BEFORE THE PUBLIC UTILITIES COMMISSION OF NEVADA

In the Matter of the Application of TGP Dixie Development Company, LLC, for a permit to construct the Coyote Canyon Geothermal Electric Generating project pursuant to the Nevada Utility Environmental Protection Act.	)	DOCKET NO. _____

APPLICATION OF TGP DIXIE DEVELOPMENT COMPANY, LLC
FOR A PERMIT TO CONSTRUCT
THE COYOTE CANYON GEOTHERMAL ELECTRIC GENERATION PROJECT

COMES NOW, TGP Dixie Development Company, LLC, ("TGP") by and through its attorneys, ALLISON, MacKENZIE, PAVLAKIS, WRIGHT, & FAGAN, LTD., and submits herewith its application to the Nevada Public Utilities Commission ("Commission") for a permit to construct utility facilities to be known as the TGP Coyote Canyon Geothermal Project (referred to as the "Coyote Canyon Project" "CC" and the "Project"). The Coyote Canyon Project will be located in Dixie Valley, Churchill County, Nevada. The utility facilities will include a 70 MW geothermal power plant and associated production/injection wells, pipelines, and support facilities. The Project will also include a 0.4 mile long 230 kV transmission line which will connect to an existing 211 mile 230 kV transmission line which extends from Terra-Gen Power, LLC's existing Dixie Valley geothermal power plant to the Control Substation located near Bishop, California. The project area is comprised of federal leases issued to the Coyote Canyon Project by the U.S. Department of Interior, Bureau of Land Management ("BLM").

This application is filed pursuant to the Utility Environmental Protection Act ("UEPA"), NRS 704.820 et seq. and NAC 703.421 and NAC 703.423.

A. BACKGROUND AND AUTHORIZED REPRESENTATIVES

1. TGP is a Delaware limited liability company authorized to conduct business in the state of Nevada.

2. TGP is a wholly owned subsidiary of Terra-Gen Power Company ("Terra-Gen"). Terra-Gen owns and operates geothermal, wind and solar electric generating facilities in the western states. Terra-Gen currently owns and operates the 60 MW Dixie Valley geothermal electric generating station in Churchill County, Nevada.

3. TGP's principal place of business mailing address and telephone number are: 11512 El Camino Real, Suite 100, San Diego, CA 92130. (858) 764-3736.

4. All corresondence related to this application should be sent to the following:

Vincent J. Signorotti
Vice President, Land Management
Terra-Gen Power, LLC
11512 El Camio Real, Suite 100
San Diego, CA 92130

and

Patrick V. Fagan, Esq.
Allison, MacKenzie, Pavlakis,
Wright & Fagan, Ltd.
P. O. Box 646
Carson City, NV 89702

B. INFORMATION REQUIRED BY NAC 703.423 AND NRS 704.870

TGP in support of its application, submits the following:[1]

1. A description of the location of the proposed utility facility as required by subsection 1 of NRS 704.870 including:

[1] All references to sections in the application conform to NAC 703.423(1)-(12)

(a) A general description of the location of the proposed utility facility, including a regional map that identifies the location of the proposed utility facility.

TGP proposes to construct and operate a nominal 70 MW, utility grade geothermal power plant in Dixie Valley, Churchill County, Nevada. To allow for flexibility, four potential locations for the project have been selected for proposed power plant facilities. Only one of the four locations would be constructed. A map which identifies the location of the proposed utility facility is attached hereto as Exhibit "1." The project includes a 0.4 mile, 230 kilovolt (kV) transmission line ("Gen-Tie" line). The Gen-Tie line will interconnect with the existing 211 mile, 230 kV transmission line which runs between Terra-Gen's Dixie Valley electric generating facility in Churchill County, NV and the Control Substation located in California near Bishop, CA.

The proposed project will utilize five BLM leases. The Coyote Canyon project is entirely on federal leases managed by the BLM Carson City Stillwater Field Office.

(b) A legal description of the site of the proposed utility facility with the exception of electric lines, gas transmission lines, and water and wastewater lines, for which only a detailed description of the site is required.

The proposed electrical generating facility will be located within the boundaries of the Coyote Canyon Exploration Unit, which was approved by the Bureau of Land Management effective May 1, 2011 (Serial No. NVN-89020X). The Coyote Canyon Unit encompasses approximately 15,313.14 acres of land of which all but 87.63 acres consists of land leased to TGP Coyote Canyon, LLC (and certain TGP affiliates) from the Department of the Interior, Bureau of Land Management. The legal description of the four proposed plant sites is as follows:

Site 1: A parcel approximately 40 acres in size located within the Northwest Quarter of Section 13, Township 24 North, Range 36 East, M.D.B.&M. on Federal Geothermal Resources Lease N-61707.

Site 2: A parcel approximately 40 acres in size located within the Southwest Quarter of Section 14 and the Southeast Quarter of Section 15, Township 24 North, Range 36 East, M.D.B.&M. on Federal Geothermal Resources Lease N-17282.

Site 3: A parcel approximately 40 acres in size located within the East Half of the Northwest Quarter and the West Half of the Northeast Quarter of Section 22, Township 24 North, Range 36 East, M.D.B.&M. on Federal Geothermal Resources Lease N-17283A.

Site 4: A parcel approximately 40 acres in size located within the South Half of the Northeast Quarter and the North Half of the Southeast Quarter of Section 21, Township 24 North, Range 36 East, M.D.B.&M. on Federal Geothermal Resources Lease N-86892.

(c) Appropriately scaled site plan drawings of the proposed utility facility, vicinity maps and routing maps.

Appropriately scaled site plans drawings of the proposed utility facility, vicinity maps and routing maps, specifically Figure 2-1, TGP Coyote Canyon Proposed Action Map and General

Plan Arrangement, are attached hereto as Exhibit "2" and incorporated herein by this reference.

2. A description of the proposed utility facility, including:

(a) The size and nature of the proposed utility facility.

The proposed facility will consist of a 70 Mw flash electric generating unit. The geothermal fluid to be utilized in production will include approximately 5.9 million pounds of fluid per hour (19,050 acre feet per year (afy)). The geothermal fluid will be received from production wells located at the site and will enter the plant and move through a series of high and low pressure separators where steam is separated from the geothermal fluid. The spent geothermal fluid is injected back into the geothermal resource. The steam is sent to a steam turbine generator where the thermal energy in the steam is converted into mechanical energy by rotating the steam turbine roter, which turns a generator to produce electrical energy. The steam is then condensed back to a liquid state for reuse in the process and ultimately injected back into the geothermal resource.

The cooling process used to condense the steam would be either a dry cooling system or a hybrid cooling system. The hybrid cooling system is being evaluated for possible use when ambient air temperatures are too high to efficiently condense steam. The hybrid cooling system uses a combination of water cooling and dry cooling technologies to accomplish the cooling process required. This hybrid cooling technology results in a significant reduction in water consumption over a traditional wet cooling system. The process water would be obtained by drilling and permitting a non-potable source of water with the Nevada Division of Water Resources ("NDWR").

The power plant facility would connect to TGP's existing 230 kV line via a 0.4 mile long 230 kV Gen-Tie. The proposed Gen-Tie routes are shown on Figure 2-1 attached hereto as Exhibit "2." Only one route will be selected based on the final location of the power plant. The Gen-

Tie would consist of a single 230 kV circuit on H-frame or 3-pole wooden structures that would be approximately 85 feet tall. Examples of the H-frame and 3-pole structures are shown in Exhibit "3" attached hereto. Construction of each Gen-Tie pole would require a temporary disturbance of 0.5 acre and an approximately 30 x 40 foot area for installing the electrical conductors or line. Installation of each wooden pole would require a permanent disturbance of approximately 6-8 square feet per pole.

The power plant would include an electrical substation that would convert the electric power generated to a voltage of 230 kV. A main control building would contain instrumentation and telecommunications equipment. The substation would measure up to 250 x 175 feet and would be surrounded by an 8-foot-tall chain link fence with a vehicle and personnel access gates.

(b) The natural resources that will be used during the construction and operation of the proposed utility facility.

The project has received a decision record and finding of no significant impact (FONSI) from BLM both dated March 7, 2011. Both the decision record and FONSI approve the proposed construction of the Coyote Canyon Project. The FONSI states that the project will not have a significant effect on the human environment nor the natural resources located in the project area. Natural resources that will be used during the construction and operation of the proposed facility include geothermal fluid (brine), water, and resources contained in building materials and machinery required for the construction of the project. The decision record and FONSI are attached hereto as Exhibit "8".

(c) Layout diagrams of the proposed utility facility and its associated equipment.

See Attached Exhibit "2."

(d) Scaled diagrams of the structures at the proposed utility facility.

See Attached Exhibit "2."

(e) A statement concerning whether the proposed utility facility is an electric generating plant or the associated facilities of an electric generating plant that uses renewable energy as its primary source of energy to generate electricity.

The Coyote Canyon Project will be an electric generating plant that uses geothermal brine which is defined as a renewable energy resource pursuant to NRS 704.7811.

3. A copy and summary of any studies which have been made of the environmental impact of the proposed utility facility as required by subsection 1 of NRS 704.870.

Environmental studies conducted for the Coyote Canyon Project include:

(a) Environmental Assessment, TGP Dixie Development Company, LLC Coyote Canyon and Dixie Meadows Geothermal Exploration dated April, 2010. (Exhibit "7").

(b) Environmental Assessment, TGP Dixie Development Company, LLC Coyote Canyon Geothermal Utilization dated November, 2010. (Exhibit "8").

The proposed action area is 55 miles northeast of Fallon, Churchill County, NV at elevations ranging from approximately 3,400 to 3,600 feet in the northern part of Dixie Valley. The proposed project will be located on the eastern slope of the Stillwater range in an area dominated by mild salt desert scrub vegetation. Terrains within the project area are gently slopping alluvial fans and valley bottom. The environmental assessment prepared by the BLM evaluated the impacts on the natural and human environment that could result from construction of the Coyote Canyon Project. The impact analysis in the environmental assessment characterizes the potential for impacts for each resource identified in the environmental assessment in the project area. Resources

examined included, but were not limited to, air quality, cultural resources, invasive, non-native and noxious species, migratory birds, wildlife, water and paleontological resources. The conclusion of the BLM as set forth in its FONSI was that the proposed project will not have a significant effect on the human and natural environment of the proposed project.

