NEAL HOT SPRINGS GEOTHERMAL WELL CONSTRUCTION RIGHT OF WAY, PHASE 2

Serial Number OR-65701

Environmental Assessment
DOI-BLM-OR-V040-2011-008

Prepared by:
U.S. Department of the Interior
Bureau of Land Management
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100 Oregon Street
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BLM Vale District

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NEAL HOT SPRINGS RIGHT OF WAY

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1 INTRODUCTION

1.1 Background

On or about May 24, 2006 U.S. Geothermal Inc. (USG) leased approximately 5,409 acres of surface and mineral rights owned by Hot Springs Ranch and Richard Jordan. The lease was established for the purpose of exploring and developing geothermal resources for renewable energy production. The general location of USG's geothermal energy project is 12 miles northwest of Vale, Oregon at the confluence of Bully Creek and Cottonwood Creek. (See Figure 1) USG also leased the mineral rights and the perpetual right of ingress and egress to and from said real property…" which were retained by the original surface owners when the surface estate was deeded to the Bureau of Land Management (BLM). [1]

In early 2008 USG filed five (5) geothermal well drilling applications with the State of Oregon, Department of Geology and Mineral Industries (DOGAMI). Four of the well drilling applications were located on private surface and private mineral estate and one well (Neal Hot Springs – 3, "NHS-3") was filed on private mineral estate where the surface estate is managed by the Vale District, Bureau of Land Management (BLM). BLM issued an 11-acre Right-Of-Way (ROW) for NHS-3 on January 8, 2010 (BLM serial number OR-65701). This decision was based on analysis completed in Environmental Assessment (EA) DOI-BLM-OR-V040-2009-030 with a Finding of No Significant Impact (FONSI) on September 11, 2009.

A Categorical Exclusion (CX), DOI-BLM-OR-V040-2009-059, was completed on October 18, 2009 for the construction of five temperature gradient wells in section 5.

Two CXs were completed on November 11, 2010 for power line corner crossing ROWs for Idaho Power Company.

The current proposed action is west of the NHS-3 well location in Malheur County, Oregon in the western half of Section 5, Township 18 South, Range 43 East, Willamette Meridian (33).

On February 24, 2011, the final closing of a $96.8-million loan guarantee with the U.S. Department of Energy (DOE) was completed for the construction of a 23-megawatt-net power plant. The plant would be constructed on private land. DOE completed Environmental Assessment DOE/EA-1676 with a FONSI on December 2, 2009.

In order to continue evaluation of the geothermal resources on the private mineral estate, USG filed six (6) Form 3260-2; Geothermal Drilling Permits and supporting maps and documentation with the BLM on October 18, 2010. This exploration proposal was amended on March 31, 2011 by submitting a ROW application for three (3) drill locations with associated access roads.

[1] Malheur County Recorder's Office, Warranty Deed 06757, Book 105 Page 111.

The private ownership of the minerals precludes BLM's approval of geothermal well drilling as BLM's authority remains with surface management on this land parcel. The State of Oregon will complete the well drilling authorization. The method of authorizing access for the exploration would be to issue a Right-Of-Way (ROW) for the drill sites and access roads. The ROW would be for 9 acres which would encompass the three drill sites and 1.9 miles of access roads associated with the exploration project. (See Figures 2 and 3)

1.2 Purpose and Need

The purpose of the BLM action is to issue a ROW, deny the ROW application, or issue a ROW with stipulations based on the application by USG. BLM must evaluate the effects of the proposed action and to determine under what conditions a ROW would be issued by the BLM to USG. The need for the action is based on USG's application for surface access for geothermal exploration of the private mineral estate.

The applicant is currently exploring for geothermal resources on adjacent private lands and other portions of T. 18 S., R. 43 E, section 5 with the intent to further explore and develop the private mineral estate located beneath the BLM administered surface estate.

On May 18, 2001, the President issued Executive Order (E.O.) 13212, ''Actions to Expedite Energy-Related Projects,'' which established a policy that federal agencies should take appropriate actions, to the extent consistent with applicable law, to expedite projects to increase the production, transmission, or conservation of energy. In that same month, the President's National Energy Policy Development Group recommended to the President, as part of the National Energy Policy, that the Departments of the Interior, Energy, Agriculture, and Defense work together to increase renewable energy production. On August 8, 2005, the President signed into law the Energy Policy Act of 2005 (PL. 109–58). Section 211 of the Act states, ''It is the sense of the Congress that the Secretary of the Interior should, before the end of the 10-year period beginning on the date of enactment of this Act, seek to have approved non-hydropower renewable energy projects located on the public lands with a generation capacity of at least 10,000 megawatts of electricity.''

Under the Federal Land Policy and Management Act (FLPMA) and its implementing regulations, BLM must respond to ROW applications. The BLM is also required to comply with the National Environmental Policy Act (NEPA) and the Council of Environmental Quality (CEQ) regulations. The BLM's Malheur Resource Area has determined that an Environmental Assessment (EA) is necessary to evaluate and disclose the potential environmental impacts associated with this proposed action and any reasonable alternatives to the proposed action, including a no action alternative.

1.3 Decision to be Made

The BLM will make the decision to grant, deny, or grant with modifications, a 9-acre ROW to USG for the construction of road access and drill pads to accommodate the drilling of a geothermal exploration wells to be located on public lands within the Vale District.

The decision would also include a determination of ROW duration currently anticipated to be 30 years with the provision for extension.

1.4 Scoping and Public Involvement

On January 28, 2011, BLM requested scoping comments from the public by means of a 30-day published scoping request. At the time, the project as submitted by USG for scoping was for six well sites and 2.3 miles of access roads for a total of 15 acres disturbance. The request was placed in local newspapers and a notification letter was sent out to interested publics with a closing date of March 1, 2011.

Four response letters were received within the allotted review period. The substantive comments are summarized as follows:

- New roads should not be necessary as there are existing roads in the area.
- Consider phased drilling with drill pads constructed as need.
- Reclamation of surface disturbance not needed for operations should be required.
- BLM should disclose and consider the water impacts of this drilling operation.
- The exploration area is within ODFW Category 2 (essential and limited) mule deer winter range.
- An active bald eagle nest occurs near the project area.
- This EA needs to examine and disclose the cumulative impacts from previously permitted activities and the potential for future expansion.

This EA was prepared in accordance with the Title V of FLPMA, the CEQ regulations for implementing NEPA (40 CFR 1500), and the BLM's NEPA Handbook (H-1790-1, January 2008). The scope of this EA is based on issues and concerns identified by the BLM staff, public comment, and the applicant.

1.5 Relationship to Laws, Regulations, Policies, and Plans

The BLM's Malheur Resource Area has determined that an Environmental Assessment (EA) would be needed to evaluate and disclose the potential environmental impacts associated with this proposed action and any reasonable alternatives to the proposed action, including a no action alternative. The EA has been prepared in accordance with the following statutes and implementing regulations:

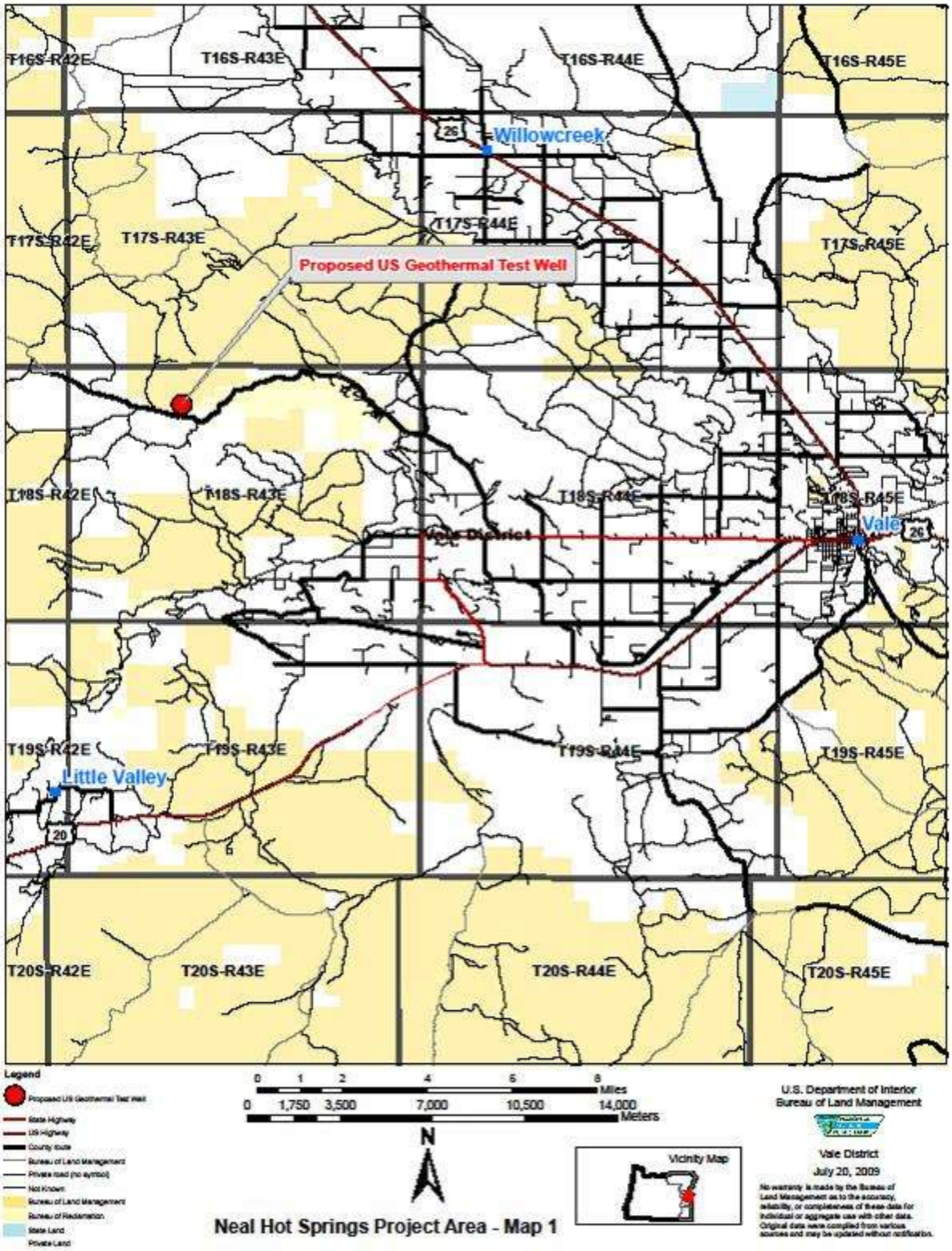
- The National Environmental Policy Act (NEPA) of 1969, as amended (Public Law [PL] 91-190, 42 U.S.C. 4321 (*et seq.*);
- 40 CFR 1500 (*et seq.*). Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act;
- USDI requirements (Departmental Manual 516, Environmental Quality [USDI 2004]);
- The Federal Land Policy and Management Act of 1976 (PL 94 579, 43 U.S.C. 1761 (*et seq.*); 43 CFR 2800, Rights-of-Way, Principles and Procedures;

