block on the west consisting of the Fish Springs Range. Paleozoic strata in both mountain blocks dip generally to the west or northwest. Based on fault-scarp profile studies and a radiocarbon age, the most recent surface rupture along the Fish Springs Fault was about 2,000 years B.P. (Oviatt 1991b).

The Utah Geological Survey identifies the project area has being in an area where no damage to buildings is likely, and that earthquakes would result in very low levels of ground movement (Christenson 1994).

### 3.4 SOILS

Soils within the area generally consist of a sandy loam (Bureau of Land Management 2010a). Sediment in the area is characterized as lake-bottom silt

with small limestone and basalt gravels covering the surface. Cobbles and small boulders are also found in the flat. Apache Tears (obsidian nodules) noted during the cultural survey are evidence of volcanic activity in the project area (Western Cultural Resource Management 2009).

## **3.5 ENERGY AND MINERALS**

### **3.5.1 Geothermal**

South of the project area is the Drum Mountain-Whirlwind Valley located between Juab and Millard counties. The valley was explored during the late 1970s and early 1980s. No developable geothermal resource was identified from this exploration, although measured temperatures as high as 70 degrees Celsius (158°F) were found in a shallow borehole at 150 meters (492 feet). The Utah Geological Survey Open File Report has suggested that this area be subject to deeper drilling, and may have potential for electric production. The land is located in close proximity to the Crater Hot Springs Known Geothermal Resource Area (KGRA) and is mostly on BLM-administered land with a scattering of Utah State Trust lands (Fleischmann 2006).

### **3.5.2 Mining**

Two types of mining sites are found in the project area; mill sites and tunnel sites.

Mill sites are on public lands which are non-mineral in character. Mill sites may be located in connection with a placer or lode claim for mining and milling purposes or as an independent/custom mill site that is independent of a mining claim. Mill sites are located by metes and bounds surveys or legal subdivision and are up to five acres in size.

Tunnel sites are tunnels excavated to develop a vein or lode. They may also be used for the discovery of unknown veins or lodes. Recordation is the same as a lode claim. A tunnel site can be regarded more as a right-of-way than a mining claim.

## **3.6 WATER RESOURCES**

### **3.6.1 Surface Water**

The project area receives approximately 8 inches of rainfall and 13 inches of snow fall annually (Western Regional Climate Center 2009). No perennial waters are located within the project area. The closest perennial water body is near Fish Springs Refuge, which is approximately 14 miles from the project area. Surface water is present in the springtime due to snow melt, and in summer months due to periods of severe or sustained thunderstorms.

Based on US Geological Service (USGS) topographic maps, there are two small ephemeral reservoirs. The Swasey Point Reservoir is located 0.33 mile northwest from well DMX-01 and the Table Knoll Reservoir is located 0.26 mile northwest of well DMX-13. There are several ephemeral streams that run

north-south through the project area; however, these streams are only active during times of snow melt and/or during periods of severe or sustained thunderstorms.

### 3.6.2 Groundwater

There are two groundwater sources in the Fish Springs Flat area. The first source is through infiltration of precipitation, also called recharge. The second source is through fault zones, fractures, and solution channels in the rocks of the mountain masses. Also, some subsurface inflow may occur through unconsolidated deposits that underlie passes (Bolke and Sumpson 1978).

Utah Geological Survey has 2 piezometers located east to northeast of Table Knoll to monitor ground water levels and potential impacts if the Southern Nevada Water Authority pumps ground water from the Nevada side of Snake Valley (Bureau of Land Management 2010b).

Within the Fish Springs Flat area, groundwater occurs under both artesian and water-table conditions. Springs within the Fish Springs Flat and most of the other springs in the area rise under artesian pressure along fracture zones associated with concealed faults. Locally, such as in recharge areas on alluvial fans or sand dunes, groundwater occurs under water-table conditions or sometimes as perched water (Bolke and Sumpson 1978).

Groundwater generally moves from areas of recharge toward the unconsolidated valley fill and then along the axis of the valley northward toward the Great Salt Lake Desert. The water moves at a relatively slow rate through the groundwater system primarily due to the small amount of recharge and probably also due to the low permeability of the unconsolidated materials in the central part of the valley (Bolke and Sumpson 1978).

Some groundwater may move into the Fish Springs Flat area from other basins such as Tule Valley through pathways provided by fractures and solution channels in the consolidated rocks forming the boundaries of the area. This water either moves into the unconsolidated fill or into fractures which give rise to springs that discharge at the land surface. These fractures have a higher permeability than the adjacent or overlying valley fill. Some of the springs along fracture zones, such as the Fish Springs group, discharge large quantities of water. Additionally, some groundwater may enter the area through the unconsolidated material that comprises low divides (Bolke and Sumpson 1978).

The BLM has identified the following three water sources in the area that are potential water sources for the project:

- The Swasey Standpipe, located on the border of the Tatow, Little Drum and Antelope grazing allotments;
- The Swasey Well, located on the Swasey Knoll Allotment; and

- Well 22, located to the east of the project area, which services the Swasey Knoll, Spor Mountain and Lady Laird allotments.

Currently, the wells have submersible pumps run by generators that are brought to the site by the BLM and that are paid for cooperatively by the BLM and the permittees. The generators are present during the winter and spring months when the allotments are active, typically from November 30<sup>th</sup> through April 30<sup>th</sup>. Each well has storage tanks, which the permittees fill up every day. The Swasey standpipe flows constantly, but at a low flow rate.

### 3.6.3 Hot Springs

The nearest hot spring is the Coyote Spring located approximately 13 miles southwest of the proposed project area in Tule Valley. There are no other hot springs within 13 miles of the project area.

## 3.7 VEGETATION

The project area lies in the Central Basin and Range Ecoregion. This ecoregion contains arid tablelands, intermontane basins, dissected lava plains, and scattered mountains. Non-mountain areas have sagebrush steppe vegetation dominated by sagebrush. The general setting of the project area is typical of the basin and foothill areas of the Central Great Basin, with sparse vegetation that is well adapted to minimal precipitation and in many cases is also adapted to alkaline soils. The area averages less than eight inches of annual precipitation (Western Regional Climate Center 2009).

The highest elevations (5,100 feet and higher) and some of the upper drainage areas are characterized by juniper woodlands with sagebrush shrub habitat. The sagebrush gives way to salt desert shrub communities at the lower elevations. Valleys have alkaline soils and are predominantly vegetated by scattered shrubs. Based on the biological survey conducted in late July 2009, plant species in the project area are made up predominantly of native plants, with some invasive and nonnative vegetation. The total vegetation cover varies based on soil depth and presence of rock or salt content, but it is generally sparse, covering from 0 to 50 percent of the ground. There are several vegetation communities within the project area (EMPSi 2009a). There are no riparian vegetation communities within the project area.

As described below, the vegetation communities identified during site surveys (EMPSi 2009a, and 2009b), correspond with those defined by the USGS's Southwest Regional Gap Analysis Program (J. S. Prior-Magee, et al. 2007).

### 3.7.1 Vegetation Communities

#### ***Great Basin Pinyon Juniper Woodland***

This plant community typically occurs on lower foothill elevations of the dry mountain ranges of the Great Basin in warm dry sites. The woodlands in the project area are dominated by juniper (*Juniperus osteosperma*). The understory

includes sagebrush (*Artemisia sp.*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), scattered ephedra (*Ephedra sp.*), and bunch grasses.

#### **Intermountain Basin Xeric Sagebrush Shrub**

This plant community occurs at higher elevations and along drainages. Soils are shallow and rocky. Shrublands are dominated by black sagebrush (*Artemisia nova*) (mid and low elevations) and rabbitbrush. Sagebrush and ephedra are also present. The herbaceous layer is sparse and composed of perennial bunch grasses such as Sandberg bluegrass (*Poa secunda*) and squirreltail (*Elymus elymoides*).

#### **Intermountain Basin Mixed Salt Desert Shrub**

This plant community is the most prevalent community in the project area and is found at the lower elevations. Soils of this community are typically alkaline, and also include some sandier areas and areas with gravel and rock. The vegetation is dominated by four-winged saltbush (*Atriplex canescens*), shadscale (*Atriplex confertifolia*), iodine bush (*Allenrolfea occidentalis*), and ephedra. Other shrubs present include yellow rabbitbush and winterfat (*Krascheninnikova lanata*). The herbaceous layer is a sparse mix of both native and nonnative grasses and forbs. Common grasses include saltgrass (*Distichlis spicata*) Sandberg bluegrass, squirreltail, Indian ricegrass (*Achnatherum hymenoides*), Great Basin wild rye (*Elymus cinereus*), crested wheatgrass (*Agropyron cristatum*), and cheatgrass (*Bromus tectorum*). Halogeton (*Halogeton glomeratus*) is a common noxious weed, but not listed in Table 3-1. Much of the ground is bare, and consists of sandy, saline, or rocky soils.