4. **A description of any reasonable alternate locations for the proposed utility facility, a description of the comparative merits or detriments of each location submitted, and a statement of the reasons why the location is best suited for the proposed utility facility, as required by subsection 1 of NRS 704.870.**

The environmental assessment has approved the construction of the project within the resource area defined by five BLM leases described in Exhibit "4." As referenced in the environmental assessment, before starting to prepare the electric generating facility site, TGP must obtain from BLM a BLM geothermal site license agreement and construction permit. Also, an approved commercial use permit must be obtained prior to commencing commercial operations from the facility. No alternatives to the current sites defined by the five BLM leases have been considered.

The Dixie Valley area is located on an alluvial plane near the foot of the Stillwater Range in Churchill County, Nevada. The project area lies with the Great Basin which is characterized by low lying alluvial filled valleys, beach gravels, dune deposits and north or northeast trending fault-bounded mountain ranges. The plant sites for the proposed Coyote Canyon electrical generating facility were selected based on a variety of criteria. One of the major considerations in selecting a power plant location was to avoid the valley playa, which extends in a southeasterly orientation from the foot of the Stillwater Range, in order to take advantage of the natural stability that is found on land that is located nearer to the range front. Each of the four proposed plant sites being considered represents the minimum adverse effect on the environment within the area expected to contain geothermal fluids in commercial quantities. The selected sites were designed to avoid

environmentally sensitive areas including wetlands, wildlife habitat, areas of cultural significance and native vegetation.

The development of geothermal energy facilities is unlike a fossil fuel plant because the facility must be located near the location where the geothermal fluids are produced. In most instances and depending on the temperature and pressure of the resource once it reaches the surface, there is a limitation on the distance geothermal fluids can travel in insulated above-ground pipelines while still retaining its heat value as the fuel for a power plant. Accordingly, as a means of conserving the resource and to maximize efficiency, geothermal power plants are typically located within a distance of not more than one mile from the well head of the production wells supplying the fuel for the plant.

5. **A copy of the public notice of the application or amended application and proof of the publication of the public notice, as required by subsection 4 of NRS 704.870.**

See Exhibit "5."

6. **Proof that a copy of the application or amended application has been submitted to the Nevada State Clearinghouse within the Department of Administration to enable agency review and comment.**

See Exhibit "6."

7. **An explanation of the nature of the probable effect on the environment, including:**

(a) A reference to any studies described in subsection 3, if applicable.

See, the Environmental Assessment for Geothermal Exploration dated April, 2010 and the Environmental Assessment for Geothermal Utilization dated November, 2010 attached hereto as Exhibits "7" and "8," respectively.

(b) An environmental statement that includes:

(1) The name, qualifications, professions and contact information of each person with primary responsibility for the preparation of the environmental statement.

See, Section 5 of the Exhibit "8" Environmental Assessment dated November, 2010.

(2) The name, qualifications, professions and contact information of each person who has provided comments or input in the preparation of the environmental statement.

See, Section 5 of the Exhibit "8" Environmental Assessment dated November, 2010.

(3) A bibliography of materials used in the preparation of the environmental statement.

See, Section 6 of the Exhibit "8" Environmental Assessment dated November, 2010.

(4) A description of:

(i) The environmental characteristics of the project area existing at the time the application or amended application is filed with the Commission.

Air Quality

The CC project area is located in a rural area with minimal industrial sources or potential contribution to emissions to the airshed from vehicle traffic. Activities associated with the Proposed Actions would occur in Groundwater Basin 128 in Churchill County, Nevada Groundwater basins in the state of Nevada correspond to airsheds and, therefore, Groundwater Basin 128 is the analysis area for air quality. This basin is in attainment for all National Ambient Air Quality Standards (NAAQS) and Nevada air quality standards. In addition, the area is not a maintenance area for any criteria pollutants.

Regulatory Environment

The U.S. Environmental Protection Agency (EPA) Office of Air Quality Planning and

Standards and NDEP have set NAAQS and Nevada ambient air quality standards for the following criteria pollutants: nitrogen dioxide, sulfur dioxide, carbon monoxide, and particulate matter smaller than 10 microns in aerodynamic diameter (PM10), particulate matter smaller than 2.5 microns in aerodynamic diameter (PM2.5), ozone, and lead. In addition to the above-listed criteria pollutants, NDEP has established an ambient air quality standard of 0.08 parts per million (ppm) or 112 micrograms per cubic meter for hydrogen sulfide (H2S). Nevada Administrative Code 445B.22097 provides the minimum standards of quality for Nevada ambient air.

Attainment is achieved when the existing background concentrations for criteria air pollutants are less than the maximum allowable ambient concentrations defined in the NAAQS. The attainment status, with respect to the NAAQS, of the air shed in which the Proposed Actions are located precludes the requirement for an air quality conformity analysis.

The Final Mandatory Reporting of Greenhouse Gases Rule issued by the EPA, as signed on September 22, 2009, requires suppliers of fossil fuels or industrial greenhouse gases (GHG), manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions to submit annual reports to the EPA. The Nevada Division of Environmental Protection (NDEP) also requires GHG emissions reporting. However, NDEP has exempted geothermal projects from GHG reporting.

Cultural Resources

Cultural resources include historic and prehistoric sites of interest and may include structures, archaeological sites, or religious sites of importance to Native American cultures. Section 106 of the National Historic Preservation Act as amended (16 USC 40 et seq.) requires federal agencies to take into account the effects of their actions on properties listed or eligible for listing on

the National Register of Historic Places (NRHP). The National Park Service (NPS) defines archaeological and historic resources as "the physical evidences of past human activity, including evidences of the effects of that activity on the environment. What makes a cultural resource significant is its identity, age, location, and context in conjunction with its capacity to reveal information through the investigatory research designs, methods, and techniques used by archeologists." Ethnographic resources are defined as any "site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it" (NPS, 1998).

The basic cultural chronology of the western Great Basin includes the Pre-Archaic and Archaic Periods (Elston, 1986). A more thorough background of the prehistoric, historic, and ethnographic resources found in the area can be found in the inventory report conducted for this project (Young and Garner 2009). Below is a very brief summary of this 12,000 years of human occupation in western Nevada.

The Pre-Archaic period is defined by artifacts including Clovis and Folsom fluted lanceolate projectile points and Lake Mojave lanceolate projectile points. Reliance on big game hunting dominated the Pre-Archaic subsistence strategy. The main indicator of the shift to the Archaic period is a change to a broader strategy focused on hunting and gathering of resources. The projectile points became smaller and more suited for hunting smaller game, although they were still mounted on the ends of a dart or spear, and there was an increase in the number and type of stone grinding implements used for plant and seed processing.

The material culture diversified greatly with the contemporaneous introduction of pottery and the bow and arrow with smaller projectile points. By around A.D. 1200, an expansion

of Numic-speaking peoples into the area seems to have replaced or displaced the previous inhabitants (Bettinger and Baumhoff, 1982). Archaeologically, the primary material culture of the Numic includes Intermountain Brownware pottery and Desert Side Notched and Cottonwood Triangular arrow points. The subsistence strategy appears to have shifted back to a focus on hunting and gathering, although there is some evidence of at least limited reliance on horticulture. The Numic-speaking peoples, including the Northern Paiute, were the occupants of the Great Basin upon the initial arrival of Europeans and their influences. Cultural resource investigations of the project area were conducted in July 2009 (Young and Garner, 2009). The investigations included Class I literature reviews of both State of Nevada and BLM field office files and Class III pedestrian inventories of the CC project area.

The Class I literature search reviewed files at both the BLM Carson City Field Office and the Nevada State Museum Annex in Carson City (Garner and Young, 2009), which included the project area and a one-mile buffer. The files indicate numerous small projects have been conducted in the past, mainly in support of geothermal exploration in Dixie Valley. Forty-seven previously recorded sites have been identified within the project area and a one-mile buffer. Most of these sites are small, simple lithic and ground stone scatters. Most of the prehistoric sites are generally located on the gentle alluvial fan on the west side of Dixie Valley. Historic resources previously documented include historic roads, homesteads, and a borax mine. All previously recorded sites within the project area were revisited during the cultural resource surveys conducted for this project (see below)

Coyote Canyon

The entire CC project area was surveyed for cultural resources, either by Far Western during the 2009 surveys for this project or by other recent investigations in the area for small

geothermal exploration or testing projects (McGuire, 1993). Fifteen cultural resource sites have been identified in the project area, two of which were combined into one site based on the recommendations of the cultural resources study, resulting in a total of 14 cultural resource sites. Prehistoric sites dominate the assemblage; one historic site was identified during a previous investigation (McGuire 1993). The historic site consists of a small-scale mining venture with associated artifacts and was previously recommended as not eligible. The site was reexamined and updated during the current inventory and is recommended as not eligible to the NRHP.

Of the remaining 13 sites, nine are classified as a simple flaked stone assemblage, two as a complex flaked stone assemblage, one as a simple ground stone assemblage, and one as a complex ground stone assemblage. Six prehistoric sites (three previously identified and three identified during the current inventory) have been determined to be eligible for listing to the NRHP based upon the potential to yield data that would contribute to the understanding of the prehistoric occupation of the area. Seven prehistoric sites are not recommended eligible for listing on the NRHP. At this stage, all recommendations for site eligibility for listing on the NRHP are based on preliminary field recommendations and are subject to review and possible changes during BLM and State Historic Preservation Office (SHPO) consultations.

Native American Religious Concerns

Consultation was initiated with the Fallon Paiute-Shoshone Tribe on July 6, 2009. Correspondence included a description of the proposed project, cultural resource inventory and a map. Subsequent correspondence provided the results of the cultural resource inventory and subsequent final report (October 27 and November 30, 2009). A face to face meeting was conducted between the BLM and tribal staff on January 12, 2010. Consultation will be ongoing.