- Rights-of-Ways under the Federal Land Policy and Management Act and the Mineral Leasing Act; final Rule, April 22, 2005.
- BLM NEPA Handbook (H-1790 1), as updated (BLM January, 2008);
- Considering Cumulative Effects under the NEPA [CEQ 1997];
- Best Management Practices as defined in the Oil and Gas *"Gold Book",* Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development", *Fourth Edition,* (Gold Book).
- Proposed Southeastern Oregon Resource Management Plan and Final Environmental Impact Statement (BLM, 2001) (SEORMPFEIS).
-

1.6 Issues

The preliminary issues identified through internal and external scoping include the potential to increase the spread of noxious weeds, the potential for impacts to cultural or historical sites, well head stabilization, surface runoff and erosion from the well pads and access roads, wildlife habitat, water resource impacts, and public safety.

Figure 1 Project Location Map



2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

The proposed action is for BLM to grant a 9-acre ROW in the western half of section 6, T. 18 S., R. 43 E., Willamette Meridian (33) to USG in accordance with the applicant's geothermal drilling application and Plan of Development (POD) dated March 31, 2011. The acreage under the ROW would allow for field adjustment of the surface disturbance associated with the 4.5 acres of access road and 4.5 acres of drill pad construction.

USG would construct, maintain, and operate roads, well drilling pads, exploratory geothermal wellheads, and associated pumping, power and control equipment. The proposed roads are designed to be 18 feet wide and 1.9 miles long (10,050 feet) with an average slope of 7%. Approximately 3,200 feet of access road was upgraded during a previous phase of the project and is not considered as new road construction, but will be an integral part of this project. Working surfaces would be covered with coarse rock or gravel to prevent excessive erosion. The road would be maintained to safely accommodate semi-trucks, trailers and drilling equipment. Best Management Practices (BMP) for road construction would be implemented in accordance with the POD and Appendix O of the SEORMPFEIS. (See Figures 1, 2, & 3 maps)

The three well pads and construction sites would affect approximately 9 acres of public surface. The well pads would be constructed in such a manner as to create a level pad for the drill rig and a graded, graveled surface for the support equipment. Storm water runoff from undisturbed areas around the constructed drill pad would be directed into ditches surrounding the drill pad and back onto undisturbed ground consistent with best management practices for storm water. A reserve or "mud" pit would be constructed for the containment and storage of drill cuttings, waste drilling mud, and storm water runoff from the constructed pad. All machinery, drilling platforms, and oil and fuel storage areas on the drill pad would drain to the reserve pit in order to prevent the offsite release of spills or storm water runoff from these source areas.

Geothermal wells would be drilled to an approximate depth of 4,000 feet with a platform-mounted conventional mud-rotary drilling rig. The drilling rig would include diesel engines, hydraulic pumps, fuel tanks, pipe racks, and drilling mud mixing tanks and mud pumps. Other auxiliary equipment, such as air compressors, would be used during drilling. During drilling, the top of the drill rig mast would be as much as 70 feet above the ground surface. Drilling fluids for the holes would consist of standard non-hazardous bentonite clay-water-based, or polymer-water-based mud used for lubrication to cool the drill bit, and to remove drill cuttings from the hole. All holes would be cased in accordance with State-approved drilling permits to insure integrity of the wellbore and to isolate the wellbore from groundwater aquifers. Only non-hazardous additives would be used to prevent corrosion, adjust mud weight, or control lost circulation.

On average, 2-3 large tractor trailer trucks (delivering drilling supplies and equipment), and 5-10 small trucks, service vehicles or work vehicles, would be driven to the site each day throughout the typical 20- to 40-day drilling process. Difficulties encountered during the drilling process, including the need to work over or to re-drill the well, could double the time necessary to successfully complete a geothermal well. Drilling would be conducted 24-hours per day, 7-days per week by a crew of six to nine workers. During short periods, as many as 15 staff would work on the drill site at any one time. Drill crew accommodations in the form of self-contained travel trailers may be on the drill site during operations. Gray water and sewage would be removed to an authorized disposal site.