#### **Intermountain Basin Semi-Desert Shrub Steppe**

This plant community is fairly prevalent in the project area. It occurs in areas with moderate to deep soils. The woody layer is a mix of shrubs and dwarf-shrubs consisting primarily of sagebrush, ephedra, and rabbitbush species. Grasses include Sandberg bluegrass, squirreltail, Indian ricegrass, Great Basin wild rye, and crested wheatgrass.

#### **Intermountain Basin Active and Stabilized Dunes**

This plant community is composed of moderately vegetated (10 to 30 percent plant cover) active and stabilized dunes. The species occupying these areas are adapted to shifting, coarse-textured substrates and form patchy grasslands and shrublands of sagebrush, saltbush, and bunch grasses. In some cases, sand-loving buckwheat (*Eriogonum nummularum* var. *ammophilum*), a rare plant discussed under special status plant species, is present.

#### **Intermountain Basin Wash**

This barren and sparsely vegetated (less than 10 percent in most cases) community is restricted to the lower elevation intermittent drainages in the project area. Plants that are present include saltbush and sagebrush species.

***Intermountain Basin Playa***

Salt covers the playa areas with small saltgrass beds in depressions and sparse shrubs around the margins. These areas are intermittently flooded. The water is prevented from percolating through the soil by an impermeable soil subhorizon and remains on the soil where it evaporates.

***Intermountain Basin Volcanic Rock and Cinderland***

These areas are dominated by a substrate of volcanic rock and cinder. Ephedra, saltbush, and buckwheat species are present.

***Invasive Annual and Biennial Forbland***

A few areas have seen substantial human and historic livestock disturbance and are now dominated by halogeton (*Halogeton glomeratus*) and cheatgrass (*Bromus tectorum*). Soils are alkaline, and iodine bush and saltbush are often present.

**3.7.2 Noxious Weeds and Invasive Plants**

The Utah Noxious Weed Control Act (Utah Weed Control Association 2009) establishes a state noxious weed list and rules for controlling weeds. Weeds are divided into three management categories: Class A weeds have a relatively low population size within the state and are of highest priority being an Early Detection Rapid Response (EDRR) weed. Class B weeds have a moderate population throughout the state and generally are thought to be controllable in most areas. Class C weeds are found extensively in the state and are thought to be beyond control. Counties within Utah are allowed to reprioritize weeds according to their infestations.

The project area has several infestations of squarrose knapweed (*Centaurea virgata*) (Bureau of Land Management 2009). Table 3-1 shows a list of noxious weeds within Juab and Millard Counties with potential to occur in the project area.

**Table 3-1  
Noxious Weeds within the Project Area**

Scientific Name	Common Name	UWMA Rank*	Millard County**	Juab County**	Near Millard or Juab County**
<i>Cardaria draba</i>	hoary cress	B	present	present	NA
<i>Centaurea virgata</i>	squarrose knapweed	B	present	present	NA
<i>Centaurea repens</i>	Russian knapweed	B	present	present	NA
<i>Onopordum acanthium</i>	scotch thistle	B	present	present	NA
<i>Carduus nutans</i>	musk thistle		present	present	NA
<i>Lepidium latifolium</i>	perennial pepperweed	B	present	present	NA
<i>Centaurea maculosa</i>	spotted knapweed	A	present	present	NA
<i>Lythrum salicaria</i>	purple loosestrife	A	present	present	NA
<i>Euphorbia esula</i>	leafy spurge	A	not present	present	NA
<i>Linaria genistifolia</i>	dalmatian toadflax	B	not present	present	NA
<i>Hyoscyamus niger</i>	black henbane	A	not present	not present	present
<i>Alhagi pseudalhagi</i>	camelthorn	not listed	not present	not present	present
<i>Centaurea solstitialis</i>	yellow starthistle	A	not present	not present	present
<i>Centaurea diffusa</i>	diffuse knapweed	A	not present	not present	present
<i>Conium maculatum</i>	poison hemlock	B	not present	not present	present

\* Utah Weed Control Association 2009

\*\*Bureau of Land Management 2009

### 3.7.3 Special Status Plant Species

Sand-loving buckwheat is the only known BLM sensitive species known to occur in the project area. It is endemic to Millard and Juab counties and the majority of the population sites have been found on white to yellow sandy areas. Sand-loving buckwheat is typically associated with shadscale, winterfat, rabbitbush, ephedra, and pinyon-juniper (Utah Native Plant Society 2009). The total population of sand-loving buckwheat is currently unknown, but is estimated to be in the tens of thousands (Robinson 2003). The estimated number of individual plants present in the project area is between 8,000 to 25,000 plants (EMPSi 2009a). Therefore, the plant populations within the project represent a large percentage of the total distribution.

A rare plant survey was conducted in July 2009. Six distinct populations of sand-loving buckwheat were recorded. Table 3-2 summarizes the findings from these surveys and describes the location of each population in relation to aspects of the proposed action.

**Table 3-2  
Sand-loving Buckwheat Populations in the Project Area**

Population #	Number of Plants/ Population	Total Area of Population (acres)	Plant Vigor	Notes
1	3**	0.01	Very feeble	~1,800 feet east of DMX-12
2	500-1,500*	2.5	Intermediate	~1,400 feet west of DMX-11
3	300-500*	0.3	Intermediate	~350 feet west of DMX-11
4	5,000-15,000*	9.5	Exceptionally vigorous	On dunes, ranging from 600 to 2,200 feet east of proposed access route to DMX-07
5	33*	0.84	Intermediate	~500 feet north of DMX-06b drill site
6	3,000-10,000*	95	Vigorous	Overlying proposed location of DMX-21 drill site

\* Estimated

\*\* Actual

All possible plant vigor ranks: very feeble, feeble, intermediate, vigorous, exceptionally vigorous

### 3.8 WILDLIFE

Sources of information used to compile this section include: published literature as cited, species occurrence data from the Utah Conservation Data Center (Utah Conservation Data Center 2009), discussions with BLM Fillmore Field Office biologists, observations or signs of species occurrence during the survey (EMPSi 2009b), and BLM sensitive species lists for the Fillmore Field Office. The survey included a 50-foot buffer around all proposed access routes, wells, and existing roads (EMPSi 2009b).

#### 3.8.1 Big Game and Other Mammals

Mule deer (*Odocoileus hemionus*) are expected to occur in the foothill areas, specifically in woodland areas, drainage swales, and sagebrush habitats. Foraging habitat in the proposed project area is not ideal because of limited grasses and forbs. Limited mule deer signs (i.e., tracks and scat) were observed during the survey. As such, it was determined that mule deer do not maintain a consistent presence in the area; however, mule deer winter habitat is located just southwest (0.7 mile) of the proposed project area in the foothills of the House Range (Utah Conservation Data Center 2009).

The entire project area is suitable habitat for American pronghorn (*Antilocapra americana*), and the area is known to be a year-round habitat area. No pronghorn were observed in the project area during the biological survey.

Several black-tailed jackrabbits (*Lepus californicus*) were observed during the survey. Desert cottontail (*Sylvilagus audubonii*) was also observed. Coyote (*Canis latrans*) tracks and scat were seen on several occasions. Rodent species, including kangaroo rats (*Dipodomys* spp.) and mice, occur throughout the proposed project area. Small rodent burrows were observed on site, mostly in the sandy dune areas and in areas with rock outcroppings. Burrows were also found at the base of larger shrubs (sagebrush, iodine bush, saltbush, and

rabbitbush). Much of the project area is fairly rocky, with some volcanic features, limiting its suitability for small rodent burrows. Pack rat (*Neotoma* spp.) dens were observed in several of the rock outcroppings in the project area, but none were found within any of the proposed access routes or well pad locations.

Numerous bats were observed foraging moths and other insects in the juniper woodlands area next to well DMX-21 and west of well DMX-18. The House Range is composed partially of Cambrian-aged limestone and shale that results in numerous caves and crevices that are ideal for bat roosts. Bat species known or suspected to occur in the proposed project area include Townsend's big-eared bat (*Corynorhinus townsendii*), western small-footed myotis (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), and pallid bat (*Antrozous pallidus*) (NatureServe 2009).

### 3.8.2 Birds

Eight bird species were observed during the 2009 biological survey (EMPSi 2009b) and several more are expected to occur in the project area. Species observed include: Brewer's sparrow (*Spizella breweri*), sage sparrow (*Amphispiza belli*), horned lark (*Eremophila alpestris*), western meadowlark (*Sturnella neglecta*), mourning dove (*Zenaida macroura*), common raven (*Corvus corax*), short-eared owl (*Asio flammeus*), and red-tailed hawk (*Buteo jamaicensis*). Species expected to occur include: western kingbird (*Tyrannus verticalis*), western scrub jay (*Aphelocoma californica*), loggerhead shrike (*Lanius ludovicianus*), and common nighthawk (*Chordeiles minor*), among others. Birds were observed in much greater numbers in the juniper woodlands and in sagebrush-dominated habitats at the higher elevations (EMPSi 2009b). No nesting birds were observed during the field survey.

On January 11, 2001, President Clinton signed Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. It directs executive departments and agencies to take certain actions to further implement the Migratory Bird Treaty Act and to conserve migratory birds. It prohibits the take of migratory birds, their eggs, feathers, or nests (US Fish and Wildlife Service 2009a).