Water Quality, Wetlands, and Floodplains

Groundwater

The CC lease area is located in the internally drained Dixie Valley groundwater basin (NDWR-designated Administration Groundwater Basin 128). Dixie Valley is located in Nevada Hydrographic Region 10 (Central Region) (NDCNR-DWR, 2005), and is in the Great Basin hydrographic area. By Order 715, dated June 8, 1978, the Nevada State Engineer has "designated" the Dixie Valley groundwater basin, which indicates that the permitted groundwater rights approach or exceed the estimated average annual recharge and the water resources are being depleted or require additional administration (NDCNR-DWR, 2009).

Groundwater Basin 128 has an area of 1,303 square miles and a perennial yield of 15,000 acre-feet per year (AFY). The basin has committed underground water rights of 18,076 AFY and geothermal water rights of 13,428 AFY (NDCNR-DWR, 2009). Groundwater occurs in alluvial basin fill sediments and in underlying bedrock. In the northern portion of Dixie Valley, where the project areas are located, groundwater moves south through the valley, east from the Stillwater Mountains, and west from the Clan Alpine Mountains.

Recharge to groundwater occurs from precipitation, primarily snowmelt, at higher elevations in the Stillwater Range and Clan Alpine Range west and east of Dixie Valley and in the alluvial fans and landslide deposits at the base of these mountains. The Humboldt Salt Marsh (playa) is the ultimate groundwater sink for Dixie Valley and six sub basins that are adjacent to Dixie Valley (Fairview, Pleasant, Jersey, Eastgate, Cowkick, and Stingaree valleys). Groundwater moves radially from the surrounding mountains and converges on the playa, where it discharges. Vertically, groundwater moves upward in the central part of the valley in response to hydraulic gradients, where

it discharges to the playa and is lost to evaporation and transpiration.

Groundwater occurs in two separate but related aquifers in Dixie Valley: a shallow, non-thermal, alluvial aquifer and a deep, thermal, bedrock aquifer (Karst, 1987). Groundwater in the alluvium occurs under unconfined and confined conditions; however, hydraulic heads are typically beneath the elevation of the valley floor. Thermal groundwater is confined and generally occurs in fractured, zones within the bedrock underlying the alluvial basin fill sediments. Deep thermal groundwater and shallower alluvial groundwater are separated by a confining sequence thousands of feet thick, composed of shale, siltstone, volcaniclastic rocks, and a complex of intrusive and extrusive igneous rocks that includes gabbro, diorite, and basalt (Bruton et al., 1997). Chloride isotope analysis and a geochemical mixing evaluation reported by Bruton et al. (1997) indicates that shallow groundwater in Dixie Valley contains approximately 15 percent geothermal water, likely from fumaroles and hot springs in the area. As a groundwater discharge area, the depth to groundwater is anticipated to be shallow throughout much of northern Dixie Valley and would be expected to be shallowest close to the Humboldt Salt Marsh.

The total dissolved solids (TDS) concentration in shallow alluvial groundwater in Dixie Valley ranges from 900 to 1,900 milligrams per liter (mg/L) according to data tabulated by Karst (1987). Thermal groundwater in the area generally has higher dissolved solids content; however, the maximum TDS value reported by Karst was 1,920 mg/L, essentially the same as the maximum non-thermal groundwater concentration of 1,900 mg/L (Karst, 1987).

Surface Water

Based on analysis of USGS topographic maps and NDWR groundwater basin mapping, the Proposed Actions would be located in an internally drained desert basin that is a great

distance from and lacks hydrographic connectivity to major rivers and water bodies. Therefore, there are no navigable waters of the United States within Rivers and Harbors Act jurisdiction (as defined by 33 CFR part 329) and no waters of the United States within Clean Water Act jurisdiction (as defined by 33 CFR 328) in the CC project area. A letter asking for an approved jurisdictional determination concurring with this finding was sent to the U.S. Army Corps of Engineers on July 13, 2009. A response is pending.

Coyote Canyon

The geothermal reservoir to be explored in CC is at an expected depth of up to 10,000 feet. The USGS 7.5-minute topographic map of the area (Bolivia, Nevada Quadrangle 1990) shows ephemeral washes flowing southeast across the alluvial fan and valley bottom within the CC lease area and into the Humboldt Salt Marsh within Dixie Valley. These ephemeral washes only flow from significant rainfall or snowmelt events and those observed during field visits were dry. There are no Federal Emergency Management Agency (FEMA) Flood Insurance Program Mapping (FIRM) special flood hazard areas (SFHAs) or floodway areas within the CC project area (FEMA, 2008a). USGS mapping shows three seeps in Section 23 and one seep in Section 24. There is a spring on the southern border of the lease area, on the border of Sections 22 and 27. There are numerous seeps and springs mapped directly south of the lease area. There are no National Wetland Inventory (NWI) mapped wetlands within the CC lease area (USFWS, 2008); however, palustrine emergent wetlands associated with seeps in Sections 23 and 24 were observed during field visits.

Biological Resources

Biological surveys, including a habitat assessment and general wildlife explorations, of the CC lease area, was conducted on June 29, 30, and July 1, 2009 (CH2M HILL, 2009b). An

additional assessment of vegetation in portions of the project areas was conducted August 24 to 27, 2009. Southwest Regional Gap Analysis Project (SWReGAP) landcover data were supplemented and updated with field explorations and reference to Intermountain Flora, Volume 1 (U.S. Geological Survey [USGS], 2004; Cronquist et al., 1972).

Vegetation

The vegetation within this semi-arid area is controlled greatly by elevation, substrate, aspect, and landform. Alluvial fan surfaces above 3,430 feet above sea level and below the mountain front support the intermountain basins mixed salt desert scrub community, with the exception of dry wash channels, which contain intermountain basins greasewood flats. The area between 3,430 feet above sea level and the edge of the intermountain basin playa community (generally 3,390 to 3,400 feet above sea level) is composed of a mosaic of halophytic (salt-tolerant) and hydrophytic (wetland) plant communities. The halophytic communities include intermountain basins greasewood flats, saltgrass (Distichlis spicata var. stricta) meadows, and iodinebush (Allenrolfea occidentalis) scrub. The hydrophytic communities are primarily marshes typified by cattail (Typha latifolia), rush (Juncus spp. and Scirpus spp.), and common reed (Phragmites australis) among other species. The playa is largely barren of vegetation.

The intermountain basins mixed salt desert scrub community is characterized by open shrubland dominated by shadscale (Atriplex confertifolia) with scattered bush seepweed (Suaeda moquinii), yellow rabbitbrush (Chrysothamnus viscidiflorus), Nevada jointfir (Ephedra nevadensis), spiny hopsage (Grayia spinosa), budsage (Artemisia spinescens), broom snakeweed (Gutierrezia sarothrae), winterfat (Krascheninnikovia lanata), Indian ricegrass (Achnatherum hymenoides), and cheatgrass (Bromus tectorum). Despite its apparent diversity there is much barren ground between

the shrubs, and there is little grass cover. Cheesebush (Hymenoclea salsola) and desert trumpet (Eriogonum inflatum var. deflatum) were found occupying disturbed areas.

The intermountain basins greasewood flats community is dominated by greasewood (Sarcobatus vermiculatus) and contains sparsely scattered Torrey's saltbush (Atriplex torreyi), yellow rabbitbrush, saltlover (Halogeton glomeratus), budsage, and bush seepweed. Bare ground is common and the substrate usually possesses the poorly developed soils of washbottoms. Again there are few perennial grasses.

At the fringe of the playa, where the salt concentration appears too great for greasewood, more salt-tolerant communities such as saltgrass meadow and iodinebush scrub are found. Marshes are found at springs, seeps, and around open water in the CC project area. These palustrine emergent wetlands are surrounded by desert vegetation or playa. The marsh vegetation is adapted to saturated soil conditions and includes species of rush, knotweed (Polygonum spp.), canarygrass (Phalaris spp.), spikerush (Eleocharis spp.), duckweed (Lemna sp.), as well as common reed and cattail. Riparian trees and shrubs are not common and are restricted to isolated stands of willow (Salix sp.), wild rose (Rosa woodsii), Russian olive (Eleaegnus angustifolia), and saltcedar (Tamarix ramosissima), the latter two being introduced species, invasive in many hydric habitats.

Coyote Canyon

Just fewer than half the potential well pads in the CC project area and their associated access routes are located in intermountain basins mixed salt desert scrub community. Most of the remainder of the potential well pads and their access routes are located in salt-tolerant communities (e.g., intermountain basins greasewood flats, saltgrass meadow, and iodinebush scrub). A minority of the potential well pads are located within the intermountain basin playa community, some of

which may be in the vicinity of marsh vegetation associated with seeps and springs, based on analysis of aerial photographs.

Invasive, Non-native, and Noxious Species

The State of Nevada lists 47 noxious weed species that require control (Nevada Administrative Code 555.10; Nevada Department of Agriculture, 2008). Of these, saltcedar (Tamarix ramosissima) was the only noxious weed identified in the project areas during field surveys. In addition, the following invasive, non-native species were identified within or in the vicinity of the project areas: Russian olive (Elaeagnus angustifolia), cheat grass (Bromus tectorum), Russian thistle (Salsola kali), and common sowthistle (Sonchus oleraceus).

Migratory Birds

On January 11, 2001, President Clinton signed Executive Order 13186 (Land Bird Strategic Project) placing emphasis on conservation and management of migratory birds. The species are not protected under the Endangered Species Act, but most are protected under the Migratory Bird Treaty Act of 1918. Management for these species is based on Instruction Memorandum - IM 2008-050 dated December 18, 2007 (BLM, 2007b). Migratory birds with potential to use the project areas, such as black-throated sparrow (Amphispiza bilineata), horned lark (Eremophila alpestris), and common raven (Corvus corax), are species associated with intermountain basins mixed salt desert scrub, salt-tolerant communities, marsh, and playa habitats.

Coyote Canyon

Table 12 of Exhibit "7" lists migratory birds potentially present in CC.

Special-status Species

Threatened and Endangered Species

BLM Manual 6840 - Special Status Species Management, establishes policy for management of species listed or proposed for listing pursuant to the Endangered Species Act that are found on BLM-administered lands (BLM, 2008c).

Pursuant to the requirements of Section 7(c) of the Endangered Species Act, for federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) concerning listed species, separate letters were sent to USFWS on July 15, 2009, requesting information regarding threatened and endangered species that may occur in the CC project area. USFWS responded in separate letters dated August 26, 2009, that to the best of its knowledge no listed, proposed, or candidate threatened and endangered species exist in the CC project area.