Figure 2 Site Location Map

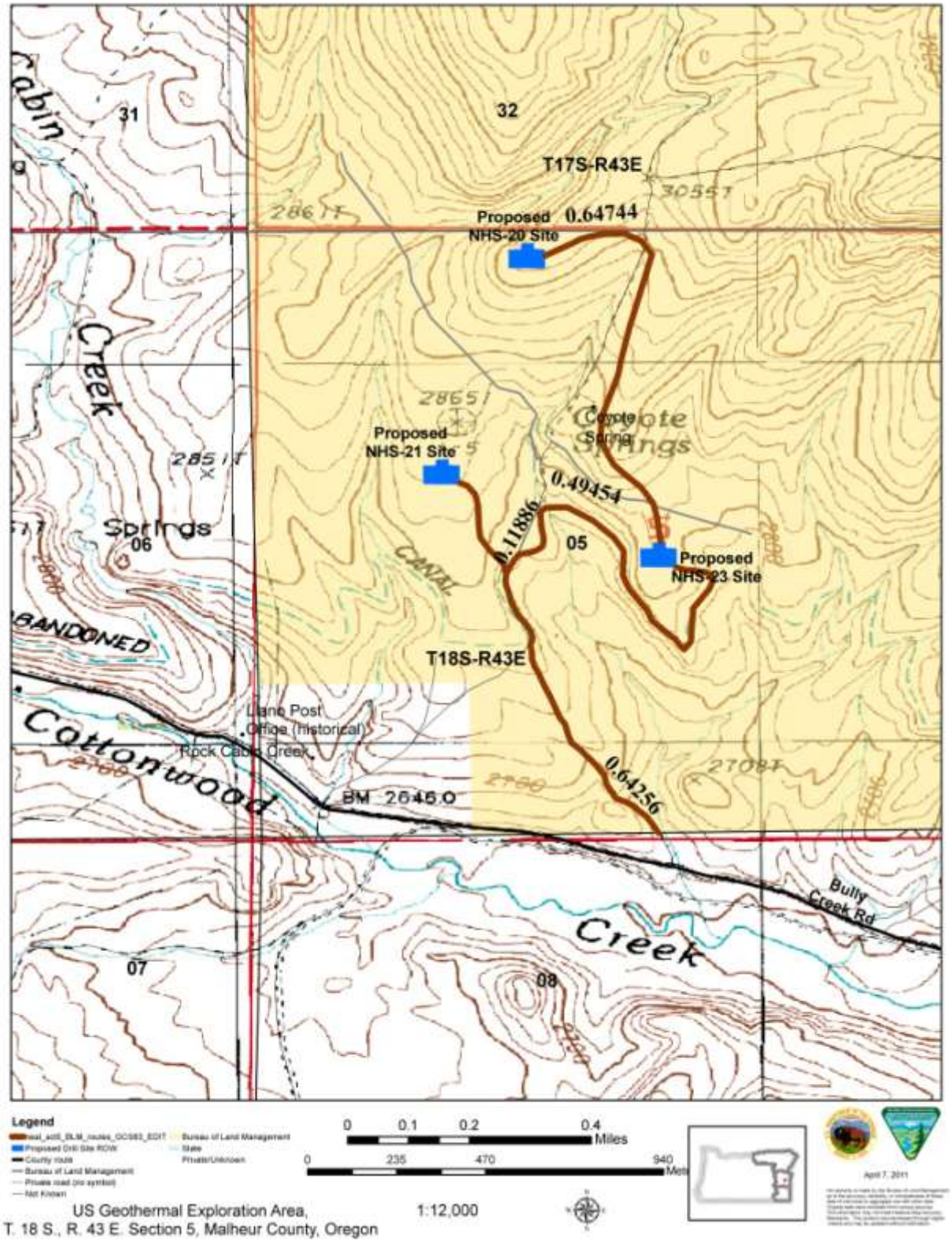
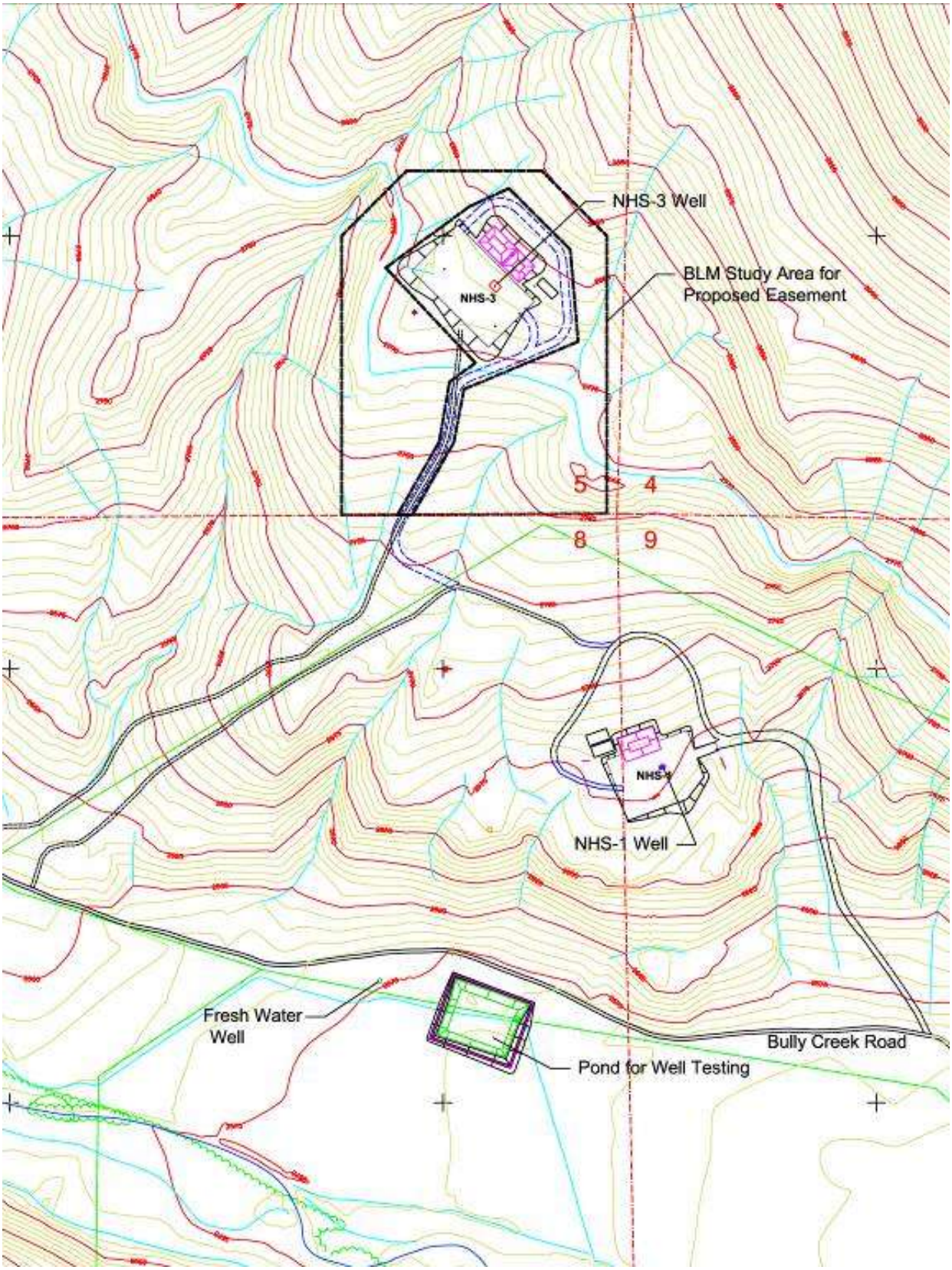


Figure 3 Typical Drill Site Detail



Pending successful discovery of a geothermal resource or an appropriate injection zone, USG would propose to transition the exploration wells to operational geothermal wells for long term renewable energy production.

In the event no geothermal values are identified or injection sites are determined to be ineffective, all improvements would be removed and the site would be shaped, graded, re-vegetated, and reclaimed to the approximate original contour of the area. The actual wells would be abandoned in accordance with requirements of the Oregon Department of Geology and Mineral Industries.

All construction and surface improvements would be maintained throughout the term of the ROW.

2.2 Adopted Environmental Protection Measures

USG would implement the following operational environmental protection measures.

- Water would be applied to the ground during the construction and operations, as necessary, to control dust.
- Portable chemical sanitary facilities would be available and used by personnel. The facilities would be maintained by a local contractor.
- Solid wastes (paper trash and garbage) generated by the operations would be transported offsite to an appropriate landfill facility by a local contractor.
- A Spill or Discharge response plan would be maintained with the on-site construction office.
- Best Management Practices for erosion control and runoff water management would be implemented.
- Vehicles and equipment from outside the area would be cleaned before traveling onto the site in order to assist in reducing the potential spread of noxious weeds.
- USG would coordinate with the BLM and/or Malheur County Weed Supervisor to identify and treat noxious or invasive weed species.

2.3 Alternative 1 – The No Action Alternative

The No Action alternative would result from the denial of USG's ROW application which would preclude surface use and access for mineral exploration or development. USG would not be able to improve, construct, and maintain any access road, drilling pad, or pumping facilities on BLM-administered lands.

2.4 Alternatives Considered but Not analyzed in Detail

The NEPA Handbook directs the BLM to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal that involves unresolved conflicts concerning alternative uses of available resources…"[2]

[2] BLM NEPA Handbook H-1790-1, January 2008, Section 6.6.1

No unresolved conflicts involving alternative uses have been identified to drive the creation of an alternative which would allow evaluation and development of the geothermal resource. Therefore, no alternatives (other than the required "No Action Alternative") will be analyzed in detail in this Environmental Assessment. Two alternatives were considered but rejected from detailed evaluation. The alternatives included directional drilling and use of an alternate access route.

2.4.1 Directional Drilling

Directional drilling was considered as a method for reducing impacts to public surface resources. Directional drilling would require USG to locate a drill pad on adjacent private surface ownership and drill "directionally" to the intended geothermal target. Directional drilling has physical limitations, requires specialized equipment, potentially larger operations area, and requires additional staff. In the case of this project, the relationship of the target production zone to the property boundary and the surface elevation physically limit the ability to directionally drill. Upgraded equipment would result in an approximate 15% to 25% ($300,000 - $500,000) increase in drilling costs and greater surface disturbance on steeper topography would result in five to ten additional acres of surface disturbance. Directional drilling was rejected based on economic impacts, engineering constraints, and a cumulative increase in surface impacts.

2.4.2 Alternate Drill Locations and Additional Access Roads

Three additional drill sites and associated access roads were proposed by USG to evaluate geothermal resources in the eastern portion of T. 18 S., R. 43 E., section 5. The evaluation within this environmental assessment is largely based on evaluating the larger proposed disturbance area. The alternate access routes extended from roads on private land through the previously authorized NHS-3 drill site on BLM administered lands. Other proposed roads generally followed the abandoned canal from the west side of section 5, south of Coyote Springs, to access two drill sites. Evaluation by USG engineering staff determined that the drill sites and access was not necessary for an evaluation of the geothermal resource.

2.5 Plan Conformance

The proposed action is in conformance with the goals and objectives of the SEORMPFEIS and the Northern Malheur Management Framework Plan. Appendix P of the SEORMPFEIS describes Reasonably Foreseeable Development of Geothermal Resources. The Proposed Action is consistent with Appendix P which states that; "A typical geothermal well drilling operation would require 2–4 acres for a well pad, including reserve pit, and 0.5 mile of moderate duty access road with a surface 18 to 20 feet wide (total disturbed width, with ditches, cuts, and fills, of 40 feet). Existing roads would be used whenever possible. Total surface disturbance for each well and any new road is expected to be less than 6 acres." The proposal contributes to attainment of the goals and objectives established for mining, minerals and energy described in the SEORMPFEIS.[3]

[3] USDI, BLM, 2001, SEORMPFEIS, Appendix P, pp 351-352

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

The proposed ROW is located in Malheur County, Oregon approximately two miles west of Bully Creek Reservoir and immediately adjacent to the privately owned Neal Hot Springs. Grazing, recreation and mineral exploration are the predominant uses of the public lands in the area. The site is located at 2,800 feet above sea level and is located in the Owyhee uplands. "The Owyhee uplands lie in the northwest corner of the Great Basin. This region differs from the rest of the province in that it is a flat deeply dissected plateau with little interior drainage where fault-block topography is less pronounced. The drainage basin of the Owyhee River encompasses the uplands. Originating in Nevada, the Owyhee River flows northerly through Idaho and Oregon to join the Snake River near Adrian, Oregon. In spite of low rainfall in the area, steep gradients give the [sic] river and its tributaries well-defined drainage patterns and deep canyons. Cutting through the uplands over 6,000 feet above sea level, the river drops to approximately 2,000 feet where it joins the Snake. Small streams flowing in from the hills are largely intermittent."[4]

The site is typical of mid-elevation Owyhee Plateau rangelands. The proposed ROW is located in the Cottonwood Creek watershed, a tributary to Bully Creek. Stream flow is influenced by winter snowpack and summer rainfall. Cottonwood Creek, in the project area, does not typically carry water after June. The nearest surface water is Cottonwood Creek, an interrupted perennial drainage, located 0.4 miles south of the proposed ROW. In the project area, extensions of the Walker Lane fault create openings for thermal springs to reach the surface. Three intermittent springs and seeps also occur on private lands approximately 0.3 miles south of the ROW. One thermal spring has measurable flow that discharges to Bully Creek.