### 3.8.3 Amphibians and Reptiles

Reptile species observed during the survey included the side-blotched lizard (*Uta stansburiana*), sagebrush lizard (*Sceloporus graciosus*), western fence lizard (*Sceloporus occidentalis*), long-nosed leopard lizard (*Gambelia wislizenii*), desert horned toad (*Phrynosoma platyrhino*), and western rattlesnake (*Crotalus viridis lutosus*). These species were found throughout the project area, with long-nosed leopard lizard and sagebrush lizard being pervasive throughout the area. Gopher snake (*Pituophis catenifer deserticola*), striped whipsnake (*Masticophis taeniatus*), and night snake (*Hypsiglena torquata deserticola*) are also expected to occur in the proposed project area.

### 3.8.4 Special Status Species

#### **Federal Status Species**

The Endangered Species Act protects listed threatened and endangered plant and animal species and their critical habitats. The Fillmore Field Office maintains a current list of species listed under the Endangered Species Act that occur within the field office jurisdiction. The list was reviewed to assess the potential for federally listed threatened, endangered, proposed for listing, and candidate species to be found in the project area. The Utah prairie dog (*Cynomys parvidens*), a federally threatened species, and the yellow-billed cuckoo (*Coccyzus americanus*), a candidate for federal listing, were not recognized as having potential to occur. The Utah prairie dog relies on well-drained grasslands with deep soils for burrowing. The cuckoo relies on forested areas, typically in riparian zones, for feeding and nesting (NatureServe 2009). The project area does not provide ideal habitat for the greater sage grouse (*Centrocercus urophasianus*), a candidate species (Utah Conservation Data Center 2009). Suitable habitat for these species is not found at or near the proposed project area; therefore, neither surveys nor consultations with the US Fish and Wildlife Service (USFWS) are required.

#### **BLM Sensitive Species**

The proposed project area provides marginally suitable-to-ideal habitat for numerous BLM sensitive animal species, as listed below in Table 3-3. Short-eared owl and sage sparrow were observed in the proposed project area during the survey. Additional species included the dark kangaroo mouse (*Microdipodops megacephalus*), Pygmy rabbit (*Brachylagus idahoensis*) and Townsend's big-eared bat (*Plecotus townsendii*).

**Table 3-3  
BLM Sensitive Animal Species with Potential to Occur in the Proposed Project Area**

<b>Name</b>	<b>Habitat Requirements*</b>	<b>Likelihood of Occurrence</b>	<b>Notes*</b>
<b>Mammals</b>			
Kit fox ( <i>Vulpes macrotis</i> )	Grassland and shrub steppe habitats.	Low	Potentially suitable habitat present within project area; however, most habitats are sparsely vegetated and provide little shade. No kit fox were observed.
Dark kangaroo mouse ( <i>Microdipodops megacephalus</i> )	Occurs primarily in the Great Basin ecoregion. In Utah, the species occurs in the West Desert, typically in sagebrush areas with sandy soils.	High	Sandy soils and dune areas provide suitable habitat for this species throughout the project area. This animal is likely to occur. No dark kangaroo mice were observed.

Name	Habitat Requirements*	Likelihood of Occurrence	Notes*
Pygmy rabbit ( <i>Brachylagus idahoensis</i> )	Shrub steppe with deep, friable soils.	Moderate	The project area is predominantly comprised of volcanic, rocky, and alkaline soils. The area is not ideal habitat for pygmy rabbit. The area also has limited understory, making it less than ideal foraging habitat. No pygmy rabbits were observed.
Townsend's big-eared bat ( <i>Plecotus townsendii</i> )	Roosts colonially in caves, buildings, mine adits; forages over diverse habitats.	Moderate	Likely forages in the project area and roosts in the House Range. Unidentified bat species were seen around DMX-21 and west of DMX-18.
<b>Birds</b>			
Ferruginous hawk ( <i>Buteo regalis</i> )	Nests on trees, cliffs, ground; forages over grassland and steppe habitats.	Low	Suitable habitat exists. Ferruginous hawks are typically very active foraging during July, with young beginning to fledge from nests and are easily identified in flight when present. No ferruginous hawks were observed.
Grasshopper sparrow ( <i>Ammodramus savannarum</i> )	Shrub-steppe and grassland habitat.	High	Suitable habitat present. No Grasshopper sparrows were observed.
Greater sage-grouse ( <i>Centrocercus urophasianus</i> )	Shrub-steppe and grassland habitat.	Low	The Utah Department of Natural Resources: Utah Conservation Data Center has not designated the area as suitable sage grouse habitat. The project area would provide only marginal foraging habitat at best for the greater sage grouse. The habitat in the project area has minimal forb or grass understory. This composition would not provide adequate cover or feed for sage grouse in most instances. No sage grouse or sage grouse signs were observed during the survey.
Northern goshawk ( <i>Accipiter gentilis</i> )	Mature coniferous forests.	None	Suitable nesting and foraging habitat does not exist. No Northern goshawks observed.
Sage sparrow ( <i>Amphispiza belli</i> )	Shrub-steppe habitats.	High	Suitable habitat present. Sage sparrows were observed during surveys.
Short-eared owl ( <i>Asio flammeus</i> )	Broad expanses of open land with low vegetation for nesting and foraging are required, including open woodlands and grasslands.	High	A pair of owls was observed during surveys in the Juniper woodland area. They were not nesting in the area, but followed the vehicle and came to investigate the surveyor's presence at dusk.

Name	Habitat Requirements*	Likelihood of Occurrence	Notes*
<b>Amphibians and Reptiles</b>			
Western toad ( <i>Bufo boreas</i> ) (Northern Rocky Mountain group only)	Known in a variety of habitats associated with ponds, streams, and wetlands; can be found in uplands.	Low	Suitable habitat was not present during surveys. No water is present, and the area is extremely dry.

\*Biotics Database 2005, Clark and Wheeler 2001, Connelly et al. 2004, Green and Flinders 1980, Rauscher 1997, NatureServe 2009, Sibley 2000, and Utah Conservation Data Center 2009.

### 3.9 CULTURAL RESOURCES

Historic and cultural resources are defined as nonrenewable remains of past human activity, including buildings, sites, structures, or objects, each of which may have historical, architectural, archaeological, cultural, or scientific importance. Historic and cultural resources are protected under the National Historic Preservation Act of 1966 (NHPA) and the Archaeological Resources Protection Act of 1979. The archaeological record of the proposed project area has been partially examined through surveys, ethnographic materials regarding Native American populations, and historic documents pertaining to the settlement and use of the area by Euro-Americans.

#### 3.9.1 Environmental Context

The project area is located in the Eastern Great Basin in west-central Utah, 40 miles northwest of the City of Delta, which is at the junction of US Highways 6 and 50. The area is characterized by many north/south-trending, isolated fault block mountain ranges separated by alluvial basins. It is located in Fish Springs Flat in the basin northeast of Swasey Mountain in the House Range. The Fish Springs Range is to the northwest, the Thomas Range to the northeast, and the Drum Mountains to the east. Elevation in the project area ranges from 4,600 to 5,180 feet (1,402-1,579 meters). Swasey Peak at 9,678 feet (2,950 meters) is the highest point in the vicinity of the project area.

Pleistocene Lake Bonneville once covered the entire project area between 14,500 and 16,000 years ago. A Pleistocene shoreline that may be the Provo shoreline runs east/west in the northern portion of the project area (Grayson 1993). The area is dotted with seasonal playas at present. Sediment in the area is characterized as lake-bottom silt with small limestone and basalt gravels covering the surface. Cobbles and small boulders are also found in the flat. Apache Tears (obsidian nodules) noted during the survey are evidence of volcanic activity in the project area.

#### 3.9.2 Literature Review and Records Search

Records at the Utah State Historic Preservation Office indicate that five previous cultural resource investigations were performed within one mile of the project area, and three sites were recorded (Table 3-4). Copies were made of

the site forms and topographic maps to assist the field crew in locating sites within the project area. All or parts of the five previous surveys were within one mile of the project area; however, none of the surveys covered any of the current project area.

### 3.9.3 Survey Results

Archaeological survey of the project Area of Potential Effect (APE) is required to assist in implementing Sections 106 and 110 of the NHPA, procedures of the Advisory Council on Historic Preservation (36 CFR 800), and BLM policy requiring inventory and evaluation of cultural resources within potential impact areas. Section 106 requires that, prior to any action, federal agencies identify cultural resources potentially affected by the action that may qualify as eligible to the National Register of Historic Places (NRHP). If eligible resources are identified, federal agencies must take prudent and feasible measures to avoid or reduce adverse impacts and provide the Advisory Council on Historic Preservation an opportunity to comment on these measures. Under NRHP criteria, archaeological sites are generally recognized as eligible based on research potential.