BLM Sensitive Species

BLM Manual 6840 - Special Status Species Management, establishes policy for management of BLM sensitive species that are found on BLM-administered lands (BLM, 2008c). Species designated as BLM sensitive must be native species found on BLM-administered lands for which the BLM has the capability to significantly affect the conservation status of the species through management, and either:

1. There is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range, or

2. The species depends on ecological refugia or specialized or unique habitats on BLM-administered lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk. BLM mapping confirmed

(USGS, 2008) and field surveys verified that no greater sage grouse (Centrocercus urophasianus) habitat is present within the lease boundary. However, sage grouse may use water sources in desert scrub habitat that is relatively near sagebrush habitat (Wilson, 2009).

Table 14 of Exhibit "7" presents BLM sensitive species, their habitat association, and presence/absence of habitat in the project areas.

Wildlife Resources

Wildlife found in the project areas is typical of Great Basin deserts. Wildlife species observed in the area during biological surveys included various bird species, coyote (Canis latrans), black-tailed jackrabbit (Lepus californicus), cottontail (Sylvilagus spp.), white-tailed antelope squirrel (Ammospermophilus leucurus), horned lizard (Phyrnosoma platyrhinos), zebra-tailed lizard (Callisaurus draconoides), western whiptail (Aspidoscelis tigris), side-blotched lizard (Uta stansburiana), and long-nosed leopard lizard (Gambelia wislizenii). Bat habitat is found in mines, caves, and rock crevices of the Stillwater Range.

Marsh and open water habitats are found in and around the CC project area. Herons, egrets, bitterns, ducks, geese, and other birds associated with open water and wetland habitats occur in these areas. The marsh areas also provide habitat for amphibian species.

Invasive, Non-native, and Noxious Species

The State of Nevada lists 47 noxious weed species that require control (Nevada Administrative Code 555.10; Nevada Department of Agriculture, 2008). Of these, saltcedar (Tamarix ramosissima) was the only noxious weed identified in the project areas during field surveys. In addition, the following invasive, non-native species were identified within or in the vicinity of the project areas: Russian olive (Elaeagnus angustifolia), cheat grass (Bromus tectorum), Russian thistle

(Salsola kali), and common sowthistle (Sonchus oleraceus).

Wastes, Hazardous or Solid

There are no known hazardous wastes or hazardous materials known to occur in the project area. Numerous federal and state laws and regulations have been enacted including the Resource Conservation and Recovery Act (RCRA) and Nevada Revised Statute 459.400 and are enforced by the Nevada Division of Environmental Protection (NDEP) Bureau of Waste Management to ensure that hazardous materials, hazardous waste and solid wastes are properly handled, stored, and disposed of.

Visual Resources

BLM utilizes a 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 subject 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 in terms of changes that are allowed to the characteristic landscape (BLM, 1986).

Based on information contained in the Consolidated Resource Management Plan (BLM, 2001) and environmental assessments for other projects sharing this vicinity, the CC lease area is located within a Class IV VRM category. The objective for this class is to provide for management activities that allow major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. Activities in a Class IV category 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 elements.

The closest transportation route is Dixie Valley Road, which is designated State Route 121. The closest urban sensitive receptor (park, church, residence, school, or hospital) is located in Lovelock, Nevada, approximately 27 air miles west of the project sites. The Stillwater Mountain Range, with peaks higher than 8,500 feet, is located between the CC lease area and Lovelock. The closest receptor would be the 7 Devils Ranch located approximately 14 miles northeast of CC.

Paleontological Resources

An Initial Paleontological Resources Assessment for the CC project area was completed in August 2009 (CH2M HILL, 2009a). In it, the initial Potential Fossil Yield Classifications (PFYC) of the geological units affected by the Proposed Actions were determined following the guidance of BLM's Instructional Memorandum no 2008-009 (BLM, 2007c). Initial PFYC classifications were based on the results of literature searches and record reviews, as well as an analysis of remote imagery of the project area. In the case of the CC project area, there are sediments designated as possessing low paleontological sensitivity (PFYC = 2), and those possessing unknown sensitivity but which have yielded scientifically important fossils in other parts of the Great Basin (PFYC = 3b). These latter are sediments that were similar in character and geomorphic setting to those laid down on the margins of Pleistocene (Ice Age) lakes and at ancient springs, both of which are found in the CC project area. Satellite imagery was used to estimate the extent of these sediments, and then these findings were field checked during a paleontological resources survey.

A paleontological survey of the areas with a PFYC of 3b was completed in September

2009 to more specifically characterize their paleontological sensitivity. This field work included surveys of areas with the potential to yield fossil material, in-field determinations of "low" paleontological sensitivity based on (especially) topographic position and nature of the sediments (e.g., alluvium vs. lacustrine silt), and spot-checking areas with a PFYC of 2 to confirm their low paleontological sensitivity.

Fossil material was discovered in only one restricted part of the CC project area. In the case of most of the CC project area, however, field evidence justifies a downgrade of areas with an initial PFYC of 3b (unknown) to a PFYC of 2 (low). Areas identified in remote imagery as paleospring deposits based on their albedo and hue were found to actually be salt-encrusted playa surface. Playa sediment normally possesses low paleontological sensitivity near the surface because bone and other organic debris are not only quickly oxidized, but also mechanically degraded by the seasonal dissolution and recrystalization of salts in this soil environments.

The location of remaining areas where sediments possess sensitivity is confidential resource information and maps showing these areas are documented separately with the BLM.

Coyote Canyon

Alluvium seldom yields fossils and therefore the alluvial fan sediments that comprise most of the surfaces of Sections 12, 13, 14, 15, 21, and 22 (T24N, R36E) were given a "low" PFYC of 2. Portions of Sections 13, 14, 15, 21, 22, 23, and 24 that were assigned an initial PFYC of 3b (unknown) were subsequently subject to survey and field review. The subsequent field review and survey established the low paleontological potential (PFYC = 2) of all these areas except portions of Sections 14 and 15.

In portions of Sections 14 and 15 subfossil wood consisting primarily of the logs of

pinyon (Pinus monophylla) and Utah juniper (Juniperus osteosperma) were found on the alluvial fans of two of the larger canyons issuing from the Stillwater Range. Similar wood material was observed outside of the project area on the surface on the Cottonwood Canyon alluvial fan several miles to the northeast. Woodland currently lies several miles into the Stillwater Range and more than 1,500 feet higher in elevation. Unlike conventional paleontological material, subfossil wood is simply "mummified" in the dry climate, and its scientific potential lies in its dendrochronological, paleoecological and surface-age dating potential. Therefore, the portions of Sections 14 and 15 where subfossil wood was found were assigned a PFYC Class 4 (high potential).

Soils

Soil types in the project areas were identified using the "Churchill County Area, Parts of Churchill and Lyon Counties" soil survey (U.S. Department of Agriculture National Resource Conservation Service [USDA NRCS], 2009). Descriptions of the soil types found in the lease areas are provided in this section.

Soil unit 343 is the Slaw-Trocken-Chuckles association. Slaw soils occur on 0-4 percent slopes, are well drained, occasionally flood, but never pond, and are moderately to strongly saline. The typical profile is composed of silt loam underlain by stratified very fine sandy loam to silty clay. Trocken soils occur on 0-2 percent slopes, are well drained, occasionally flood, but never pond, and are moderately to strongly saline. The typical profile includes very gravelly loam and gravelly loamy coarse sand. Chuckles soils occur on 0-2 percent slopes, are moderately well drained, never flood or pond, and are moderately to strongly saline. The typical profile is composed of loam and silt loam underlain by stratified very fine sandy loam to silty clay. Soil unit 343 has a slight hazard of off-road or off-trail erosion and is poorly to moderately suited for natural surface road

construction, primarily due to flooding potential and low strength (USDA NRCS, 2009).

Soil unit 184 is the Bluewing-Pineval association. Bluewing soils occur on 4-8 percent sloping fans or washes, are excessively drained, and flood rarely too occasionally, but never pond. The soil profile typically consists of very gravelly loamy sand underlain by stratified very gravelly sand to extremely loamy coarse sand. Pineval soils occur on 4-8 percent slopes, are well drained, and rarely flood and never pond. The typical soil profile includes very cobbly loam and very gravelly sandy clay loam underlain by stratified extremely gravelly sand to gravelly sandy loam. Soil unit 184 has a slight hazard of off-road or off-trail erosion and is moderately suited for natural surface road construction, due to flooding potential, sandiness, and slope (USDA NRCS, 2009).

Soil unit 330 is the Settlement-Louderback-Rustigate association. Settlement soils occur on 0-2 percent slopes, are poorly drained, have a water table depth of 12 to 36 inches, rarely flood and never pond, and are slightly to moderately saline. The typical soil profile consists of silty clay and clay. Louderback soils occur on 0-2 percent slopes, are somewhat poorly drained, have a water table at 36 to 40 inches, rarely flood and never pond, are very slightly or slightly saline, and support saline meadow vegetation. The typical soil profile is composed of sand underlain by stratified sand to loam. Rustigate soils occur on 0-2 percent slopes, are somewhat poorly drained, have a water table at 36 to 40 inches, rarely flood and never pond, and support a saline meadow vegetation community. The profile is typically silt loam underlain by loam. Soil unit 330 has a slight hazard of off-road or off-trail erosion and is moderately suited for natural surface road construction, primarily due to low strength and sandiness (USDA NRCS, 2009).

Soil unit 900 is composed entirely of playa. Playas occur on 0-1 percent slopes, are poorly drained, have a water table at the surface, rarely flood, but have frequent ponding, and are

moderately or strongly saline. The typical soil profile is silty clay loam underlain by silty clay. Soil unit 900 has a slight hazard of off-road or off-trail erosion and is poorly suited for natural surface road construction, primarily due to frequent ponding, wetness, and low strength (USDA NRCS, 2009).