3.1 Vegetation

Vegetation in the project area historically supported a sagebrush steppe plant community. Disturbance factors such as wildfires, domestic livestock grazing use, and invasive plants have converted a portion of the shrub and perennial grass rangeland to annual grasses and local common weed species.

The dominant vegetation type on the surrounding hill slopes is Wyoming big sagebrush (Artemisia tridentate ssp. wyomingensis) with an understory of perennial grass species, primarily bluebunch wheatgrass (Pseudorogneria spicata). Two site surveys were conducted by Rebecca Beavers, the contracted botanist, in May and in June of 2008. Essentially the east two thirds of the site are covered in Medusahead (Taeniatherum caput-medusae), cheat grass (Bromus tectorum), whitetop, and other annual grasses. The west one third of the site supports a mix of shrub steppe vegetation. Ms. Beavers also reported a significant amount of bare soil on site.[5]

[4] Orr E. L. and W. N. Orr. 1999. *Geology of Oregon*. Kendall/Hunt Publishing Co., p 79
[5] Botanical Specialist Report, Rebecca Beavers, July 2008

3.2 Noxious Weeds

Invasive nonnative species are noxious weeds, insects, and plant diseases, non-native to Oregon, that have come to thrive in a given ecosystem. Invasive, nonnative species spread from infested areas by people, equipment, livestock/wildlife, and the wind. Because of their aggressive colonization and lack of natural enemies, these species can be highly destructive, competitive with native species, and difficult to control. Dominant invasive species identified on the site include hoary cress (*Cardaria draba*), medusa head rye *(Taeniatherum caput-medusae),* and cheatgrass (Bromus tectorum). The Bully Creek corridor and the surrounding uplands support numerous populations of noxious weeds and at least two noxious weeds, hoary cress and cheat grass, are the dominant plant species on the ROW.

Scotch thistle (Onopordum acanthium), a noxious, invasive species is present along Bully Creek road and could easily be transported by passenger vehicle traffic into the site. Rush skeletonweed (Chondrilla juncea) was found approximately two miles south of the site in October of 2008, and it is also known to exist a few miles northeast of the site.

3.3 Special Status Plants

After consulting with necessary agencies to identify special status plants within and surrounding the project area a botanical clearance was conducted by a specialist in the spring of 2008. One special status plant known to occur near the proposed project area is Malheur prince's plume (*Stanleya confertiflora*). Malheur prince's plume is a Bureau Sensitive Species and a Species of Concern (SOC) by the U.S. Fish and Wildlife Service. Additionally, recent modeling has noted the area to possess potential habitat for the occurrence of slickspot peppergrass (*Lepidium pappeilliferum*) (Colket-2008 Slickspot Peppergrass (*Lepidium papilliferum*) Field Survey and Predictive Distribution Modeling) yet no populations have been discovered in Malheur County, Oregon. Slickspot peppergrass holds no Bureau or State status in Oregon due to the lack of documented occurrences. During the clearance no special status plants or the appropriate habitats were noted within the project area. The closest documented site for Malheur prince's plume is 3.5 miles to the north, northwest. For slickspot peppergrass, the closest site is greater than 40 miles to the east in the state of Idaho.

3.4 Migratory Birds

The proposed project is located in a sagebrush/grassland habitat type. Migratory bird species expected to occur in the area include sagebrush obligate species such as Brewer's sparrow, sage sparrow and sage thrasher. Chukar partridge and California quail are year round residents. Other species such as Burrowing owls, northern harriers, long-billed curlews, golden eagles and bald eagles are known to occur in or near the proposed project area. Other migratory birds and several raptor species common to southeastern Oregon live throughout the area. An active bald eagle nest was found approximately 2.5 miles from the proposed project area near Bully Creek Reservoir.

3.5 Wildlife and Fish

Wildlife in the proposed project area is typical of Wyoming big sagebrush /bluebunch wheatgrass and sagebrush/cheatgrass disturbed habitat types in the northern Great Basin and Owyhee Uplands communities. The project area is utilized by a variety of upland big game species including pronghorn antelope, mule deer, Rocky mountain elk and mountain lion. Mule deer and elk primarily use the area in the winter, while antelope and mountain lion occupy the area year round. Small mammals found in the project area include coyotes, badgers, black-tailed jackrabbits, deer mice, and woodrats. Reptiles include bull snakes, western rattlesnakes, and several species of lizard.

Greater sage-grouse, a BLM special status species, may occur in the proposed project area on a yearlong basis; however, the project area does not possess the vegetative qualities (contiguous canopy cover) needed to provide suitable nesting habitat. The nearest sage-grouse lek is approximately 4 miles away. Sagebrush habitat adjoining the lek provides hiding and nesting cover for sage-grouse during the breeding season. Therefore, sagebrush stands adjacent to the project area may provide nesting habitat. Riparian areas such as Cottonwood Creek and several seeps and springs found adjacent to the proposed project area provide important brood rearing habitat for sage-grouse. Sage-grouse likely forage within the proposed project area.

Based on a review of a list of threatened, endangered, proposed, and candidate species provided by the Fish and Wildlife Service it was determined that no federally listed, proposed or candidate species are known to occur in the project area and thus would not be impacted by the proposed project.

No fishery resources are present; as such they will not be discussed further.

3.6 Livestock Grazing

The area of the proposed ROW is located in the Kern Creek pasture of the Cottonwood Mountain Allotment (20102). The Kern Creek pasture encompasses 16,450 acres and the Allotment encompasses 34,432 acres. The BLM Malheur Resource Area administers 33,290 acres while 1,142 acres are private or other federally administered lands. An animal unit month (AUM) is the amount of forage needed to sustain one cow, five sheep, or five goats for a month. The allotment supports 7,383 AUMs during the grazing year. On an average basis, each acre of land will support 0.2 animals units per month or inversely, it requires approximately five acres to support each animal unit.

3.7 Recreation and Visual Resources

Hunting is the predominant recreational activity in the area of the proposed action. The area is open to off-highway vehicle (OHV) use and there are no travel restrictions limiting OHVs to designated trails.[6] There are no trails that would indicate regular OHV use and the proposed action is not located at a trailhead or on an access route. The proposed action is consistent with

[6] Op.Cit. SEORMPFEIS, Appendix I and Map OHV-PRMP, 2001

the objectives of the SEORMPFEIS; as a result, recreation access will not be discussed further in the environmental assessment.

The BLM initiated the visual resource management (VRM) process to manage the quality of landscapes on public land and to evaluate the potential impacts to visual resources resulting from development activities. VRM class designations are determined by assessing the scenic value of the landscape, viewer sensitivity to the scenery, and the distance of the viewer to the landscape. These management classes identify various permissible levels of landscape alteration, while protecting the overall visual quality of the region. They are divided into four levels; Classes I, II, III, and IV. Class I is the most restrictive and Class IV is the least restrictive.

The proposed action is located in a VRM Class IV area. The objective of Class IV is to provide for management activities that require major modification of the existing landscape character. The level of change to the characteristic landscape can be high. Management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic landscape elements.[7] The proposed action is consistent with the objectives of the SEORMPFEIS; as a result visual resources will not be discussed further in the environmental assessment.

3.8 Wilderness Study Areas

Wilderness characteristics and values, described in section 2(c) of the "Wilderness Act" of 1964 (Public Law 88-577), must be protected and enhanced in all Wilderness Study Area's (WSAs). The initial task of identifying areas suitable for wilderness preservation has been completed as mandated in FLPMA section 603, and is documented in Oregon Wilderness Final Environmental Impact Statement (OWFEIS) and Wilderness Study Report Oregon (WSRO)."[8] The proposed ROW is not located within or adjacent to any lands which are suitable for wilderness preservation.

3.9 Cultural Resources

Cultural resources in the project area are associated with landforms as transportation corridors (wagon roads), historic homesteads, early irrigation projects features, early mining activity, and remains of stage and telegraph stations.

3.10 Paleontological Resources

Miocene, Pliocene, and Pleistocene fossil flora and fauna have been located in volcanic tuffs, sandstone and siltstone beds and Pleistocene gravels in areas of southeastern Oregon. Fossil fauna include fish and Miocene mammals. A wide variety of plant species have been identified by leaf fossils of trees, shrubs, herbs, and vines. The geology of the Neal Hot Springs site does not typically support paleontological resources.

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[7] Op.Cit. SEORMPFEIS, Appendix J, 2001
[8] Op.Cit., SEORMPFEIS, pg. 106

3.11 Air and Atmospheric Quality

The Project area is located within the U.S. Environmental Protection Agency, Region 10, Eastern Oregon Air Quality Control Region. The air quality in the area is generally good and typical of large rural areas within the Great Basin and Owyhee Uplands. Wind measurements for the site have not been recorded. However, data from the Western regional Climate Center (WRCC) of the National Climate Data Center (NCDC) of the National Oceanic and Atmospheric Administration (NOAA) indicates that at site Westfall 2N, Oregon, 15 miles west of the Project area, the wind is from the west approximately 11 months of the year and the average speed is 5.9 miles per hour (mph), with a low average speed of 4.0 mph and a high average speed of 8.1 mph (WRCC, 2006). Winds may also blow from the northwest. The mean annual monthly precipitation is approximately 10.5 inches while the average annual maximum air temperature is 49.7 degrees Fahrenheit (WRCC, 2005). The principal source of air contaminants in the project area is from wind-blown dust, both off dry rangeland in the region and from traffic along dirt roads. During the summer months dust storms and rangeland wildfires may negatively affect air quality.