The cultural resources inventory and evaluation activities resulted in the identification of 9 new archaeological sites and 35 isolated occurrences (IOs). IOs consisted of one or more artifacts that lacked the elements meeting the criteria of a site. Three of the sites are recommended eligible for the NRHP and six are recommended not eligible for the NRHP. Diagnostic artifacts and archival records suggest that the area has been in use from the Paleo-Archaic period to the present. Table 3-4 provides a summary of archaeological sites within the proposed project APE and their recommended eligibility status for the NRHP.

**Table 3-4**  
**NRHP Eligibility for Sites within the Project Area**

Temporary Site Number	Site Type	NRHP Eligibility Recommendation
1	Prehistoric camp with historic camp	Eligible
2	Lithic Scatter	Ineligible
3	Lithic Scatter	Eligible
4	Lithic Scatter	Ineligible
5, 6	Table Knoll Reservoir and diversion ditches	Ineligible
7	Lithic Scatter	Eligible
8	Historic road	Ineligible
9	Historic road	Ineligible

### 3.10 RANGELAND MANAGEMENT

The project area overlaps two sheep grazing allotments on BLM lands: the Swasey Knoll allotment and the Sand Pass allotment.

The Swasey Knoll allotment (allotment number 04337) covers most of the area east of the proposed access route to DMX-2 and sixteen of the proposed drill sites (sites 3, 4, 6B, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, and 21). The Swasey Knoll allotment has a total acreage of 53,821 (47,922 federal, 5,899 state). The allotment is management for 4,562 Federal Animal Unit Months (AUMs) and 291 state AUMs.

The Sand Pass allotment (allotment number 04333) covers the northwestern corner of the project area including four of the proposed drill sites (sites 1, 2, 11, and 12). The Sand Pass allotment has a total acreage of 36,668 (33,100 federal, 3,568 state). The allotment is managed for 2,000 Federal AUMs and 127 state AUMs.

In 1981, the BLM developed three selective management categories—improve, maintain, and custodial - to prioritize grazing allotments according to management needs. Each allotment went through the selective management process and was then placed into one of these categories according to management needs, resource conflicts, potential for improvement, and BLM funding/staffing constraints. The three categories are described as follows:

- Improve category allotments are managed to improve current unsatisfactory resource conditions and receive the highest priority of funding and management actions.
- Maintain category allotments are managed to maintain current satisfactory resource conditions and are managed to ensure that resource values do not decline.
- Custodial allotments are managed by the BLM to protect resource conditions and values.

The Swasey Knoll allotment has a Management Status Code of “I – Improve” (GeoCommunicator 2010a) and the Sand Pass allotment has a Management Status Code of “M – Maintain” (GeoCommunicator 2010b).

Additional BLM-authorized grazing allotments near the project area are East Fish Springs to the northwest, Spor Mountain to the northeast, and Tatow to the south (GeoCommunicator 2010c).

### 3.11 WILD HORSES AND BURROS

The project area overlaps the Swasey Herd Management Area (HMA). The Swasey HMA contains 120,113 acres of federal, state, and privately-owned lands. The original source of the animals is unknown; however, many of the horses in the Swasey Herd are descendents of horses that were turned loose or escaped from local ranches. The Swasey Herd is dominated by gray and light-

colored horses. Other colors include black, brown, bays, buckskins, and pintos. The average size of herd adults is 14 to 14.5 hands. The Appropriate Management Level (AML) for the Swasey HMA is between 60 and 100 horses (Bureau of Land Management 2007b).

### **3.12 VISUAL RESOURCES**

Visual resources are the visual physical features on a landscape, such as land, water, vegetation, animals, and structures (Bureau of Land Management 2004). There are no visible structures or towers in the project area.

# CHAPTER 4

## ENVIRONMENTAL IMPACTS

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### 4.1 INTRODUCTION

This chapter analyzes the environmental consequences of impacts expected to occur as a result of the proposed action and alternatives. For each effect, the level of significance is discussed and mitigation proposed to reduce any effects. The scope of analysis is commensurate with the availability of data. Current conditions of the planning area, as described in Chapter 3, provide the baseline for assessing impacts. Significance criteria are determined by the lead agency.

### 4.2 CLIMATE AND AIR QUALITY

#### 4.2.1 Proposed Action

The proposed action would result in air pollutant emissions during site preparation, drilling activities, and reclamation activities.

Project-related emissions would include (1) fugitive dust from earth disturbing activities during any blading for access route development, from sump construction and from vehicle travel on unpaved roads and access routes; and (2) diesel exhaust from vehicles, construction equipment, the generator for the downhole water pump, and the truck-mounted drill rig.

##### *Site Preparation Emissions*

Site preparation would consist of digging sumps and, where necessary, blading of access routes. Digging of sumps would involve the temporary stockpiling of soils until such time that reclamation is complete and the sump is refilled with those soils. Blading of access routes, where necessary, would generate temporary and localized fugitive dust emissions and leave soils exposed to erosion until reclamation. Per the design features, Standard Steam would use overland travel where topography and vegetation allow, minimizing the amount of blading and thereby minimizing emissions of fugitive dust. Also per the design features, if wind erosion begins to become an issue as identified by a BLM representative, the authorized officer may require the proponent to water the road surface during periods of high wind.

Exhaust would be released to the atmosphere from gas- and diesel-powered construction equipment, the water pump generator, and personnel vehicles. Air quality impacts would be temporary.

#### *Drilling Emissions*

The primary sources of emissions during drilling would be exhaust emissions from diesel-powered engines on the truck-mounted drill rig, the water pump generator, and personnel vehicle emissions. Other ancillary equipment would have a negligible contribution to project emissions.

Given the low background concentrations of criteria pollutants in the area and the limited and temporary nature of emissions from site preparation and drilling activities, the proposed action would not result in any violations of state or federal air quality standards. The project area is not within a nonattainment area; therefore, Clean Air Act general conformity does not apply.

#### **4.2.2 No Action**

The no action alternative would result in no new sources of air emissions and would therefore have no air quality impacts.

### **4.3 GEOLOGIC RESOURCES**

#### **4.3.1 Proposed Action**

No unique geological features are present in the project area and none would be affected. The area is considered to be at low risk of earthquake activity causing damage to structures on the surface. The proposed action would result in no impacts related to seismicity or geologic resources.

#### **4.3.2 No Action**

The no action alternative would result in no impacts related to seismicity or geologic resources.

### **4.4 SOILS**

#### **4.4.1 Proposed Action**

Soils would be vulnerable to accelerated wind and water erosion both during and after disturbance (Bureau of Land Management 2010a). Soils along the banks of drainages would have a higher sensitivity to erosion than soils in flatter, vegetated areas. The proposed action would involve nine drainage crossings: Access routes to DMX-2, -3, -12, -16 and -18 would each cross one drainage, while the routes to DMX-14 and -15 would each cross two drainages.

Per lease notice GEO-LN-34, the BLM modified access route alignments from the original proposal to avoid some drainages. Per the design features, Standard Steam would cross all drainages as perpendicular as possible to minimize erosion from the proposed action. Access routes proposed to cross drainages would be constructed in such a way that the function of the drainage would not be compromised to the extent that it would result in excess soil erosion.

Wind- and water-related erosion impacts would be reduced by reclamation of the disturbed areas through re-vegetation once operations are complete.

#### **4.4.2 No Action**

Under the no action alternative, there would not be any impacts to soils.

### **4.5 ENERGY AND MINERALS**

#### **4.5.1 Proposed Action**

The proposed action would evaluate the potential for the use of existing geothermal resources in the project area, increasing the likelihood of production of geothermal resources, considered by the BLM to be a fluid mineral. This proposed action would provide needed data for the geothermal resources in the project area. The proposed action would have no effect on wind, solar, or biomass resources in the area or the ability to harness them and would also not directly preclude future mineral extraction operations in the project area.

#### **4.5.2 No Action**

The no action alternative would have no impact on energy and mineral resources.

### **4.6 WATER RESOURCES**

#### **4.6.1 Proposed Action**

Potential impacts on water resources involve both water supply and water quality. Impacts could result from increased erosion (quality), aquifer drawdown (supply), water use during site preparation and drilling (supply), and any spills or accidents that released hazardous materials to surface waters or to soils that could transmit the contaminants into shallow-water aquifers (quality).

Water for construction would be brought in by a water truck. Each water truck has a capacity of 2,200 gallons. Standard Steam estimates that at least one truckload of water would be required for each drill pad. Assuming that on average 1.5 truckloads of water would be utilized per drill pad, it is anticipated that approximately 3,300 gallons per drill pad would be required for dust control, drilling, and other activities during project development. Multiplied by the 20 drill sites, total water consumption for the entire proposed action is estimated at 66,000 gallons.

Water would primarily be used for drilling water and cuttings to settle out in the sumps. Excess drilling fluids would be discharged to the sump pit, which would be unlined and would allow for fluids to percolate back into the soil. Standard Steam would use only commonly used drilling additives and would provide the Material Safety Data Sheets for such additives to the BLM for approval prior to use. Due to the non hazardous nature of these additives and the fact that they are commonly used in drilling not only oil, gas, and geothermal wells but also water wells, there is no risk of contamination of groundwater.

Standard Steam would access water from a BLM well. As stated in Chapter 3, the BLM has identified the following three potential water sources for the project: the Swasey Standpipe, the Swasey Well, and Well 22.