Soil unit 960 is the Kolda-Umberland association. Kolda soils occur on 0-2 percent slopes, are very poorly drained, have a water table at the surface, never flood, but frequently pond, are very slightly or slightly saline, and typically support wetland vegetation. The soil profile is typically silt loam, underlain by silty clay and clay. Umberland soils occur on 0-2 percent slopes, are somewhat poorly drained, have a water table at 18 to 30 inches, rarely flood, but never pond, are moderate to strongly saline, and support wet meadow vegetation. The soil profile is typically a silty clay loam underlain by silty clay. Soil unit 960 has a slight hazard of off-road or off-trail erosion and is poorly to moderately suited for natural surface road construction, primarily due to frequent ponding, wetness, and low strength (USDA NRCS, 2009).

Coyote Canyon

Soil units 184, 343, and 330 are present in the CC project area; a similar number of well pads are planned within each soil unit. The western portion of the CC lease area was not considered in this analysis because no Proposed Action is planned in this area of steep mountainous terrain.

Geology and Minerals

Coyote Canyon

The non-mountainous portions of the CC lease area, where wells would be installed as part of the Proposed Actions, is located at elevations ranging from approximately 3,400 feet to

3,600 feet in the northern part of Dixie Valley. Dixie Valley is a north-northeast/south southwest trending elongated valley in west-central Nevada, within the Great Basin Section of the Basin and Range Physiographic Province. The western edge of Dixie Valley is defined by the Stillwater Range and the eastern edge is defined by the Clan Alpine Mountains. Alluvial fans and pediment surfaces flank the area between the mountains and the valley interior. The proposed project is located on alluvial fans at the base of the Stillwater Range on the western edge of Dixie Valley.

Paleozoic marine carbonate rocks and clastic sedimentary rocks crop out in the Clan Alpine Mountains; however, these rocks have not been penetrated by wells drilled within Dixie Valley. Dixie Valley wells have penetrated marine siltstone, shale, sandstone, and volcaniclastic rocks exposed in the Stillwater Range (Bruton et al., 1997). The Miocene Table Mountain basalt overlies older sedimentary and igneous rocks and has been encountered at a depth of approximately 7,000 to 8,000 feet within Dixie Valley. It is overlain by a thick sequence of late Tertiary basin-fill sediments, including lacustrine, playa, and alluvial fan sediments. Hydrothermal alteration and mineralization from geothermal fluids has locally affected the rocks in the area (Bruton et al., 1997).

Structurally, Dixie Valley is an elongated down-dropped block, or graben, bounded by high-angle faults of Holocene age (Ryall and Vetter, 1982). The Dixie Valley fault lies beneath the west valley edge at the base of the Stillwater Range. Seismic activity subsequent to the tectonism that formed the Dixie Valley graben has further deformed the bedrock, resulting in a complex series of faults in the bedrock beneath the valley floor. Dixie Valley is located in an active seismic area. A major earthquake of magnitude 6.8 occurred in 1954 beneath Dixie Valley and created a visible scarp along the portions of the west margin of Dixie Valley (Ryall and Vetter, 1982).

Livestock Grazing

BLM manages rangelands on public lands under 43 CFR Part 4100 and BLM Handbooks 4100 to 4180. BLM conducts grazing management practices in accordance with BLM Manual H-4120-1 (BLM, 1984).

Under this management, ranchers may obtain a grazing permit for an allotment of public land on which a specified number of livestock may graze. An allotment is an area of land designated and managed for livestock grazing. The number of permitted livestock on a particular allotment on public land is determined by how many animal unit months (AUMs) that land would support. An AUM is the amount of forage needed to sustain one mature cow, five sheep, or five goats for 1 month (BLM, 2008b).

Coyote Canyon

The CC lease area lies within the Boyer Ranch Allotment, which comprises approximately 127,194 acres and 1,789 AUMs of currently authorized grazing capacity. Within this allotment, one AUM is equal to approximately 71 acres. The grazing allotments within the project areas consist entirely of public lands administered by the BLM Carson City Office. Table 15 displays land ownership in the Boyer Ranch Allotment (BLM, 2009b).

Lands

Most of the land in Dixie Valley is federal land managed by the BLM and nearly all of it is designated as having the highest geothermal resource potential of any BLM-managed public lands in the state (BLM, 2001). The federal government administers more than 82 percent of the land in Churchill County. In accordance with the BLM PEIS for Geothermal Development (BLM, 2008a) and the Churchill County Master Plan (2005), the expansion and development of geothermal resources is supported and promoted for federal lands in this region in support of a national energy

policy for renewables. A BLM designated utility corridor exists within Dixie Valley with the express purpose of providing an outlet for geothermal power to be produced in the valley (BLM, 2001). There is a transmission line within this corridor.

Small private parcels exist throughout the valley, and a large portion of the southern half of the valley is controlled by the Department of Defense for testing of low-level supersonic flight operations as part of the Fallon Range Training Complex.

The existing Terra-Gen Dixie Valley geothermal plant is just north of the CC lease area, and a small private ranch is approximately 12 miles northeast of the Dixie Valley geothermal plant. The area is relatively undeveloped and most of the valley is utilized for cattle grazing, with BLM assuming grazing management responsibility on adjacent military-controlled lands.

Several rights-of-way or other authorizations have been granted on public lands within the project areas. These include rights-of-way for transmission lines, roads, and geothermal leases. There are 24 BLM-registered geothermal well leases in the area.

A BLM right-of-way planning corridor exists in Dixie Valley with the express purpose of providing an outlet for geothermal power to be produced in the valley (BLM, 2001). There is an existing 230-kilovolt (kV) transmission line owned by TGP within this corridor. BLM also has prepared a PEIS for Geothermal Leasing in the Western U.S. (BLM, 2008a), which analyzes potential impacts of geothermal development and provides a list of stipulations and best management practices (BMPs) related to geothermal leasing and related development on BLM-managed public land. In 2008, BLM issued a Record of Decision (ROD) for geothermal leasing in the Western U.S., including adoption of Resource Management Plan amendments related to geothermal leasing (BLM, 2008d).

Coyote Canyon

The CC lease area is located in Township 24N, Range 36E, in Sections 2, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 22, 23, and 24. The project area is located on land administered by BLM and leased for exploration activities to TGP. The Department of Defense operates the Gabbs North Military Operating Area (MOA) designated for low-level supersonic flight operations in the vicinity of Coyote Canyon.

The BLM Legacy Rehost (LR 2000) Report System and the BLM National Integration Land System (NILS) GeoCommunicator lists several non-producing geothermal leases and lease agreements within the leased area of the CC project, as well as producing leases, owned by TGP, within Sections 12 and 13 (BLM, 2009c). Within Section 12 is a right-of-way granted to the Navy for a remote relay station. Just east of the project area is a road right-of-way associated with the Terra-Gen Dixie Valley 230-kV transmission line, which runs southwest to northeast through Sections 12, 13, 14, 15, 21, and 22 of the lease area. There are also active lode mining claims located across Sections 2, 9,10,11,12, 13, 14, and 15 of the lease area (BLM, 2009c).

(II) The environmental impacts that the construction and operation of the proposed utility facility will have on the project area before mitigation.

Air Quality

Air emissions from the Proposed Actions at the CC site would be primarily attributable to the following air pollution sources:

- Heavy equipment and drill rig (diesel exhaust and GHG emissions)
- Earth moving and grading (particulate fugitive and GHG emissions)
- Well testing (H2S and GHG emissions)

Heavy Equipment, Drill Rig, and Earth-moving and Grading Activities

Fugitive dust emissions during construction and from construction vehicles using the access roads would result in temporary emissions of particulate matter, but these emissions would be of larger particulate sizes and the majority of these fugitive particulate emissions would settle before leaving the leasehold site. Since the proposed total disturbed area is greater than 5 acres for CC, the NDEP Bureau of Air Pollution Control (BAPC) requires a Surface Area Disturbance Permit and corresponding Dust Control Plan. The NDEP BAPC has jurisdiction of air quality programs over all counties in Nevada except Washoe and Clark counties.

Short-term construction and drill rig exhaust emissions, including volatile organic compounds, carbon monoxide, nitrogen dioxide, PM10, hazardous air pollutants, and oxides of sulfur would result from internal combustion engines and heavy equipment used at the construction site. These short-term fugitive emissions would be below the threshold level that would require a permit from NDEP BAPC.

Well Testing

Small quantities of naturally occurring non-condensable gases, such as H2S and GHGs (carbon dioxide and much smaller amounts of methane) would be emitted to the air during well testing. H2S initial concentrations in the CC area geothermal fluids are estimated at

approximately 70 ppm, and methane concentrations are estimated at less than 2 percent of non-condensable gases, based on historical data (Freeman, 1986). This estimate is conservative in that more recent tests at the existing Dixie Valley geothermal plant indicate lower concentrations (TGP, 2009). As discussed in Chapter 2 of this EA, up to 15 slim wells and/or exploration wells at CC would be drilled and performance tested. Well testing would be conducted for an average of 3 days (24 hours per day) for each well. It is anticipated that the initial flow rates of fluid from each well into its reserve pit (and to the existing Dixie Valley sumps, as required) would be approximately 500 to 1,500 gallons per minute on average (with up to 700,000 pounds per hour geothermal flow) depending upon the productivity of the well. Based on this estimate, total potential emissions from the proposed well testing would be approximately 26.40 tons H2S (1.76 tons per well) at site.
Air emission sources that exceed 5 tons per year of criteria air pollutant emissions require an air permit from the NDEP BAPC. This permit would be a temporary permit for operations of less than 1 year duration or a stationary source permit for operations greater than 1 year duration.

The Proposed Actions would each require temporary permits because project-related emissions would be greater than 5 tons per year and performance testing would last less than 1 year. If the total activity duration were extended beyond 1 year, TGP would obtain a stationary source permit.

Heavy Equipment and Well Testing

Cumulative GHG emissions from well testing and construction-related diesel engines were reviewed and determined to be less than 25,000 tons per year, which is below the level that triggers federal reporting requirements.

Additionally, according to State of Nevada regulations, only electrical generating power plants are required to report GHG emissions; therefore, the Proposed Actions would not be required to report GHG emissions.