Under the Clean Air Act, BLM-administered land in the proposed project area is classified as Class II. All land will be managed under Class II standards unless it is reclassified by the State of Oregon. The proposed ROW is not located in or adjacent to any mandatory Class I (most restrictive) Federal air quality areas, U.S. Fish and Wildlife Service (USFWS) Class I air quality units, or American Indian Class I air quality lands.[9]

Climate Change

The temperature of the planet's atmosphere is regulated by a balance of radiation received from the sun and the amount of that radiation absorbed by the earth and atmosphere. Greenhouse gases (e.g., carbon dioxide and methane), as well as water vapor and particulate matter in the atmosphere keep the planet's temperature warmer than it would be otherwise; allowing the planet to sustain life. While these gasses and particles have occurred naturally for millennia, there has been a marked increase in their atmospheric concentration since the start of the industrial age, contributing to observed climatic variability beyond the historic norm. While global and national inventories are established, regional and state-specific inventories are in varying levels of development. Quantification techniques are in development – for example, there is a good understanding of climate change emissions related to fuel usage; however measuring and understanding the effects of albedo is less comprehensive. Analytical tools necessary to quantify climatic impacts are presently unavailable. As a consequence, impact assessment of specific effects of anthropogenic activities cannot be determined.

Ongoing scientific research has identified the potential impacts of anthropogenic (man-made) greenhouse gas (GHG) emissions and changes in biological carbon sequestration due to land management activities on global climate. Through complex interactions on a regional and global scale, these GHG emissions and net losses of biological carbon sinks cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia, recent industrialization and burning

[9] SEORMPFEIS, pg. 29

of fossil carbon sources have caused CO2(e) concentrations to increase dramatically, and are likely to contribute to overall global climatic changes. The Intergovernmental Panel on Climate Change recently concluded that "warming of the climate system is unequivocal" and "most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations.

Global mean surface temperatures have increased nearly 1.8°F from 1890 to 2006. Models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Northern latitudes (above 24° N) have exhibited temperature increases of nearly 2.1°F since 1900, with nearly a 1.8°F increase since 1970 alone. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of GHGs are likely to accelerate the rate of climate change.

In 2001, the IPCC indicated that by the year 2100, global average surface temperatures would increase 2.5 to 10.4°F above 1990 levels. The National Academy of Sciences has confirmed these findings, but also has indicated there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature will not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures is more likely than increases in daily maximum temperatures. Increases in temperatures would increase water vapor in the atmosphere, and reduce soil moisture, increasing generalized drought conditions, while at the same time enhancing heavy storm events. Although large-scale spatial shifts in precipitation distribution may occur, these changes are more uncertain and difficult to predict.

As with any field of scientific study, there are uncertainties associated with the science of climate change. This does not imply that scientists do not have confidence in many aspects of climate change science. Some aspects of the science are known with virtual certainty, because they are based on well-known physical laws and documents trends (EPA 2008).

Several activities contribute to the phenomena of climate change, including emissions of GHGs (especially carbon dioxide and methane) from fossil fuel development, large wildfires and activities using combustion engines; changes to the natural carbon cycle; and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs will have a sustained climatic impact over different temporal scales. For example, recent emissions of carbon dioxide can influence climate for 100 years.

It may be difficult to discern whether global climate change is already affecting resources, let alone the Planning or Decision Areas for the RMP. In most cases there is more information about potential or projected effects of global climate change on resources. It is important to note that projected changes are likely to occur over several decades to a century. Therefore many of the projected changes associated with climate change described below may not be measurably discernible within the reasonably foreseeable future.

Existing climate prediction models are global in nature; therefore they are not at the appropriate scale to estimate potential impacts of climate change on the project area.

3.12 Geology

The Owyhee uplands are part of the Basin and Range physiographic province. The Basin and Range is an area of fault-block topography, mountain ranges running north to south separated by broad basins. The Owyhee uplands lie in the northwest corner of the Great Basin. This region differs from the rest of the province in that it is a flat deeply dissected plateau with little interior drainage where fault-block topography is less pronounced. The drainage basin of the Owyhee River encompasses the uplands. Originating in Nevada, the Owyhee River flows northerly through Idaho and Oregon to join the Snake River near Adrian, Oregon. In spite of low rainfall in the area, steep gradients give the river and its tributaries well-defined drainage patterns and deep canyons. Cutting through the uplands over 6,000 feet above sea level, the river drops to approximately 2,000 feet where it joins the Snake. Small streams flowing in from the hills are largely intermittent. (Orr and Orr. 1999).

The geological background of this province is based in volcanic activity which started in the Miocene. There are deep volcanic deposits of basalts, tuffs and tuffaceous sediments. While basalt is prevalent, other features include rhyolite flows, air-fall tuffs, bentonitic clay deposits, diatomaceous earth deposits, Quaternary sedimentary deposits and recent surface lava.

Malheur County is recognized as an active geothermal region. The Proposed Action has been subjected to numerous exploration efforts for oil and gas, geothermal, and hard-rock mineral resources. BLM managed lands northeast of the Proposed Action were historically leased for oil and gas exploration and the known geologic character of the site resulted in the reservation of mineral rights by prior surface owners. Numerous hot springs associated with deep geothermal resources have been mapped from Owyhee Reservoir north and west to Beulah Reservoir. The U.S. Department of the Interior has identified seven sites in Oregon as *among the 35 "highest potential" geothermal regions in the country*. The sites include Newberry Crater near Bend and the Klamath Falls, Lakeview, Crump Lake, Summer Lake, Malheur River and *Vale areas of southern and eastern Oregon* (emphasis added).[10]

The Neal Hot Springs geothermal reservoir is hosted in Tertiary volcanic and volcanoclastic rocks consisting of basalt flows, dikes and plugs injected into and interbedded with ashflow tuffs and tuffaceous lake sediments.[11] The project area is structurally complex with high-angle faults trending dominantly northwest. These faults intersect, or are truncated by, northeast- and north-trending faults. The northwest trending faults are perceived to host the potential geothermal resource at depths of approximately 3,000 feet.

Geologic resources will not be discussed further in the environmental assessment.

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[10] News of Interest, Oregon Department of Geology and Mineral Industries, June 18, 2003

[11] William Teplow, Professional Geologist, personal communication, 2008 with Scott Nichols, USG

3.13 Soils

No soil survey data is available through the Natural Resource Conservation Service (NRCS), however, soil data is available from the BLM through a fourth order soil survey. The soils found in the area of the proposed project were surveyed and described in Oregon's Long Range Requirements for Water 1969, Appendix I-10, Malheur Drainage Basin.

Soils within the ROW are Encina series which are moderately deep or deep, well-drained clay loam soils derived from old stratified sediments. The native vegetation consists mostly of bluebunch wheatgrass, Sandberg bluegrass, big sagebrush, rabbitbrush, and squaw apple. Encina soils are used mostly for range. They have good potential for range seeding and are well suited for irrigation on lower slopes.

3.14 Hydrology and Aquatic Resources

The Project area is located in the Bully Creek Hydrologic Subbasin, 4th-field HUC number 17050118. The watershed encompasses approximately 385,000 acres and 937 stream miles.[12]

The proposed action is located on a dry south-facing hillside. There are no surface waters, wetlands, or riparian zones located within or immediately adjacent to the proposed ROW on public lands. The stream channels in the proposed project area are ephemeral, flowing only during or immediately after rainfall, but dry the rest of the year.

The nearest flowing stream is Cottonwood Creek, an interrupted perennial drainage, located 0.2 miles south of the proposed ROW. Cottonwood Creek flows southeast to discharge into Bully Creek.

Coyote Springs consists of a surface seep area with minor riparian values that has been developed to provide water to a water trough on the adjacent ridge. Three intermittent springs and seeps occur on private lands approximately 0.3 miles south of the ROW. The springs and seeps are associated with a wetland complex and riparian vegetation. There exists a flowing thermal spring area approximately one mile southeast of the proposed drill sites. This spring system creates a measured flow of about four gallons per minute at temperatures ranging from 130 to 140 degrees Fahrenheit.

3.15 Community and Economic Values

The closest population center is Vale Oregon, 12 miles east of the proposed ROW. Absentee landowners are common throughout the region. The local economy is based on agricultural commodities such as onion, corn, alfalfa, wheat, sugar beets, cattle, and sheep.

Vale has a population of approximately 3,800 residents while Malheur County has a population of approximately 30,907. There are four manufacturing related businesses but the dominant employer is the city and county government which employs over 130 staff. The second largest

[12] SEORMPFEIS, 2001, Table 2-9, pg. 55 and Map HYDR-3M

employer is the Eagle-Pitcher Minerals Company that produces high quality filtration material from diatomaceous earth. The median household income in Malheur County is $36,100, approximately $12,600 below the Oregon state median income.