The BLM has indicated that the Swasey Standpipe may not have sufficient flow to fill the water trucks for the proposed action. The sheep operators who use these wells have first rights to these wells and typically use them from November through April every year. Per the design features, Standard Steam would give first priority on water extraction to the sheep operators ensuring no impact to existing water users.

Standard Steam would supply its own generator at each water source to power the downhole pump(s). Standard Steam would complete a BLM Water Use Agreement, which would specify the conditions of water use. Standard Steam would pay the BLM a nominal charge based on the volume of water used. Standard Steam would keep track of the volumes used.

The extraction of approximately 66,000 gallons of water could impact water levels in the vicinity of the selected well(s), but the effects would be temporary and the water table would re-stabilize after completion of the proposed action.

Site preparation and drilling activities would introduce petroleum products, oils, lubricants, and hydraulic fluids into an environment that was for the most part, previously unoccupied by machinery and free from hazardous materials. The introduction of these substances would create the potential for spills into surface waters and onto soils, which can then conduct these contaminants into shallow aquifers.

Per the design features, Standard Steam would develop a spill prevention and response plan, which would minimize potential impacts related to the contamination of onsite surface and groundwater.

#### **4.6.2 No Action**

Under the no action alternative, site preparation and drilling would not occur, and water resources in the project area would not be impacted.

## **4.7 VEGETATION**

### **4.7.1 Proposed Action**

The impact area is small (1 acre total for all wells and 12 acres for all new routes). Ground disturbance would not exceed the minimum amount necessary to conduct temperature gradient exploration and all ground disturbances would be re-vegetated with an approved seed mix during the autumn after completion of exploration.

#### *Species-Specific Environmental Consequences*

Three individual sand-loving buckwheat plants within Population 6 have the potential to be impacted at proposed drill site DMX-21, which is on State of

Utah land; however, the location of these individual plants are such that they can be marked and potentially avoided during operations. Populations 1, 2, 3, 4 and 5 would be avoided altogether as no project activities are proposed in their vicinity. At most, three sand-loving buckwheat plants would be impacted.

#### **4.7.2 No Action**

Under the no action alternative, no ground disturbance would occur, and there would be no impact to vegetation.

## **4.8 WILDLIFE**

### **4.8.1 Proposed Action**

#### ***General Environmental Consequences***

Standard Steam would have a biological monitor on the project area for activities occurring during the migratory bird season of March 15 through July 15.

Per the design features, Standard Steam would conduct migratory bird and raptor surveys prior to any ground disturbance. The migratory bird surveys would be conducted between March 15 and July 15 and no earlier than 72 hours prior to any activities. If nesting migratory birds are discovered, a 200-foot no-activity buffer would be established around the nest and would remain in place until the young have fledged or the nest has failed. This survey and reporting would reduce any impacts to migratory birds.

#### ***Species-Specific Environmental Consequences***

Although suitable kit fox habitat occurs within the project area, the proposed exploration sites do not provide suitable habitat for kit fox. No kit fox are expected to be in the proposed impact area. There would be no impacts on kit foxes.

The dark kangaroo mouse has a high likelihood to occur and the project area provides suitable habitat. No kangaroo mice were observed. It is not known if there are any kangaroo mouse burrows in the impact area. Ground disturbing activities would impact any present kangaroo mice, likely causing them to abandon their burrows and move elsewhere. Ground disturbing activities could possibly result in injury or death of kangaroo mice.

The area is not ideal habitat for pygmy rabbit. The area also has limited understory, making it less than ideal foraging habitat. Pygmy rabbits are not likely to occur in the impact areas and therefore there would be no impacts on pygmy rabbits.

The Townsend big-eared bat may use parts of the impact areas for foraging. Ground disturbing activities may have a minor impact on foraging habitat.

Per the environmental protection measures, Standard Steam would conduct nesting raptor surveys within 0.5 miles of any ground disturbance. If a nest is identified, a 0.5-mile no-activity spatial and temporal buffer would be established around the nest and would remain in effect until (a) the young have vacated the nest, or (b) the nest, through systematic monitoring, is suspected to have failed or has been abandoned and is no longer active. After monitoring, if the nest is suspected to be non-active, a monitoring report would be submitted to the BLM biologist to make a final determination of nest status prior to any ground disturbing activities. If the nest becomes active during operations, the 0.5-mile buffer would be established. The guidelines to be followed are *BLM Best Management Practices for Raptors and their Associated Habitat in Utah 2006* and *Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances* (US Fish and Wildlife Service 2002). This survey and reporting would reduce any impacts to nesting raptors.

Grasshopper sparrows are highly likely to occur within the project area and may nest or forage within the impact area. Per the design features, Standard Steam would conduct surveys for grasshopper sparrow nests and limit development to 200 feet away from any active nests found in impact areas. Using these directives, there would be no impacts to Grasshopper sparrows.

The Greater sage-grouse is not likely to occur in the project area of impact area. There would be no impacts to the Greater sage-grouse.

Suitable nesting and foraging habitat does not exist for the Northern goshawk. There would be no impacts to the Northern goshawk.

Sage sparrows are highly likely to occur within the project area and may nest or forage within the impact area. Sage sparrows were observed during the field survey (EMPSi 2009b). Per the design features, Standard Steam would conduct surveys for Sage sparrow nests and limit development to 200 feet away from any active nests found in impact areas.

Short-eared owls are highly likely to occur within the project area and impact area and were seen during the field survey (EMPSi 2009b). Per the design features, Standard Steam would conduct a short-eared owl survey prior to ground disturbance for activities planned to occur during the nesting period of March 1 through August 1. If short-eared owls are nesting within 0.25 mile from a well or new access route, construction and drilling activities may not take place during this time period.

The Western boreal toad occurs in wet habitats. No wet habitats would be impacted by the proposed action.

#### **4.8.2 No Action**

Under the no action alternative, there would be no impacts to wildlife in the project area.

## 4.9 CULTURAL RESOURCES

Section 106 of the NHPA states that an undertaking would have an adverse effect on a historic property (i.e., NRHP-eligible resource) if that undertaking were to alter or diminish characteristics of the property that qualify it for inclusion in the NRHP. This includes Native American Traditional Cultural Properties in that they possess traditional cultural significance. Per 36 CFR 60.4, properties eligible for the NRHP possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- A. Are associated with events that have made a significant contribution to the broad patterns of our history; or
- B. Are associated with the lives of persons significant in our past; or
- C. Embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction; or
- D. Have yielded or may be likely to yield, information important in prehistory or history.

Any impacts on NRHP-eligible historic properties as a result of the project must be identified, discussed with the State Historic Preservation Office and interested parties, and mitigated to the extent possible under the NHPA in order to avoid a significant impact under NEPA.

### 4.9.1 Proposed Action

All sites discovered as a result of the cultural resources survey have been avoided through the relocation of drill sites and rerouting of access routes. Therefore, there would be no adverse impact to historic resources as a result of the proposed action.

### 4.9.2 No Action

Under the no action alternative, no ground disturbance would occur, and there would be no adverse impact to historic resources.

## 4.10 RANGELAND MANAGEMENT

### 4.10.1 Proposed Action

The project would involve the temporary loss of vegetation on up to 13 acres (1.1 acres for drill pads and 12 acres for new access routes). The Swasey Knoll allotment, which has 53,821 acres in total, would have 0.88 acres of impact from drill site construction (16 drill sites) and up to 10.02 acres of impact from the preparation or improvement of access routes. The Sand Pass allotment, which has 36,668 acres in total, would have 0.22 acres of impact from drill site construction (4 drill sites) and up to 1.14 acres of impact from new routes. These areas would still be used for sheep to cross but would not offer much in the way of grazing vegetation. Grazing opportunities would return to these

areas once revegetation has been successful. Livestock operators would be asked to avoid reseeded areas for a minimum of two growing seasons or until revegetation of the disturbed areas has been successful.

These impacts on the grazing allotments would be minimal and would not change the management status since the proposed action operations would be temporary and short term.

#### **4.10.2 No Action**

Under the no action alternative, no loss of vegetation would take place, and there would be no adverse impacts on rangeland management in the project area.

### **4.11 WILD HORSES AND BURROS**

#### **4.11.1 Proposed Action**

Small areas of land occupied by vehicles and equipment would be made temporarily unavailable for herd movement during project activities. Up to 13.1 acres of land would be made temporarily unavailable for grazing due to vegetation removal. Noise and visual impacts from on-site activities would pose a minor and temporary deterrent for wild horses and burros from approaching the immediate area of project activity and would limit movement in the area.

#### **4.11.2 No Action**

Under the no action alternative, no loss of vegetation would take place, and no noise or visual impacts would take place. There would be no adverse impacts on wild horses and burros.