To minimize air pollution emissions from construction activities and construction and drill rig diesel engines, the following BMPs for fugitive dust and diesel exhaust would be implemented during operational activities:

- Surfacing access roads with aggregate materials, wherever appropriate
- Using dust abatement techniques, such as watering on unpaved, unvegetated surfaces to minimize airborne dust, as needed
- Posting and enforcing speed limits to reduce fugitive dust (speed limit of 15 miles per hour, as necessary)
- Applying dust abatement techniques (such as watering, requiring loader buckets to be emptied slowly, minimizing drop heights, etc.) to earth-moving, excavating, trenching, and grading activities
- Minimizing equipment and vehicle idling times during construction activities

Cultural Resources

Consultation with the SHPO on Determinations of Eligibility and Finding of Effect for cultural resources located within the project area are ongoing, and finalizing the evaluation below

is contingent on completing that consultation process. Following the State Protocol Agreement between the Bureau of Land Management, Nevada and the Nevada State Historic Preservation Office for Implementing the National Historic Preservation Act, 2009, Appendix H. Avoiding Properties, Sections A and B, archaeological resources recommended as eligible will be avoided.

Coyote Canyon

Six archaeological resources were recommended as eligible. Following the State Protocol Agreement between the Bureau of Land Management, Nevada and the Nevada State Historic Preservation Office for Implementing the National Historic Preservation Act, 2009, Appendix H., Sections A and B., the design of the proposed project construction (pads or roads) would be relocated to avoid those sites recommended as eligible. A thirty meter buffer will be placed around historic properties identified within the APE. In the event that any construction overlaps this buffer an archaeological monitor will be on site during the construction.

Native American Religious Concerns

Consultation regarding the CC site between the BLM and federally recognized Native American tribes is ongoing. During consultation for the proposed project following concerns were identified: cultural resources including historic properties; continued access and use of the Dixie Hot Springs for healing and spiritual purposes; and other resources that may be affected by the current project.

Water Quality, Wetlands, and Floodplains

As described in Exhibit "8," Section 2, access roads would be constructed as part of the Proposed Actions. Roads and wells would be located and designed to avoid impacts to surface water features such as springs, seeps, ponds, and ephemeral washes to the extent possible. Well

testing would involve removing thermal groundwater and discharging it to the drill pad reserve pit. Excess fluids from each well would be trucked to existing reserve pits at the Dixie Valley geothermal power plant. The anticipated test flow rates (500 to 1,500 gallons per minute) and durations (average of 3 days) may result in 2 to 6 million gallons of thermal groundwater being extracted from the geothermal aquifer for each well during testing. Installation and testing of deep geothermal wells has the potential to cause impacts on surface water through accidental release of geothermal fluids to surface water features.

The release of hazardous materials to the environment could affect surface water features. BMPs to prevent such a release, including development of a construction Stormwater Pollution Prevention Plan (SWPPP) and spill prevention, control, and countermeasures (SPCC) plan, are described in Exhibit "8," Section 4.1.7.

In addition to these measures, the following steps would be undertaken during construction to avoid or minimize the potential for impacts to surface water or groundwater in the area:

- When permanent new access roads must cross ephemeral washes, rolling dips would be installed. The rolling dips would be designed to accommodate flows from at least a 25-year storm event. Culverts may be used wherever rolling dips are not feasible.
- Drill pad reserve pits would be compacted during construction and settled bentonite clay from drilling mud would accumulate on the bottom of the drill pad reserve pit to act as an unconsolidated clay liner, reducing the potential for drilling fluid to percolate to groundwater.

- TGP would obtain necessary working in waters and/or groundwater discharge permits and provide a Notice of Intent to NDEP prior to well pad construction.
- Wetland boundaries would be avoided to the extent possible.
- A BLM-approved grouting and casing program for construction of slim well and/or exploration wells would be implemented to prevent water quality effects on groundwater during or after well installation.
- Borehole geophysics analyses (cement bond logs) would be conducted to document that well-casing grouting activities provide an effective seal, isolating the geothermal aquifer from shallow alluvial aquifers and therefore minimizing potential impacts on surface washes, springs, seeps, or floodplains.
- BMPs would be implemented to ensure that any geothermal fluid encountered during the drilling does not flow uncontrolled to the surface. These include the use of "blowout" prevention equipment during drilling and the installation of well casing cemented into the ground.
- A hydrologic evaluation plan will be submitted to the BLM for approval prior to drilling.

Surface Water and Groundwater Monitoring Plan

Standard aquifer testing procedures would be employed at targeted depth intervals as the boreholes for slim wells and/or exploration wells are advanced. The vertical boundaries of the aquifers, the depth of aquifers (non-thermal and thermal) penetrated during drilling, would be noted

from the drilling log. The horizontal boundaries would be noted if any are reflected on time-drawdown plots produced during aquifer testing. Borehole geophysics analysis would be conducted from the ground surface to the total depth of the borehole.

Aquifer testing would be used to determine drawdown associated with pumping. If possible, an assessment of whether the aquifer is confined or unconfined would be made, as well as an estimate of aquifer thickness and a qualitative assessment of its relative productivity. The temperature of penetrated aquifers would be noted. A hydrologic evaluation plan would be put in place to confirm the expectation that no impacts to quality, quantity, or temperature of surface water and groundwater occurred as a result of slim well and/or exploration well installation and testing.

Selected seeps and springs, determined in consultation with BLM, would be monitored for basic water quality, flow, and temperature prior to and during the Proposed Actions.

Coyote Canyon

Palustrine emergent wetlands associated with springs and seeps are present within the CC lease area in Sections 23 and 24. Based on a review of USGS topographic maps and NDWR groundwater basin mapping, these water bodies are not jurisdictional waters of the U.S. because they are located in an internally drained desert basin that is distant from and lacks hydrographic connectivity to major rivers and water bodies. A request for jurisdictional determination concurring with this finding is pending from the U.S. Army Corps of Engineers. Although the waters are not jurisdictional waters of the U.S., construction activities would avoid wetland areas associated with seeps and springs to the extent possible.

Biological Resources

Vegetation

Impacts to vegetation would be minimized by reseeding all areas of access roads and well pads not required for subsequent energy production using a BLM-approved native seed mixture. Topsoil would be salvaged whenever possible and reused in a timely manner.

Coyote Canyon

The specific locations of the 15 wells to be installed at CC would be determined prior to drilling. This analysis conservatively assesses impacts based on the potential maximum number of well locations identified within each vegetation type to identify impacts to vegetation, even though the area disturbed by CC exploration activities would not be more than 73 acres.

According to SWReGAP analysis, up to 20 acres of disturbance could be located on intermountain basins playa, which is generally lacking vegetation, although scattered salt tolerant communities also occur (USGS, 2004). Implementing the Proposed Actions could lead to the disturbance of up to 62 acres of intermountain basins mixed salt desert scrub and up to 17 acres of salt-tolerant communities. In addition, disturbance could occur to small areas of fringing wetland vegetation associated with seeps and springs in the vicinity of well pads and access roads on the margin of the playa; however, this disturbance would be minimized by implementation of the BMPs.

Invasive, Non-native Species

The Proposed Actions have the potential to increase the spread of invasive, non-native species. Weed seeds can germinate when soils are disturbed by construction activities, particularly where available soil moisture is increased by application of water for dust suppression. Weeds also could be introduced by construction equipment brought to the project from infested areas or by the

use of seed mixtures or mulching materials containing weed seeds.

The potential for the Proposed Actions to increase the spread of invasive, non-native species would be minimized through the use of BMPs, including mapping and treating weed infestations prior to disturbance or during construction, and use of certified weed-free seed and mulching materials.

A noxious weed control program consisting of monitoring and eradication for species listed on the Nevada Designated Noxious Weeds List (NRS 555.010) also would be implemented. With implementation of these measures, no long-term impacts associated with invasive, non-native species are anticipated.

Migratory Birds

Direct impacts stem from approximately 73 acres of actual habitat that would be disturbed in CC during the life of the Proposed Action, although effective habitat loss from the disturbance and fragmentation may encompass a larger area for some species. Construction, human activity, and increased noise in the area from construction and drilling could temporarily displace migratory birds from the area. However, large tracts of similar habitat are found adjacent to the project areas, and migratory birds would likely return to the area after construction.

The Migratory Bird Treaty Act (MBTA) analyzes requirements related to ground-disturbing activities during the migratory bird nesting season. To meet these requirements, habitat for migratory birds would be eliminated within areas of proposed disturbance prior to the nesting season. In the event this elimination measure is not implemented, if ground disturbing activities do take place during the migratory bird nesting season, migratory bird nest surveys would be conducted early in the nesting season by a qualified biologist acceptable to BLM. This survey

would be conducted to identify either breeding adult birds or nest sites within the specific areas to be disturbed. If active nests are present within these areas to be disturbed, TGP would coordinate with BLM to develop appropriate protection measures for these sites, which may include avoidance, construction constraints, and/or the establishment of buffers.

To minimize impacts to migratory birds and other wildlife, in addition to the management practices described above, well pads and roads would be recontoured and reseeded following completion of the Proposed Actions as described in Exhibit "8," Section 2. Erosion-control measures would be implemented as described in Exhibit "8," Section 4. Topsoil would be salvaged and reused whenever possible and in a timely manner.

Sensitive Species

Threatened and Endangered Species

Because no threatened or endangered species were observed during field surveys or are known to exist in the CC lease area, there would be no impacts to threatened or endangered species from the Proposed Action (BLM, 2003; USFWS, 2009a; USFWS, 2009b).

BLM Sensitive Species

Sage grouse may use the project area as a water source. Mitigation measures would be implemented to minimize impacts to water resources; therefore, negligible impacts to sage grouse are expected as a result of implementation of the Proposed Actions.

No sensitive bat roosting habitat is expected to be disturbed due to implementation of the Proposed Actions. However, direct impacts stem from approximately 73 acres of actual habitat that would be disturbed in CC during the life of the Proposed Action, although effective habitat loss from the disturbance and fragmentation may encompass a larger area for some bat species. Bat

species in the area are insectivorous and it is not expected that insect populations would be adversely affected by construction activities. There are large tracts of similar habitat in the vicinity of the project area for bats to forage; therefore, no impacts to sensitive bat species are anticipated.