3.16 Lands and Realty

Based on information contained in the master title plat maps of the area, one 12.46 Kv, single phase transmission line provides power to local residents in the Bully Creek drainage. The line is located both north and south of the proposed action on BLM administered and private lands. There are no ROW's that currently exist at or near the proposed project and there are no other conflicting ROW's in the area. The proposed action is consistent with the objectives of the SEORMPFEIS, and provides the mineral owner access to patented mineral resources. Lands and realty will not be discussed further in the environmental assessment.

3.17 Critical Elements and Supplemental Authorities

Critical elements of the human environment are subject to requirements specified in statute, regulation, or executive order and must be addressed in any document prepared pursuant to NEPA. The BLM NEPA Handbook (H-1790-1), as updated in January 2008 stipulates that if the resource or value is not present or is not affected by the proposed action or project alternatives, this may be documented in the EA as a negative declaration. The following fifteen (15) critical elements were taken into consideration: Air Quality, Areas of Critical Environmental Concern (ACECs), Cultural Resources, Environmental Justice, Floodplains, Invasive Nonnative Species, Migratory Birds, Native American Religious Concerns, Prime or Unique Farmland, Threatened and Endangered Species, Wastes, Hazardous or Solid, Water Quality (Surface and Ground), Wetlands and Riparian Zones, Wild and Scenic Rivers, and Wilderness. The effects of the proposed action were also reviewed in relation to 11 additional resource values.

Those Critical Elements (Table 1) or Resources (Table 2) marked as "not present" are not present within or adjacent to the ROW. Those elements or resources marked as "present not affected" may be present within or adjacent to the ROW but would not be impacted by the proposed action. Those elements or resources marked as "present affected" may be found within or are adjacent to the ROW and may be subject to direct, indirect and cumulative effects. Only those elements marked as present and affected must be analyzed within the Environmental Effects section of this environmental assessment.

Table 1 Critical Elements of the Human Environment

Critical Elements	Not Present Not Affected	Present Not Affected	Present Affected	Reference Section
Air Quality		XX		3.12 & 4.1.8
ACECs	XX			N/A
Cultural Resources	XX			3.10 & 4.1.7
Environmental Justice	XX			N/A
Floodplains	XX			N/A
Invasive Species		XX		3.2
Migratory Birds			XX	3.4 & 4.1.4
Native American Religious Concerns	XX			N/A
Prime or Unique Farmlands	XX			N/A
Threatened & Endangered Species	XX			N/A
Hazardous or Solid Waste	XX			N/A
Water Quality	XX			N/A
Wetlands & Riparian Zones	XX			N/A
Wild & Scenic Rivers	XX			N/A
Wilderness Study Areas	XX			3.8

Table 2 Resource Values

Resource	Not Present Not Affected	Present Not Affected	Present Affected	Reference Section
Soils			XX	3.14 & 4.1.9
Mineral Resources	XX			3.5
Vegetation			XX	3.1 & 4.1.1
Wildlife			XX	3.5 & 4.1.5
Hydrology & Aquatic Resources		XX		3.15
Range Resources		XX		3.6 & 4.1.6
Recreation		XX		3.7
Visual Resources		XX		3.7
Social Values	XX			N/A
Community & Economic Values		XX		3.16
Lands & Realty		XX		3.17

4 ENVIRONMENTAL CONSEQUENCES

This chapter is organized by alternative to illustrate the differences between the proposed action and the "no action" alternative. This chapter identifies the direct and indirect impacts associated with the proposed right-of-way; their relative severity and duration and the design features to minimize these impacts.

4.1 Proposed Action

4.1.1 Vegetation

The proposed action would directly impact approximately 9 acres of existing sagebrush steppe and local weed species. The impacts would be due to road and drill pad construction. Design features would include reclamation of the area with a native seed mix approved by the BLM and necessary weed control post project. Details of these design features are described in the POD for the ROW.

4.1.2 Noxious Weeds

Because the area currently contains noxious or invasive species, ground disturbance within the project area would not increase the overall area for weed colonization; however, the diversity of invasive species could increase and additional species could become established. Indirect impacts could result from the transport of noxious or invasive species onto the site and open new areas to additional invasive species.

The POD requires washing vehicles before they first enter the area and for weed spraying. Controlled access, design features, and weed management activity provide measures to control the spread of invasive and noxious plant species. The proposed action is in keeping with the SEORMPFEIS Rangeland Vegetation Objectives #1 and #3 and incorporates all applicable portions of the noxious weed management section of Appendix O of the SEORMPFEIS (p 344). Impacts that would cause an increase in area of noxious weeds colonies are not expected to occur because of the precautions observed in the POD and Appendix O.

4.1.3 Special Status Plants

The proposed action would not displace any known sites of special status plants. The nearest special status plant site of Malheur prince's plume is located approximately three and one half miles to the north, northeast of the project site.

4.1.4 Migratory Birds

The proposed project would eliminate nine acres of sagebrush steppe and grassland habitat. Construction activities and removal of vegetation could disrupt breeding behavior or destroy occupied sites. In addition, construction activity and noise is expected to cause displacement of individuals from the proposed project area and immediately adjacent habitats. However, construction activities are temporary and therefore impacts from displacement of birds are expected to be short term, not more than two months, during this exploration stage. The proposed action would not have any significant direct or indirect impacts on migratory birds and thus would not result in a violation of the Migratory Bird Treaty Act as long as design features were implemented.

Construction activities should not occur during the breeding or nesting season (March 15-June 30) to ensure there would be no take of migratory species or active nests as a result of implementation of the proposed action.

4.1.5 Wildlife and Fish

Implementation of the proposed action would result in the loss of approximately nine acres of wildlife habitat. Construction activity is expected to displace individuals within and adjacent to the proposed project area. Since vegetative loss from the proposed action is expected to be minimal, only a small amount of winter range for big game and summer forage for species such as sage grouse is expected to be impacted. Some of this habitat would be restored upon reclamation with a native seed mix. In addition, construction activities are temporary and occur

outside the breeding and nesting season; therefore, impacts from displacement of wildlife are short term. The proposed action would not result in any significant direct or indirect impacts to area wildlife species.

4.1.6 Livestock Grazing

Under the Proposed Action construction activity would effectively remove approximately nine acres of the 16,450 acre Kern Creek pasture from grazing during construction activities, so impacts to grazing would be short term. The Proposed Action would not result in the need to reduce stocking rates. Grazing values that are lost as a result of USG's activity would be paid by USG for the life of the ROW.

The Proposed Action meets the grazing management objectives established in the BLM's SEORMP FEIS and allows for a sustained level of livestock grazing consistent with other resource objectives and public land use allocations.

4.1.7 Cultural and Paleontological Resources

Mark Druss, Ph.D., Registered Professional Archeologist and the contracted archeological consultant, conducted a literature search of known cultural resources and conducted a Class III inventory of the proposed project site using pedestrian transects spaced less than 30 meters apart. The survey for this project was designed to locate, record, and evaluate all prehistoric and historic cultural resources visible on the ground surface. No archeological sites are documented near the project area and no archeological or paleontological artifacts were observed. No direct or indirect impacts to cultural or paleontological resources have been identified.

Design features of the proposed action and pursuant to 43 CFR 10.4 require that construction activity cease and additional cultural evaluations be conducted if archeological or paleontological resources or artifacts are observed. The proposed action would be in conformance with the objective of the BLM's SEORMPFEIS to protect and conserve cultural and paleontological resources.

4.1.8 Air and Atmospheric Quality

Direct impacts to air quality would result from construction of the roads across public land to the drilling sites as well as from service and supply vehicles that would travel the road once constructed. The drilling activity itself would also have an effect on air quality.

Air quality impacts would be short term and localized and would not result in or contribute to non-attainment of any air quality standards. The proposed action would conform to the air resource management objective in the BLM's SEORMPFEIS to meet or exceed the "National Ambient Air Quality Standards" and the "Prevention of Significant Deterioration" with all authorized actions.[13] Dust generated from earth-moving activities and from vehicles traveling the ROW would be controlled by watering. No issues related to air quality have been identified and

[13] Op.Cit., SEORMPFEIS, 2001, pg. 186

there would be no residual air quality impacts. No mitigation is proposed beyond the USG proposed road watering and compliance with Best Management Practices as outlined in Appendix O of the SEORMPFEIS.

Climate Change
The temperature of the planet's atmosphere is regulated by a balance of radiation received from the sun and the amount of that radiation absorbed by the earth and atmosphere. Greenhouse gases (e.g., carbon dioxide and methane)(GHG), as well as water vapor and particulate matter in the atmosphere keep the planet's temperature warmer than it would be otherwise; allowing the planet to sustain life. While these gasses and particles have occurred naturally for millennia, there has been a marked increase in their atmospheric concentration since the start of the industrial age, contributing to observed climatic variability beyond the historic norm.

While global and national inventories for GHGs are established, regional and state-specific inventories are in varying levels of development. Quantification techniques are in development – for example, there is a good understanding of climate change emissions related to fuel usage; however measuring and understanding the effects of albedo is less comprehensive. Analytical tools necessary to quantify climatic impacts are presently unavailable. As a consequence, impact assessment of specific effects from anthropogenic activities cannot be determined within the scope of this EA.