### **4.12 VISUAL RESOURCES**

#### **4.12.1 Proposed Action**

The proposed project would temporarily alter the visual character of the project area through the following:

- The visibility of activities involving site preparation and drilling activities (the top of the drill rig derrick could be as much as 29.5 feet above the ground surface with the mast up and 13.5 feet above the ground surface with the mast down);
- Vegetation damage;
- Clearing of vegetation for access trails;
- Scarring of the terrain from access trail and drill pad construction;
- Fugitive dust from construction activities and newly exposed soils; and
- Lighting during site preparation and drilling activities.

#### 4.12.2 No Action

Under the no action alternative, there would be no impacts to visual resources.

### 4.13 CUMULATIVE IMPACTS

Council on Environmental Quality regulations state that the cumulative impact analysis should include the anticipated impacts to the environment resulting from “the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time” (40 CFR 1508.7). Impacts of the proposed action and alternatives presented in this EA are assessed for cumulative impacts with other actions conducted in the region.

Except where otherwise indicated, the region of influence for this cumulative impacts analysis is a 15-mile radius around the project area. The region of influence encompasses the Fish Springs Flats, the Fish Springs Range to the northwest, the Thomas Range to the northeast, the Drum Mountains to the southeast, the Swasey Range to the southwest, and the northern part of the Tule Valley.

Consultation with the BLM Fillmore Field Office revealed that in addition to maintaining all current activities on BLM-administered lands in the area, two projects were identified that are reasonably foreseeable within in the region of influence. These projects include a proposal to drill geothermal wells on BLM lands directly to the east and southeast of the project area, and an interest in starting minerals (clay) extraction nine miles northwest of the project site.

The proposed project area covers an approximately 15,000 acres leased by Standard Steam within a larger approximately 108,000-acre lease area. The other lease holders in this area are Ormat Nevada, Inc., and Intermountain Renewable Power. As of April 2010, Ormat is planning an exploratory well drilling program on its leases in the Drum Mountain and Whirlwind Valley areas. These areas are directly to the east, and the southeast, respectively, from the project area.

Some of the Ormat and Intermountain Renewable Power leases in this area were issued in February 2009, while the rest were issued in April 2010. As such, the BLM-administered lands in this area have only recently become available for geothermal exploration and development proposals. It is reasonably foreseeable that additional new geothermal projects will be proposed across this area, potentially in the near future. It is also reasonably foreseeable that if TGH exploration by Standard Steam yields information that indicates there may be a viable geothermal resource present, Standard Steam may move forward with full-bore exploration drilling, well testing, and potentially the construction of a geothermal power plant. Exploration drilling (and well testing) and power plant construction would each require subsequent, separate NEPA analyses. Such

actions are considered here in the context of cumulative impacts only and are not covered by this EA.

Regional influences identified are increases in recreation and an increase in invasive plants and noxious weeds.

#### **4.13.1 Cumulative Impacts of the Proposed Action**

This section addresses only the resources for which environmental effects have been identified, and then discusses those effects in a cumulative context. Any resources not discussed here would not be subject to cumulative effects from the proposed action.

##### ***Climate and Air Quality***

Dust and diesel exhaust emissions associated with the proposed action could cumulatively contribute to air quality impacts from mineral extraction operations and increased recreation-associated traffic. Since impacts from the proposed action are minimal and short in duration, any cumulative impacts would be minimal. Given the constant movement of air, air quality impacts from a temporary project such as the proposed action would also be temporary and would not cumulatively combine with any air quality impacts from other geothermal exploration or development activities in the future.

##### ***Soils***

The proposed action would result in a cumulative increase in soil erosion in the region of influence when combined with mineral extraction activities nine miles away, increased dispersed recreational uses across the region, and increased future geothermal activities in the area.

##### ***Water Resources***

The proposed action could result in cumulative impacts to ground water supply through lowering the water table in the region of influence when combined with anticipated future geothermal activities in the area.

##### ***Vegetation***

The proposed action could cumulatively combine with mineral extraction activities nine miles away and with anticipated future geothermal activities in the area to increase the potential for colonization by invasive plants and noxious weeds.

##### ***Wildlife***

The proposed action could cumulatively combine with mineral extraction activities nine miles away and with anticipated future geothermal activities in the area to increase the potential for habitat loss, habitat fragmentation, and direct impacts to species present in the region of influence.

##### ***Range Management***

The region of influence for this cumulative impacts analysis is limited to the Swasey Knoll and Sand Pass grazing allotments. The temporary nature of the

proposed action and the reclamation of any disturbed areas would preclude any cumulatively impacts from occurring associated with anticipated future geothermal activities in the area. The proposed action would not result in a long-term reduction in quality and quantity of acres available for grazing within the two allotments.

***Wild Horses and Burros***

Given the temporary nature of the proposed action and the proposed reclamation of the site to pre-project conditions, the proposed action would contribute a temporary, minimal cumulative impact when combined with impacts on wild horse and burros from potential mineral extraction activities nine miles away. There would be no cumulative impact in association with anticipated future geothermal activities in the area since the timelines of these actions would not overlap.

**4.13.2 Cumulative Impacts of the No Action Alternative**

Under the no action alternative, there would not be any cumulative impacts for any of the resources considered in this EA.

# CHAPTER 5

## PERSONS, GROUPS, AND AGENCIES CONSULTED

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A project scoping packet was mailed to seven potentially interested parties on September 30, 2009, announcing the project and seeking comment through October 30, 2009. The scope of this EA is based upon specific issues and concerns identified by BLM, other federal, state, and local agencies, and members of the public. These issues and concerns include the following:

- Impacts on sheep in grazing allotment during the months sheep are present (December through April);
- Challenges with reclamation given low precipitation of area and slow plant regrowth; and
- Presence of sand-loving buckwheat, a BLM Sensitive Plant species and need for minimization of surface disturbance related to access routes and well pad construction, likely impacts to this species, and potential for mitigation.

Notification of the proposed action was placed on the Utah Electronic Notification Bulletin Board on October 5, 2009. No further comments have been received aside from a phone call from a Millard County Commissioner asking the BLM basic questions about the project.

The Draft EA was circulated for public review via posting on the Utah BLM Electronic Notification Bulletin Board (ENBB) from May 28, 2010 to June 26, 2010. One letter of comment was received from the Southern Utah Wilderness Alliance and is included in Appendix B. Comments related to visual resources and air quality.

### 5.1 LIST OF PREPARERS

BLM staff specialists (Interdisciplinary Team) who determined the affected resources for this document are listed in Table 5.1. The Interdisciplinary Team checklist is included as Appendix A. Those who contributed further analysis in the body of this EA are also listed in this table.

**Table 5-1  
List of Preparers**

**BLM - Interdisciplinary Team**

<b>Name</b>	<b>Role/ Resource Program</b>
Steve Bonar	Wilderness Study Areas/Recreation/Visual Resources
Paul Caso	Range Resources/Grazing/Water Resources
Brent Crosland	Hazardous Materials
George Cruz	Project Manager
Teresa Frampton	Lands and Realty
Jerry Mansfield	Geologic Resources
Joelle McCarthy	Cultural and Native American Resources
James Priest	Wildlife
Matt Rajala	Climate and Air Quality/Soils/Socioeconomics
Eric Reid	Wild Horses and Burros
David Whitaker	Vegetation/Seedmix

**BLM - Project Support**

Chris Hite	Geothermal Resource Development Advisor, Cedar City Field Office
Al McKee	Petroleum Engineer, Utah State Office

**EMPSi –  
Environmental Management and Planning Solutions, Inc.  
(Contractor)**

<b>Name</b>	<b>Resource Program</b>
Amanda Davila	Climate and Air Quality/Energy and Minerals/Water Resources/Livestock Grazing
Andrew Gentile	Project Manager
Julia Howe	Visual Resources/Soils/Lands and Realty
Marcia Rickey	Biological Resources/GIS
Shine Roshan	Socioeconomics
Jennifer Thies	Technical Editor
Drew Vankat	Noise/Wilderness Study Areas/Recreation/Hazardous Materials
David Batts	Project Director/Biological Resources

**WCRM –  
Western Cultural Resource Management, Inc.  
(Subcontractor)**

Chuck Wheeler	Cultural Resources/American Indian Concerns
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## CHAPTER 6

# REFERENCES

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**Appendix A**  
**BLM Interdisciplinary Team**  
**Checklist**

# INTERDISCIPLINARY TEAM ANALYSIS RECORD CHECKLIST

**Project Title:** Drum Mtn Temperature Gradient Explorations

**NEPA Log Number:** DOI-BLM-UT-W020-2009-28-EA

**File/Serial Number:** Geothermal Lease parcel #s UTU-86778, UTU-86779, UTU-86780, & UTU-86781

**Project Leader:** George Cruz

**DETERMINATION OF STAFF: (Choose one of the following abbreviated options for the left column)**

NP = not present in the area impacted by the proposed or alternative actions

NI = present, but not affected to a degree that detailed analysis is required

PI = present with potential for significant impact analyzed in detail in the EA; or identified in a DNA as requiring further analysis

NC = (DNAs only) actions and impacts not changed from those disclosed in the existing NEPA documents cited in Section C of the DNA form.