In the project area for CC, resident BLM sensitive avian species (including golden eagle, ferruginous hawk, prairie falcon, and loggerhead shrike) and breeding sensitive avian species (such as burrowing owl and vesper sparrow) would lose approximately 73 acres of habitat at each site as a result of the Proposed Actions. Effective habitat loss from disturbance and fragmentation may encompass a larger area for some avian species. Indirect effects from noise and increased human activity could temporarily displace and reduce breeding success of these sensitive avian species; however, the species would be able to return to the disturbed areas upon completion of ground-disturbing activities. No population-level impacts to the sensitive avian species are expected as a result of implementation of the Proposed Actions. Because sensitive avian species would likely return to the area after construction is complete and because similar habitat is available near the project area, impacts to sensitive avian species are expected to be minor from implementation of the Proposed Actions. There are large tracts of similar habitat in the vicinity of the project area; therefore, no impacts to BLM sensitive avian species are anticipated.

Impacts to BLM sensitive species associated with marsh habitats (e.g., northern leopard frog, sandhill crane, snowy plover, black tern, long-billed curlew, and least bittern) would be similar to avian species described above.

Bighorn sheep habitats within the Stillwater Range are not anticipated to be disturbed by construction or drilling activities because drilling and road construction would not occur in these areas. Therefore, no impacts to bighorn sheep are expected as a result of the implementation of the

Proposed Actions.

Wildlife Resources

Coyote Canyon

Direct impacts to wildlife species stem from disturbance of approximately 73 acres of actual habitat, although effective habitat loss from disturbance and fragmentation may encompass a larger area for some species. Because the specific locations of the 15 wells to be installed would not be determined until drilling begins, the potential habitat impacts are calculated based on the worst-case scenario for each habitat type (assuming the maximum number of wells in each habitat type). As a result, the total acreage impacts reflected in this analysis add up to more than 73 acres. Up to 62 acres of intermountain basins mixed salt desert scrub, up to 17 acres of intermountain basins greasewood flat/saltgrass meadows/iodine bush scrub, and up to 20 acres of intermountain basins playa habitat could be disturbed by implementation of the Proposed Actions. In addition, disturbance may occur to small areas of fringing wetland vegetation associated with seeps and springs in the vicinity of well pads and access roads on the margin of the playa; however, this disturbance would be minimized by implementation of the BMPs.

Construction of access roads and installation of wells would result in direct loss of habitat. Direct impacts from mortality to smaller, less mobile species could occur during construction if those species are present. Noise, human presence, and heavy equipment present during construction activities are likely to temporarily displace wildlife that may be present or near the project area and could have an indirect effect on wildlife species in the area. These indirect effects could reduce breeding success of species that are sensitive to human activity. These impacts are expected to be temporary and short term for the duration of the proposed construction and drilling

activities. Wildlife would be able to return to the disturbed areas upon completion of ground-disturbing activities. No population-level impacts to wildlife species are expected as a result of implementation of the CC Proposed Action. Because wildlife would likely return to the area after construction is complete and because similar habitat is available near the project area, impacts to wildlife are expected to be minor from implementation of the CC Proposed Action.

Wastes, Hazardous or Solid

Diesel fuel, lubricants, hydraulic fluids, and drilling chemicals (drilling mud, caustic soda, barite, etc.) would be transported to, stored on, and used at both project areas. The Proposed Action must conform to federal and state requirements for handling these hazardous materials. Typical of most construction projects, the storage and use of these materials could result in minor, incidental spills of diesel fuel or oil to the ground during fueling of equipment, filling of fuel storage tanks, and handling lubricants. Other incidental spills could be associated with equipment failures such as ruptured hoses. Management practices, including development of a spill plan, use of secondary containment structures, and worker training, would be used to prevent the release of hazardous wastes to the environment. Solid wastes would be transported offsite to a landfill. Implementation of these procedures would prevent or minimize potential impacts on the environment due to generation of hazardous or solid wastes.

Visual Resources

Temporary impacts to visual resources would occur during road and well pad construction activities at the project area and as a result of the presence of drill rigs. Drilling equipment would be seen from Dixie Valley Road. Roads, drill pads, and laydown areas are near ground level and would not affect visual resources. Construction impacts would be minor and

short-term and would be consistent with the objectives of Class IV VRM objective.

During the drilling operations, the drill rig could extend up to about 160 feet above ground level. These operations would be 24 hours per day, 7 days per week. During drilling operations, the rig would be visible at distances of greater than 1 mile from the respective drill site, and lights used when drilling at night would increase rig visibility. All drill rig and well test facility lights would be limited to those required to safely conduct the operations and would be shielded and/or directed in a manner that focuses direct light to the immediate work area.

Access roads would remain after the wells have been drilled until reclamation is conducted. Laydown areas and concrete slab drill pads would be removed if they are no longer needed.

The Stillwater Mountain Range, with peaks higher than 8,500 feet, is between the CC lease area and Lovelock. The CC project area is, therefore, not visible from the Lovelock area. The CC project area is located approximately 14 miles away from The 7 Devils Ranch and is not likely to be visible.

Paleontological Resources

Direct impacts to paleontological resources could result from the mechanical destruction of fossils as a consequence of uncontrolled excavations of paleontologically sensitive sedimentary units. This includes grading, and excavating and drilling. Other activities, such as laying roadway gravel over the top of paleontologically sensitive sediment, would have little or no impact on paleontological resources. Indirect effects to paleontological resources could include unauthorized fossil collection after fossil-rich sediment is exposed by excavation, in the absence of measures to restrict public access to such sites or to educate workers on paleontological resource avoidance.

Coyote Canyon

Construction activities that include surface disturbance of the immediate subsurface at one well pad (Well 61-15) would have the potential to impact paleontological resources because subfossil wood occurs in the immediate vicinity (PFYC = 4). Prior to construction at this site, this impact would be mitigated by moving the location of Well 61- 15 to the west away from this resource, staking for avoidance that area within Sections 14 and 15 where subfossil wood exists, subsequent avoidance of the area during construction, and by worker education that would include the importance of paleontological resources avoidance.. The paleontological potential of the other 24 well pads and their access routes is low (PFYC Class 2), and therefore impacts to paleontological resources are not expected.

Of the 25 well sites in the CC area, only one possesses high (PFYC Class 4) paleontological sensitivity (Well 61-15), because of the presence of subfossil wood on the surface in the immediate vicinity. The subsurface potential of all well pads in the CC area is considered to below (PFYC Class 2) because they are located at sites underlain by alluvium or oxidized playa sediments. Impacts to paleontological resources from project development in the CC area would therefore not occur because the one area designated PFYC Class 4 (high sensitivity) will be avoided by relocation of the well pad, and by educating workers on paleontological resources avoidance.

Soils

The hazard of off-road or off-trail soil erosion in the project areas is slight (USDA NRCS, 2009). The soils are poorly to moderately suited for natural surface road construction (USDA NRCS, 2009); therefore, TGP would implement the BMPs described below when constructing access roads and well pads.

The loss of soil productivity is expected to be low because the soils have low native fertility and no farmlands, as covered under the Farmland Protection Policy Act (Public Law 97-98, 7 USC 4201), are present within the CC lease area.

The release of hazardous materials to the environment could affect soil resources. BMPs to prevent such a release, including development of a SPCC plan.

Erosion and loss of soil productivity would be minimized by implementing the following BMPs during access road and well pad construction:

- Excavation into native soil during construction of well pad reserve pits would be minimized to the maximum extent possible.
- Wells and roads not required for development purposes would be re-contoured to blend with the surrounding topography, in accordance with lease stipulations.
- Topsoil would be salvaged and reused whenever possible and in a timely manner.
- Temporarily disturbed areas would be reseeded where previously vegetated using a BLM-approved seed mixture.
- Erosion control measures, including but not limited to silt fencing, diversion ditches, water bars, temporary mulching and seeding, and application of gravel or rip rap, would be installed where necessary immediately after completion of construction activities to avoid erosion and runoff.
- Access roads would follow existing contours to the maximum extent possible. In areas where new access roads must be constructed across slopes,

erosion control measures would be installed as necessary, in accordance with Gold Book standards (BLM, 2007a).

- An average of 6 inches of gravel would be used as road surface because roads would be used during all seasons. Up to 3 feet of gravel may be used on some sections of road, and no gravel would be used on road sections where the natural surface is adequate.
- Additional gravel would be laid down when ground conditions are wet enough to cause rutting or other noticeable surface deformation and severe compaction. As a general rule, if vehicles or other project equipment create ruts in excess of 4 inches deep, a gravel surface would be installed prior to additional use.
- When construction occurs in areas of very soft soils, up to 3 feet of aggregate would be used.
- An NDEP BAPC Surface Area Disturbance documenting the BMPs to be used would be required for the project because the surface disturbed would be greater than 5 acres.
- Overland route corridors may be used for infrequently accessed locations.

Coyote Canyon

Construction of roads and well pads in the CC project area could disturb up to 73 acres (see Table 6 of Exhibit "7"). Erosion and loss of soil productivity would be minimized as described above.

Geology and Minerals

A history of recent (1954) seismicity and the presence of hot springs on the surface trace of the Dixie Valley fault zone led Ryall and Vetter (1982) to suggest that Dixie Valley would have a relatively high potential for induced seismicity if injection of geothermal fluids into deep wells occurs. Because the exploration activities described in this document do not involve injecting fluids into the slim wells and/or exploration wells, induced seismicity is not expected to occur related to exploration activities.

Livestock Grazing

As outlined in Tables 6 and 7 of Exhibit "7", the proposed projects would collectively disturb up to 146 acres (73 acres for CC) within various grazing allotments. To maintain flexibility in location of slim wells and/or exploration wells, TGP is proposing 25 potential well locations at CC. However, a maximum of 15 slim and/or exploration wells would be drilled in each project area. Conservatively, it is estimated that up to 2.81 AUMs, or less than three one-hundredths of one percent of the 10,521 AUMs within the three grazing allotments, would be compromised by disturbance from the projects. Due to this small disturbance, there is no impact to the AUMs from the Proposed Actions, and no reduction in authorized grazing use would be required. All activities for both projects are located away from sources of water in the vicinity and would not compromise livestock access to available water sources.

Coyote Canyon

The CC Proposed Action could disturb up to 73 acres, less than one percent of the 127,194 acres comprising the Boyer Ranch Allotment, reducing the 1,790 AUMs within the allotment by approximately 1.02 AUMs. No reduction in authorized grazing use would be required.