4.1.9 Soils

Disturbed soils would be subject to increased wind and water erosion during construction activity within the ROW, and would result in effects such as soil displacement, erosion, loss of moisture holding capacity, loss of microbiotic soil forming processes, and increased runoff potential. Soil productivity and soil forming processes on approximately nine acres would be altered until the disturbed areas are reclaimed and re-vegetated. Design features of the proposed action and associated construction activity are consistent with the BLM's Gold Book Standards for Road Construction and Appendix O of the SEORMPFEIS. The proposed action and design features would prevent excessive erosion, control runoff and stabilize disturbed soils. The proposed action conforms with the mineral and energy development goals of the BLM's SEORMPFEIS. Impacts would be localized and short term until the site has been stabilized or reclaimed.

4.1.10 Hydrology and Aquatic Resources

USG's application calls for implementation, maintenance, and evaluation of Best Management Practices to control surface runoff and erosion from disturbed lands. The Oregon Department of Environmental Quality (ODEQ), DOGAMI, Oregon Department of Water Resources (ODWR) and the US Army Corps of Engineers manage water quality, water quantity, and wetlands. Each agency has reviewed the surface and subsurface geothermal exploration activities that would be initiated with the proposed ROW. The agencies have both engineering and environmental management responsibility to ensure all activities are conducted in a manner that would not adversely affect water quality, water quantity, wetlands and associated natural resource values. Design features call for implementation and ongoing evaluation of Best Management Practices (BMPs) to protect water quality. The project would have little potential for adversely affecting

the quality of surface waters in the project area because all Project activities are located at least 1,000 feet away from Cottonwood Creek and land shapes minimize or prevent sediment from being transported to surface water. The proposed action would have no direct or indirect effects to water quality or wetlands.

Geothermal fluid is a recognized mineral right that is owned and controlled by U.S. Geothermal Inc. There are two potential water impacts associated with geothermal energy development. The first potential issue is cooling water availability for the power plant. The second potential issue is groundwater contamination resulting from geothermal fluid injection. The Neal Hot Springs geothermal power plant is designed and will be built as an air cooled power plant. As a result, no water is used for power production and no water rights are necessary for the operation. USG is required by the Department of Geology and Mineral Industries and by the Department of Environmental Quality to inject all geothermal fluid. Both agencies require that well casings be pressure grouted and sealed to prevent migration of groundwater and comingling of groundwater with the geothermal fluid. The agencies also require monitoring to verify groundwater protection standards are met. The result is that water rights and water quality must be protected and maintained throughout the operation.

Construction activity within the ROW would result in some increased runoff, sediment transport, and water quality impacts over the short-term until the site has been stabilized or reclaimed. By adhering strictly to the BMPs listed in Appendix O of the SEORMPFEIS, the proposed ROW and project design features would have limited potential for adversely affecting surface water quality. The proposed action and design features would minimize total disturbance, prevent excessive erosion, and control runoff over the long-term.

4.2 The No Action Alternative

None of the previously described environmental consequences associated with the proposed construction of three well sites would occur. The No Action Alternative would affect the continued data gathering and resource analysis that could lead to development and monitoring of geothermal resources in the Neal Hot Springs area.

In order to define whether commercial quantities of geothermal resources exist on public lands, directional drilling would be required from adjacent private land. The adverse impacts resulting from directional drilling described under section 2.4.1, would result from the No Action Alternative. Specifically, surface disturbance on private land would increase by approximately 10 acres, visual impacts would be increased, soil loss and erosion potential would be increased and drilling costs would be increased by 15% to 25%. Indirect impacts to wildlife and vegetation would also be increased because of increased disturbance on lands with higher topographic and vegetative diversity.

The No Action Alternative is not consistent with legal access provided under the Warranty Deed along with the right of ingress, egress, and mineral development.

The No Action alternative would not support Executive Order 13212, establishing a policy that federal agencies should take appropriate actions, to the extent consistent with applicable law, to expedite projects to increase the production, transmission, or conservation of energy.

The No Action alternative would not support the Energy Policy Act of 2005 (Pub. L. 109–58). Section 211 of the Act directs the Secretary of the Interior to seek to have approved non-hydropower renewable energy projects located on the public lands with a generation capacity of at least 10,000 megawatts of electricity before the end of the 10-year period beginning on the date of enactment of this Act.

The No Action alternative would not support the Department of Interior Secretarial Order 3285, signed March 9, 2009 which establishes the development of renewable energy as a priority for the Department of Interior and establishes policy to encourage the production, development and delivery of renewable energy.

4.2.1 Special Status Plants

Under the No Action Alternative, the site would remain in its current condition with no ffect on special status plants.

4.2.2 Rangeland Vegetation

Under the No Action Alternative, all vegetation associated with the project site would remain in its current quantity condition.

4.2.3 Migratory Birds

Nesting and breeding habitat would remain unchanged with no additional direct impacts to migratory bird species.

4.2.4 Wildlife

Wildlife habitat values would remain unchanged with no additional direct impacts to wildlife species.

5 CUMULATIVE EFFECTS ANALYSIS

The Council on Environmental Quality (CEQ) defines cumulative effects as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7). A June 2005 CEQ memorandum states:

> The environmental analysis required under NEPA is forward-looking, in that it focuses on the potential impacts of the proposed action that an agency is considering. Thus, review of past actions is required to the extent that this review informs agency decision making regarding the proposed action. This can occur in two ways:
>
> First, the effects of past actions may warrant consideration in the analysis of the cumulative effects of a proposal for agency action. CEQ interprets NEPA and CEQ's NEPA regulations on cumulative effects as requiring analysis and a concise description of the identifiable present effects of past actions to the extent that they are relevant and

useful in analyzing whether the reasonably foreseeable effects of the agency proposal for action and its alternatives may have a continuing, additive and significant relationship to those effects. In determining what information is necessary for a cumulative effects analysis, agencies should use scoping to focus on the extent to which information is "relevant to reasonably foreseeable significant adverse impacts," is "essential to a reasoned choice among alternatives," and can be obtained without exorbitant cost (40 CFR 1502.22). Based on scoping, agencies have discretion to determine whether, and to what extent, information about the specific nature, design, or present effects of a past action is useful for the agency's analysis of the effects of a proposal for agency action and its reasonable alternatives. Agencies are not required to list or analyze the effects of individual past actions unless such information is necessary to describe the cumulative effect of all past actions combined. Agencies retain substantial discretion as to the extent of such inquiry and the appropriate level of explanation (*Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 376-77 [1989]). Generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.

Second, experience with and information about past direct and indirect effects of individual past actions may also be useful in illuminating or predicting the direct and indirect effects of a proposed action. However, these effects of past actions may have no cumulative relationship to the effects of the proposed action. Therefore, agencies should clearly distinguish analysis of direct and indirect effects based on information about past actions from a cumulative effects analysis of past actions.

The following cumulative impact analysis is limited to past, present, and reasonably foreseeable future actions that involve impacts to a resource value that overlaps temporally and/or spatially with the Proposed Action’s impacts to that same resource value. Thus, not all actions identified are discussed for each resource.

5.1 Cumulative Effects Analysis Area

The Cumulative Effects Analysis (CEA) considers that this Proposed Action is a site specific action where impacts to a number of affected resources are confined to the acreage described within the proposed ROW. The effects to vegetation, noxious weeds, special status plants, wildlife, livestock grazing, cultural and paleontological resources, and soils, all having been analyzed in this document, would not occur beyond that area disturbed by road construction and the drill pad. This disturbance would occur by the activities resulting from the approval of access to, and development of, a geothermal exploration well and temporary pipeline. Other resources that are part of the affected environment, and that may be affected beyond the above-defined geographic area, are migratory birds, and air quality.

While the proposed project is located in a sagebrush/grassland habitat type, the affected environment section states that the project area does not possess the vegetative qualities (contiguous canopy cover) for sage-grouse nesting. This cover is also needed to provide suitable nesting habitat for migratory birds. Additionally, and as analyzed in Section 4, construction activities would be temporary, not more than six months, and this would not occur during nesting season (March 15-June 15) should there be suitable nesting sites present. Impacts to migratory

birds in the immediate area would occur at the site-specific level. Effects occurring from the exploration well development would displace local bird individuals to areas remote from the drilling activity.

Sage-grouse may occur in the proposed project area on a yearlong basis, and although the project area does not possess the vegetative qualities needed to provide suitable nesting habitat a small amount of summer forage is expected to be impacted.

Impacts to air quality would result from construction of the road across public land to the drilling site as well as from service and supply vehicles that would travel the road once constructed. The drilling activity itself would also have an effect on air quality. Vehicles and drilling equipment would also contribute small quantities of air pollutants from engine exhausts. Dust resulting from these activities would drift beyond the 9 acres defined by the ROW, perhaps as far as a few miles before settling back to the ground. For the purposes of this analysis, all of the effects described here would be of short duration, about six months. The air quality effects from the proposed action would logically be comparable to, and would be additive with, the ongoing effects to air quality caused by local farming practices—cultivating soils and maintaining local access roads. However, BLM recognizes that these proposed activities, road construction, well pad area clearing, and well drilling would occur over a short time period. As addressed in the proponent's plan of development, this time period would likely be about two months (POD pg 2). Effects from these activities would therefore also be of this same duration. After the construction time period, rehabilitation of the drill pad site via reseeding would occur using a BLM-approved seed mix. The rate of plant establishment after the reseeding would depend on precipitation levels and other variables.

The Neal Hot Springs geothermal power plant is designed and will be built as an air cooled power plant. No surface or groundwater is used for power production and no water rights are necessary for the operation. USG is required by the Department of Geology and Mineral Industries and by the Department of Environmental Quality to inject all geothermal fluid back to the geothermal source zone at depth. Both agencies require that well casings be pressure grouted and sealed to prevent migration of groundwater and comingling of groundwater with the geothermal fluid. The agencies also require monitoring to verify groundwater protection standards are met. The result is that water rights and water quality must be protected and maintained throughout the operation.