## PROJECT DESCRIPTION:

The need is for the BLM to cooperate with Standard Steam Trust in exploring its four geothermal lease parcels west of the Drum Mountains by allowing it to follow up on the gravity survey completed in February 2009 with further exploratory work to determine the potential extent and feasibility of geothermal development on these parcels. The purpose of the Proposed Action is to further refine knowledge of subsurface geothermal resources by installing 19 temperature gradient wells in a grid pattern throughout portion of the T. 14 S., R. 13 W. township that is northeast of the road at the foothills of Swasey Mountain.

### The Proposed Action:

The proposal is to install 19 exploratory temperature gradient wells in a grid pattern on BLM land and 2 temperature gradient wells on two SITLA sections at the north end of Whirlwind Valley/south end of Fish Springs Flat, west of the Drum Mountains. Access will be via existing roads and new road construction as needed. Access to install two temperature gradient wells on SITLA lands will be via BLM land including new road construction to one of those well sites.

### The No Action

No exploratory temperature gradient wells would be installed west of the Drum Mountains. This would result in at least three options: 1) no development of geothermal resources, 2) development of geothermal resources based largely on only the gravity survey, and 3) a proposal to do some other form of exploratory work that builds solely on the gravity survey.

## MANAGEMENT REVIEW OF PROPOSAL:

Field Office Manager	Date Reviewed	Comments

**STAFF REVIEW OF PROPOSAL:**

<b>Determination</b>	<b>Resource</b>	<b>Rationale for Determination*</b>	<b>Signature</b>	<b>Date</b>
PI	Air Quality	Ground disturbing activities have the potential to create fugitive dust within the area. To the greatest extent possible roads should be constructed perpendicular to the dominant wind direction. Watering of roads and disturbed areas as well as suspending operations during periods of high wind would be required to minimize the transport of fugitive dust.	/s/ Matt Rajala	10/19/2009
NP	Areas of Critical Environmental Concern	There are no ACEC's within the project area.	/s/SBonar	10-02-09
NI	Cultural Resources	No Historic Properties will be affected by the project	/s/ Joelle McCarthy	7-2-10
NI	Environmental Justice	The proposed action would not present any disproportionate impacts to minority or low income populations within the area.	/s/ Matt Rajala	10/19/2009
NI	Farmlands (Prime or Unique)	Disturbances associated with the proposed action would be temporary and would not lead to impacts on Prime or Unique farmlands.	/s/ Matt Rajala	10/19/2009
NI	Floodplains	Proposed new and existing access routes cross mostly low ephemeral draws and one or two intermittent channels that do not have floodplains managed under Executive Order 11988 on Floodplains.	/s/ George Cruz	11/3/09
NI	Invasive, Non-native Species	See attachment for mitigation.	/s/ R.B. Probert	9/10/09
NI	Native American Religious Concerns	Disturbance is minimal; all NHP will be avoided	/s/ Joelle McCarthy	12-15-09
NP	Threatened, Endangered or Candidate Plant Species	There are no known federally-listed plant species within the proposed geothermal exploratory well project.	/s/DWhitaker	12/7/09
NP	Threatened, Endangered or Candidate Animal Species	There are no known federally listed fish and wildlife species known to occur within or near the proposed action.	/s/ James Priest	12/31/09
NP	Wastes (hazardous or solid)	All waste must be removed and All hazardous materials used or produced must be reported to the FFO. They must be removed and disposed in an appropriately permitted disposal facility.	/s/ bcrosland	1/13/10
NI	Water Quality (drinking/ground)	The exploratory phase of the project does not present any foreseeable impacts to water quality.	/s/ Paul Caso	11/18/09
NP	Wetlands/Riparian Zones	Checked Riparian Maps & Files and there are not riparian or wetlands in the project area.	/s/ Bill Thompson	11/10/2009
NP	Wild and Scenic Rivers	There are no Wild & Scenic rivers listed in PL 111.11 for the Fillmore Field Office area.	/s/SBonar	10-02-09
NI	Wilderness/WSA's	The Fish Springs WSA is located north of Sandy Pass road. The project area is located approximately 1 ½ miles south of this road and no impacts are anticipated due to this separation.	/s/SBonar	10-02-09
NI	Rangeland Health Standards and Guidelines	A Rangeland Health Assessment was completed for the Swasey Knoll Allotment in May 2002. This allotment was determined to be in compliance with the standards of rangeland health and in conformance with the guidelines for grazing management.	/s/ Paul Caso	11/18/09
PI	Rangeland Management	Livestock (sheep) grazing will occur in the area of the project from 12/1/09 through 3/31/10. The project may interfere with grazing use if work occurs during this time. Overland travel and travel on unimproved roads when soils are wet and muddy should be avoided.	/s/ Paul Caso	11/18/09

Determination	Resource	Rationale for Determination*	Signature	Date
NI	Woodland / Forestry	No impact to forestry	/s/bcrosland	1/13/10
PI	Vegetation including Special Status Plant Species other than FWS candidate or listed species	Sand-loving buckwheat occurs on sandy soils within and surrounding the proposed wells and access roads areas. Constructing well pads and access roads may impact this plant. An effort should be made to either avoid surface disturbance by relocating access roads or well pads, and/or mitigate impacts to this plant and potential habitat areas.	/s/DWhitaker	12/7/09
PI	Fish and Wildlife Including Special Status Species other than FWS candidate or listed species e.g. Migratory birds.	Special Status Species such as dark kangaroo mouse ( <i>Micrdipodops megacephalus</i> ) and grasshopper sparrow ( <i>Ammodramus savannarum</i> ) have a likelihood of occurring within the area of the proposed action. The short-eared owl ( <i>Asio flammeus</i> ) was observed near the project site. Conservation measures presented in the applicant biological report and within the BLM Fish and Wildlife Biological Evaluation are to be applied to avoid/minimize impacts to these species.	/s/ James Priest	12-31-09
PI	Soils	See Technical Report	/s/ Matt Rajala	10/19/2009
NI	Recreation	There will be no impacts to casual recreation use from this project.	/s/SBonar	10-02-09
PI	Visual Resources	The affected area is designated VRM Class IV. The proposed action does meet the Class IV criteria and so is in conformance with the RMP, however there would be visual impacts.	/s/SBonar	7-12-2010
PI	Geology / Mineral Resources/Energy Production	This project will provide needed data for the geothermal resources in the project area	/s/J Mansfield	10/22/2009
NI	Paleontology	There are no known significant fossil resources in this area; the project would have little if any impact on any resources were they present in any case.	/s/J Mansfield	10/22/2009
NI	Lands / Access	As described, the proposed project would not affect access to public lands. During this exploration stage, no separate rights-of-way (ROW's) would be required. The proposed project would be subject to valid prior existing ROW's. No affected ROW's were identified on the MTP. See attached Realty/Access Report for mitigation measures.	/s/ Teresa Frampton	11/19/09
NI	Fuels / Fire Management	There will be no impacts Fire/ Fuels	/s/Justin Johnson	11/19/09
PI	Energy Resources	This project could lead to development of Geothermal Energy Resources	/s/J Mansfield	10/22/2009
NI	Socio-economics	The exploratory phase of the project does not present any foreseeable impacts to the socio-economics of the area.	/s/ Matt Rajala	10/19/2009
PI	Wild Horses and Burros	The proposed project is located within the northern boundary of the Swasey Mountain Wild Horse HMA. Some displacement of horses may occur during the exploration phase of this project. If the project leads to the development of Geothermal Energy Resources and more permanent facilities are constructed, wild horses in the area could experience permanent displacement from the areas that would be taken from the HMA for the development.	/s/Eric Reid	1/12/2010
NP	Wilderness characteristics	There have been no wilderness characteristics identified in this project area.	/s/SBonar	10-02-09
PI	Water Rights	Water would be required to drill these wells. The closest water sources are Swasey Well, Well 22, and the Swasey Spring	/s/ Paul Caso	11/18/09

Determination	Resource	Rationale for Determination*	Signature	Date
		Pipeline. BLM holds the water rights to these sources. A water use agreement must be completed and approved before these water sources can be utilized. If the project occurs during the grazing season, priority for the use of these sources will be with the grazing permittee.		

**FINAL REVIEW:**

Reviewer Title	Signature	Date	Comments
NEPA / Environmental Coordinator			
Authorized Officer			

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**Appendix B**  
**Letter of Comment from**  
**Southern Utah Wilderness**  
**Alliance**



southern  
utah  
wilderness  
alliance

RECEIVED

JUN 03 2010

Bureau of Land Management  
Fillmore Field Office

June 1, 2010

George Cruz  
Bureau of Land Management  
Fillmore Field Office  
35 East 500 North  
Fillmore, Utah 84631

RE: Comments on the Swasey-Drum Geothermal Gravity Survey (# UT-W020-2009-040-CX)

Dear Mr. Cruz,

Please accept these comments from the Southern Utah Wilderness Alliance (SUWA) regarding the Swasey-Drum Geothermal Gravity Survey Environmental Assessment (# W020-2009-040). We appreciate the opportunity to submit comments on this project. SUWA supports efforts to increase production of alternative energies throughout Utah, including geothermal energy. Although the proposed locations for the 18 temperature gradient holes (TGHs) are just beyond the land proposed for wilderness in the Utah Wilderness Coalition's Little Drum Mountain and Drum Mountain Units, SUWA has several concerns, discussed below.

As you may know, SUWA is a non-profit organization based in Salt Lake City, Utah with approximately 15,000 members, many of whom reside in Utah. SUWA's mission is to facilitate the preservation of the unique and outstanding wilderness-quality lands throughout Utah, and to promote the management of these lands in their natural state for the benefit of all Americans. SUWA has a deep and longstanding interest in the protection and preservation of all of BLM's Wilderness Areas, Wilderness Study Areas, and other wilderness-quality lands managed by the Utah BLM, including lands identified by the Utah Wilderness Coalition (UWC) as possessing wilderness characteristics and proposed for Wilderness in America's Red Rock Wilderness Act (ARRWA). SUWA supports and is excited by the prospect of renewable energy development, including geothermal energy; however SUWA supports only the development of renewable projects that do not impair lands proposed for wilderness in ARRWA, and other sensitive areas.

SUWA is eager to facilitate the wise development of the country's renewable resources and ensure that such development occurs in a responsible manner in locations appropriate for such developments. SUWA agrees with the goal of developing renewable energy, and considers the goal of preserving wilderness in conformity with it; preserving wilderness and developing geothermal energy need not conflict.

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## I. The EA Must Fully Analyze the Impacts of the TGHs on Visual Resources

The EA must fully analyze the impacts the TGHs may have on visual resources. Although the proposed locations for the TGHs are not within an area proposed for wilderness in ARROW, the neighboring areas retain a wild and generally undisturbed character, as well as impressive visual resources. This area exhibits an overwhelming sense of isolation and wild character that is slowly becoming a dwindling resource in America. Any development, small or large scale near Fish Springs Flat would impact the undeveloped nature of this region and dramatically affect the experience of recreationists who visit this remote and wild region of Utah.

Indeed, BLM is mandated to conduct regular wilderness and visual resource inventories in order that information about the land under its management stays current. 43 U.S.C. § 1711. The Federal Land Policy and Management Act (FLPMA) requires BLM to “prepare and maintain on a continuing basis an inventory of all public lands and their resource and other values . . . This inventory shall be kept current so as to reflect changes in conditions and to identify new and emerging resource and other values.” 43 U.S.C. § 1711(a). An area’s wilderness characteristics and visual resources are resource values under FLPMA Section 201, and BLM must conduct inventories of these resources on a regular basis to reflect current conditions. *See Oregon Natural Desert Ass’n v. Bureau of Land Management*, 531 F.3d 1114, 1118-19 (9th Cir. 2008) (“[w]ilderness characteristics are among the ‘resource and other values’ of the public lands to be inventoried under § 1711.”).

Thus, FLPMA requires BLM to identify any visual resources that exist by conducting visual resource inventories and repeating these inventories as necessary to keep them current. The management guidance for the lands at issue comes from the House Range Resource Area Resource Management Plan (“RMP”), which was completed 22 years ago, in October 1987. Therefore, BLM is required to consider whether, and to what extent, visual resource values are now present in the proposed locations for the TGHs and, if the values are present, how drilling the TGHs would impact these values.

## II. Impacts on Air Quality from new Access Roads

While the EA proposed by Standard Steam Trust, LLC acknowledges and addresses the emissions likely to result from site preparation and drilling, the EA must also address the potentially permanent impact the construction of new access roads could have on the region’s air quality. *Drum Mountain Temperature Gradient Exploration Project*, Draft Environmental Assessment, # UT-W020-2009-040 (May, 2010). The proposed construction of up to 10 miles of new access roads could result in a significant amount of dust which would impact air quality and create pollution.

SUWA applauds the BLM’s recommendation that roads should be constructed perpendicular to the dominant wind direction, and also the watering of roads and disturbed areas as well as

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suspending operations during periods of high wind in order to minimize the transport of fugitive dust. However, the existing language of the EA—specifically with regard to the “temporary” nature of the project and the “temporary” impacts on air quality—undercuts the serious concerns about air quality in Fish Springs Flat.

FLPMA requires the BLM to ensure that the proposed geothermal gravity survey will comply with all applicable air quality standards, including standards established under the Clean Air Act. *See* 43 U.S.C. § 1712(c)(8) (requiring BLM to “provide for compliance with applicable pollution control laws, including State and Federal air ... pollution standards or implementation plans”). FLPMA extends this requirement to all BLM leases, permits, and other land use authorizations. *See* 43 C.F.R. § 2920.7(b)(3) (requiring that BLM “land use authorizations shall contain terms and conditions which shall ... [r]equire compliance with air ... quality standards established pursuant to applicable Federal or State law”).

Thus, BLM must comply with the Clean Air Act’s national ambient air quality standards—or NAAQS—for certain pollutants that have a significant effect on public health. *See, e.g.*, 42 U.S.C. §§ 7408, 7409; 40 C.F.R. §§ 50.4 30– 50.13. These are the maximum concentration of the regulated pollutants permitted by law. Ozone and PM<sub>2.5</sub>, among other pollutants, are subject to NAAQS standards.

Both short-term and long-term exposure to particulate matter can lead to increased premature mortality, increased hospital admissions and emergency room visits, visibility impairment, and the development of chronic respiratory disease. *See* 71 Fed. Reg. 2627-28. Particulate matter comes from activities such as vehicles driving on unpaved roads and vehicular emissions.

Ozone exposure can lead to adverse health effects in humans ranging from decreased lung function to possible cardiovascular-related mortality and respiratory morbidity. 73 Fed. Reg. at 16, 436. Ozone pollution also contributes to plant and ecosystem damage. *Id.* at 16, 485-89. It damages trees and other plants thereby affecting landscapes in national parks, among other places. Ground-level ozone is formed from precursor emissions—volatile organic compounds (VOCs) and nitrogen oxides (NO<sub>x</sub>)—and its concentrations are affected by temperature, sunlight, wind, and other weather factors. *See* 73 Fed. Reg. at 16,437. These precursor emissions originate from a wide variety of sources, both mobile and stationary. *Id.* Vehicles, including the vehicles that will travel along the new access routes, emit these precursors from their tailpipes.

In addition to air pollution issues related to NAAQS, the BLM must also consider the impacts that motor vehicle travel and mechanical equipment use, both cross country and on designated routes, will have on windborne dust. Dust deposition leads to early snowmelt. *See* Thomas H. Painter *et al.*, *Impact of Disturbed Desert Soils on Duration of Mountain Snow Cover*, GEOPHYSICAL RESEARCH LETTERS, Vol. 34, L12502 (June 2007). This early snowmelt creates a host of problems, including regional climate change and drought. *See* Jayne Belnap *et al.*, *Dust in the Low Elevation Lands: What Creates It and What Can We Do About It?*,

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[http://www.crwd.org/media/uploads/2009\\_09\\_18\\_Belnap\\_seminar.pdf](http://www.crwd.org/media/uploads/2009_09_18_Belnap_seminar.pdf) (presentation given at the Colorado River District's Sep. 18, 2009 seminar). Motor vehicle travel and other surface-disturbing activities also tend to destabilize soils and make them susceptible to windborne erosion. *See id.*

The National Environmental Policy Act (NEPA) and its implementing regulations require BLM to thoroughly analyze environmental impacts from proposed projects. *See* 40 C.F.R. § 1506.1(a)(1). The BLM must analyze and disclose how the geothermal gravity survey will lead to increased dust production, created by the use of vehicles and other mechanical equipment stirring up dust, as well as from the resulting destabilization of the soils from the loss of vegetation and biological crusts. BLM should then quantify to what extent snow will melt off earlier in the region, as a result of the increased dust production. Without estimating the contributions of this increased vehicular travel on dirt roads and the resulting destabilized soils, to early snowmelt and airborne dust, BLM will violate NEPA's mandate that it thoroughly analyze environmental impacts.

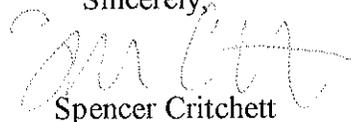
### III. Conclusion

SUWA supports BLM's efforts to increase the production of alternative energies, including geothermal energy, throughout Utah so long as there is no conflict with proposed wilderness areas. In general, SUWA appreciates the thorough consideration and analysis undertaken by BLM in its Swasey-Drum Geothermal Gravity Survey EA.

However, while the proposed locations for the TGHs are not within an area proposed for wilderness, the resulting impacts on visual resources must be fully analyzed in the EA, especially as viewed from adjacent proposed wilderness areas. Furthermore, SUWA is concerned about the impact to the region's air quality that may result from increased traffic on the proposed access roads. Finally, if geothermal development occurs in the future, particularly in areas with wilderness characteristics, SUWA will have additional concerns.

Thank you for your consideration of these comments. If you have questions or concerns, please either email me at [Spencer@suwa.org](mailto:Spencer@suwa.org) or contact me at the address or phone number at the footer of this letter. We look forward to working with you on this project and other geothermal energy developments.

Sincerely,



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Legal Intern

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