5.2 Past and Present Actions

In 2008, USG conducted geothermal exploration activities on approximately five acres of private land adjacent to, and approximately 900 yards from, this proposed ROW. That action involved drilling the same type of geothermal wells proposed for this action. Present residual effects from the first drilling are additive and considered equal to the effects to the same resources as analyzed in this EA. Within the geographic scope of this analysis, there are no other known past actions that have a residual effect on the proposed project site with the exception of livestock grazing. It is reasonable to assume that the activity generated by the proposed action would dissuade cattle from frequenting the well pad sites. Within the geographic scope of this analysis, no other known present actions, by the BLM or other parties, are in progress and no other BLM actions are anticipated during the time of road and drill pad development in this area. For this

reason, there are no effects from present actions that have a cumulative relationship with the effects of this proposed action. The surface impact related to all current land disturbing activities in the CEA area as described in the ROW application and previous ROW applications is 20 acres.

5.3 Reasonably Foreseeable Future Actions

For this analysis the "foreseeable future" considers a 30 year period for the ROW site as defined in the proponent's application. If, after BLM issued the proposed ROW, USG found that the exploration well proved to be commercially viable, utilization of this proposed ROW for the purpose of operating a commercial geothermal production site at Neal Hot Springs has been evaluated in a NEPA document prepared by the DOE (2009). In this described scenario, it would be reasonably foreseeable that USG may drill additional exploratory and production geothermal wells. However, no proposal for additional wells or for commercial production of geothermal facilities on public land has been brought to BLM at this time. Areas of Malheur County within the Neal Hot Springs region have potential for such development. The conversations with the proponent leads BLM to believe that if commercial development of the geothermal resource in this area becomes apparent, such development would likely occur primarily on private land and result in approximately 15 acres of disturbance. This potential future development would include construction and operation of a geothermal well field and a generation facility (see Figure 4), which would include heat exchangers, turbines, and reinjection wells. Surface disturbance would result from construction of additional roads and drill pads, geothermal fluid pipelines, warehouse and maintenance facilities, and transmission power lines that would connect the generating facility with an existing power grid.

As stated, a transition of this proposed exploration well to an operational geothermal well for long term renewable energy production has been evaluated by the DOE in an environmental assessment completed in 2009.

The BLM assumes that recreational uses and livestock grazing activities associated with this analysis would continue into the foreseeable future in the same manner and to the same degree as they have been conducted in the present and recent past. The BLM does not have any additional projects planned in this proposed ROW area that would have an effect on those resources analyzed in this document, nor is BLM aware of projects proposed by other entities that would affect these same resources.

Figure 4: Geothermal Power Plant Site Plan

EXHIBIT 2- POWER PLANT SITE PLAN

5.4 No Action Alternative

Project activities would not occur on BLM administered lands if the No Action Alternative were selected. A selection of this alternative would result in no direct, indirect, or cumulative effects to the proposed project site.

5.5 Irreversible and Irretrievable Commitment of Resources

The proposal would not result in an irreversible and irretrievable commitment of resources.

6 MITIGATION

Mitigation measures are developed through analysis conducted in this EA, review of the SEORMPFEIS, and staff discussion. The proponent must comply with Best Management Practices established within the SEORMPFEIS of 2002, Appendix O which are incorporated by reference. Special conditions or best management practices warranted under this proposal include:

- Pursuant to 43 CFR 10.4(g) the holder of this authorization must notify the authorized officer, by telephone, with written confirmation, immediately upon the discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony (as defined at 43 CFR 10.20). Further, pursuant to 43 CFR 10.4(c) and (d), the lessee/operator shall immediately stop all activities in the vicinity of the discovery and protect it for 30 days or until notified to proceed by the BLM authorized officer.

- During all phases of exploration and development, the lessee shall maintain a noxious weed control program within the ROW consisting of monitoring and treatment for noxious or invasive species. Any treatment of noxious weeds shall be in accordance with the existing Vale District Weed Control Plan EA and supporting EIS, the current Northeast Area Noxious Weed Control Program and Vegetation Treatment on BLM Lands in Thirteen Western States. The District Weed Control Plan will be updated upon approval of the Draft Vegetation Treatments Using Herbicides on BLM Lands in Oregon EIS. At the time, all treatments would be in compliance with the District Weed Control Plan. In accordance with District and National Policy, all weed treatments shall be made by a certified public or commercial applicator and with the approval of the BLM authorized officer.

- During surface-disturbing construction and maintenance activities, the holder shall ensure all construction equipment and vehicles are cleaned of all vegetation(stems, leaves, seeds and all other vegetative parts) prior to entering or leaving public lands in areas that are known by the authorized officer of the BLM to be infested with noxious weeds.

- No hazardous materials shall be used during any phase of the operations unless prior approval has been obtained from the BLM authorized officer. All on site drilling materials and chemicals shall be properly stored to ensure the prevention of spills. No chromate or other heavy metals or environmentally harmful additives will be used.

- No chemicals, fuels, oils, lubricants, or noxious fluids shall be disposed of at the drill site, in the reserve pit or down the wells.

- If any chemicals, fuels, oils, lubricants, and/or noxious fluids are spilled during drilling operations, they shall be cleaned up immediately. The lessee/operator shall have absorbent on site for spill containment. After clean up, the chemicals, fuels, oil, lubricants and/or noxious fluids and any contaminated material shall be removed from the drill site and disposed of at an approved disposal facility.

- The lessee/operator shall be responsible for all cost associated with any releases of chemicals and/or subsurface fluids resulting from their operations and practices.

- Material Safety Data Sheets for all drilling mud components are to be provided to the Hazmat coordinator at the Malheur Field Office.

- Portable chemical toilets shall be used for human waste. The human waste shall not be buried on site.

- All equipment and machinery shall be equipped with spark arresters and mufflers.

- The lessee/operator shall be responsible for all suppression costs for any fire resulting from their operations and practices.

- Trash and other debris shall be contained on site and then hauled to an approved landfill. Burial and/or burning on site shall not be permitted.

- Except where otherwise noted surface equipment shall be removed at the completion of operations if the well is determined to not be necessary for geothermal development.

- For a period of three years following the commencement of construction, the project site shall be inventoried by the lessee for the presences of invasive, nonnative species. Inventory data shall be reported to the BLM within thirty (30) days of receipt by the operator.

- Following the three year period, periodic inventory for the presence of invasive nonnative species would be performed at project sites, with treatment occurring as necessary. The periodic inventory and treatment would occur until the BLM determines that final reclamation of the project site is complete and acceptable.

- If the wells are successfully completed, all surface equipment and facilities shall be painted a color that blends with the natural surroundings. The authorized officer shall be contacted and BLM staff consulted prior to the selection of the color.

- Wellhead equipment left on the drill site following the completion of drilling would be painted a color, subject to approval by the authorized officer, which would blend with the landscape.

- Construction activities should not occur during the breeding or nesting season (March 15–June 15) to ensure there would be no take of migratory bird species or active nests as a result of implementation of the proposed action.

7 MONITORING

Monitoring is needed to ensure that actions comply with the terms, conditions, and mitigation measures identified in the decision. BLM would fulfill this responsibility in conjunction with USG by monitoring the implementation of mitigation measures adopted as conditions of approval to the submitted POD and ROW application. Inspection of the ROW would be conducted after staking and flagging, after construction and as necessary until the ROW is relinquished.

8 COORDINATION AND CONSULTATION

8.1 List of Preparers

Bureau of Land Management, Vale District

Steve Christensen	Planning and Environmental Coordinator
Jonathan Westfall	Geologist / Lead Preparer
Michelle Caviness	Wildlife Biologist / Wildlife & Migratory Birds
Trisha Skerjanec	Realty Specialist
Lynne Silva	Weed Specialist
Diane Pritchard	District Archaeologist
Kari Fredrick	Recreation/WSR/Wilderness/VRM
Garry Brown	Range Management Specialist
Gillian Wigglesworth	Botanist / Threatened & Endangered Plants
Todd Allai	Soils/Hydrology/Air
Garth Ross	Wildlife Biologist / Fisheries
Vern Pritchard	District Engineer
Pat Ryan	Malheur Field Manager

US Geothermal, Inc.

Scott Nichols, Manager, Permits and Lands
Douglas Glaspey, Chief Operating Officer

Technical Professionals

Rebecca Beavers, Botanist and Professional Range Manager
Mark Druss, PhD, RPA, Archeologist

8.2 List of Agencies, Organizations, and Persons Notified

Advocates for the West
Audubon Society of Portland
Burns Paiute Tribe
Committee for Idaho's High Desert
Confederated Tribes of the Umatilla
Department of State Lands, Eastern Oregon
Grazing permittees;
Interested Publics, mandatory
Interested Publics, MRA
Interested Publics, Wilderness
Malheur County Court Judge and Commissioners
Malheur County Grazing Advisory Board
Malheur National Forest
Malheur Watershed Council
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Natural Desert Association

Oregon Wild, Western Field Office
Pacific Rivers Council
Sierra Club, Oregon Chapter, High Desert Wilderness Committee
U.S. Fish and Wildlife
US Geothermal, Inc.
Western Watersheds Project; Interested Public

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