Lands and Realty

Existing linear rights-of-way in the vicinity of the CC lease area includes the Terra-Gen Dixie Valley 230-kV transmission line and its associated access road and State Route 121 to the south, which would be used only for access to the project areas. The Proposed Actions do not include drilling or other exploration activities in the State Route 121 right-of-way. The use of the lands for geothermal development would not preempt the other current uses of the land.

The Department of Defense operates the Fallon Range Training Complex, a portion of an MOA designated for low-level supersonic flight operations over the Dixie Valley region. Impacts to the MOA are reviewed by the Federal Aviation Administration (FAA) if the FAA obstruction thresholds are triggered.

The Proposed Actions would not trigger the FAA obstruction thresholds (14 CFR Part 77.13) because they would not include:

- Construction or alteration exceeding 200 feet above ground level
- Construction or alteration
- Within 20,000 feet of a public use or military airport which exceeds a 100:1 (horizontal:vertical) surface from any point on the runway of each airport with at least one runway more than 3,200 feet
- Within 10,000 feet of a public use or military airport which exceeds a 50:1 surface from any point on the runway of each airport with its longest runway no more than 3,200 feet
- Within 5,000 feet of a public use heliport which exceeds a 25:1 surface
- Highway, railroad, or other traverse way whose prescribed adjusted height

would exceed the above noted standards

- Construction or alteration located on a public use airport or heliport regardless of height or location

(III) The environmental impacts that the construction and operation of the proposed utility facility will have on the project area after mitigation.

Air Quality

Air quality impacts from the Proposed Actions at CC and would consist only of temporary impacts during well construction, including fugitive dust from construction vehicles and hydrogen sulfide emissions during well testing. If well installation activities are performed concurrently at other sites, the Proposed Actions could contribute to a cumulative temporary increase in fugitive dust and hydrogen sulfide emissions. These impacts would be minimized through the use of as the management practices.

Cultural Resources

The Proposed Actions have been designed to avoid identified cultural resources in Dixie Valley. Increased traffic and activity in the lease area, when combined with traffic from other current and potential future activities, could cause an incremental additional risk of unintentional disturbance of cultural resource areas. BMPs would be used to prevent or minimize unauthorized or unintentional disturbance of cultural resource areas.

Native American Concerns

Much of the state of Nevada is part of the traditional Paiute and Western Shoshone lands occupied for centuries before Europeans arrived, and the land maintains cultural significance for the Native American community. Over the last couple of decades more activities have begun

encroaching on what has been a largely unpopulated and pristine environment. Increases in livestock grazing, oil and gas exploration, geothermal exploration and development, mining, and recreational activities such as OHV, hunting and fishing, hiking, and mountain biking have become more common in the vicinity. These multiple uses, and the increased frequency of them, contribute to the overall decline in cultural resource sites and traditional cultural properties significant to the spiritual or cultural identities of the Native American Tribes.

In order to minimize the potential cumulative contribution of the Proposed Actions to impacts such as these, BLM Stillwater Field Office and the affected Tribal organizations need to maintain an open and honest dialog in managing public lands. All interested parties need to remain flexible in their approach to making decisions on how to administer the multiple activities taking place on public lands. Through productive communications and understanding the needs of the other parties, the decisions made on how to manage the land can reduce or eliminate impacts to any party's interests on public lands.

Water Quality and Water Quantity

When combined with other current and potential future area activities, such as other geothermal development, there would be an increased potential for impacts to surface water and groundwater quality. Potential impacts to groundwater quality would be minimized through the use of BMPs for well construction. Percolation of geothermal fluids from well testing could have a temporary local impact on groundwater quality and water levels. Potential impacts to surface water would be temporary and local, and also would be minimized through the use of BMPs.

Biological Resources

The Proposed Actions would have impacts to biological resources. Vegetation and

habitat would be disturbed and removed, and invasive, non-native plant species may spread as a result of the Proposed Actions. Other development in the area may also remove vegetation and increase growth of invasive species. However mitigation measures including reseeding of disturbed areas and monitoring of invasive species would reduce potential impacts. Wildlife habitat, including habitat for migratory birds and BLM sensitive species, could be disturbed or removed due to other development in the area. Human activity and noise could displace wildlife to surrounding areas. However, similar abundant habitat is found in the area and region, and reseeding of disturbed areas could re-establish wildlife habitat. Overall, the Proposed Action would have a negligible contribution to cumulative effects on biological resources within the analysis area.

Wastes, Hazardous or Solid

Solid waste and hazardous materials would be transported, stored, and used as part of the Proposed Actions. When combined with other area activities, the increase in the total volume of wastes handled would result in an increased risk of spill or other release of waste materials to the environment. Implementation of the BMPs would minimize the potential for wastes and hazardous materials to be released to the environment.

Visual Resources

Visual impacts from the Proposed Actions would be limited and would occur primarily during the construction process. If other geothermal exploration activities associated with the existing geothermal leases were to take place at the same time, the Proposed Actions could contribute to a temporary cumulative impact on visual resources. This contribution would be largely limited to the duration of construction when drill rigs are present onsite because any remaining structures would be low-level and not visible from a distance.

Paleontological Resources

Paleontological resources would be disturbed through implementation of the Proposed Actions. Such disturbances, when combined with disturbances from other current and future activities that disturb the surface and subsurface of the land, would have a cumulative impact on paleontological resources. However, implementation of BMPs to prevent unauthorized or uncontrolled disturbance of the land would limit the impacts.

Soils

Soil erosion could be caused by the combination of the Proposed Actions along with other current and potential future area activities. The contribution of the Proposed Actions to soil erosion would be minimized through the use of the BMPs.

Geology and Minerals

Because there are mining claims within the lease area, it is possible that the Proposed Actions could occur simultaneously with use of the area by mineral claimants. There are currently no mining Plans of Development identified within the project area. Therefore, the Proposed Actions are not expected to negatively impact mining claims in the lease area.

Livestock Grazing

Because the Proposed Actions would result in a reduction of AUMs of less than 1 percent, no reduction in authorized grazing capacity would occur. No other forage-disturbing activities are known to be planned in the area

Lands and Realty

The Proposed Actions are consistent with BLM land use planning for the area and would not interfere with other ongoing or reasonably foreseeable future activities, and therefore

would not contribute to cumulative impacts on land use.

8. Unless, pursuant to paragraph (b) of subsection 1 of NRS 704.890, the proposed utility facility is exempt from the requirement that the Commission find and determine the extent to which the proposed utility facility is needed to ensure reliable utility service to customers in this State, an explanation of the extent to which the proposed utility facility is needed to ensure reliable utility service to customers in this State, including:

(a) If the proposed utility facility was approved in a resource plan or an amendment to a resource plan, a reference to the previous approval by the Commission.

Not applicable.

(b) If the proposed utility facility was not approved in a resource plan or an amendment to a resource plan, a description of the extent to which the proposed utility facility will:

(1) Provide utility service to customers in this State.

Not applicable.

(2) Enhance the reliability of utility service in this State.

Not applicable.

(3) Achieve interstate benefits by the proposed construction or modification of transmission facilities in this State, if applicable.

The project will enhance the reliability of the electric grid which serves the western region of the United States.

9. An explanation of how the need for the proposed utility facility as described in subsection 8 balances any adverse effects on the environment as described in subsection 7.

The Coyote Canyon Project is designed to meet the need for clean, renewable, electric power. The state of Nevada possesses the potential of being the greatest supplier of geothermal

electric energy in the United States. As stated in the environmental assessment, it is the policy of the United States Department of the Interior to encourage the development of geothermal resources on federal lands. Development of these resources reduces this nations reliance on foreign sources of fossil fuel, promotes natural security, diversifies energy portfolios and contributes to the reduction of greenhouse gas emissions. Moreover, the construction of the Coyote Canyon Project will result in the creation of significant employment during the construction phase of the project as well as employment for ongoing maintenance and operation of the facility.

During construction of the proposed facility it is anticipated that as many as 250 workers will be employed over a period of approximately 16-18 months. The operation of the plant will result in 16 full-time positions. In addition, the project will result in increased property taxes for Churchill County, royalties paid to the Minerals Management Service, the State of Nevada and to Churchill County and revenues to local businesses from the procurement of goods and services associated with large construction projects.

10. An explanation of how the proposed utility facility represents the minimum adverse effect on the environment, including:

(a) The state of available technology.

and

(b) The nature of various alternatives.

Flash System with Steam Turbine Generator

The steam turbine generator (STG) would be a skid mounted, dual admission, condensing type turbine. The STG would be installed with a condenser at its discharge and would be supplied with the necessary auxiliary equipment for control and speed protection, bearing lubrication and gland sealing. The STG would be coupled to a totally enclosed synchronous

generator. The generator would rotate at 3600 revolutions per minute (rpm). The terminal voltage would be 13.8 kV, 3 phase, 60 hertz. The generator would be supplied with a brushless or static excitation system and auxiliary control system. The condensed steam would then be used for process water make-up or sent to the brine return surge tank for reinjection.

The HP and low pressure (LP) vessels at the entry points of the STG would have internal demistor pads for removing moisture from the steam prior to entering the steam turbine. The entire LP steam supply would be piped to the main turbine for power production. The spent brine would exit the bottom of the LP flash vessel and flow by gravity to the brine return surge tank for subsequent injection back into the reservoir. The HP and LP flash vessels would be vertical steel vessels.

The turbine governing valves control the steam flow to the turbine to maintain set power production. This in turn provides back pressure and establishes the pressures in the flash system. Steam relief valves on both the HP and LP steam lines would be actuated when the steam pressure exceeds set operating pressures. The steam would be vented to an above grade rock box located adjacent to the plant site until steam pressures are relieved back down to the set operating pressures.

Binary Organic Rankine Cycle Units

The binary power conversion process utilizes the Organic Rankine Cycle (ORC) technology to extract heat from the geothermal fluid. The ORC units would use a secondary organic working fluid, such as pentane (C_5H_{12}), isopentane (C_5H_{12}), butane (C_4H_{10}), isobutene (C_4H_{10}) or a refrigerant such as R245fa, which would extract heat from the steam/brine. The working fluid is vaporized, due to a lower boiling point, in the preheater and vaporizer to drive special organic fluid

turbines before it is condensed by in the air cooled condensers. It then repeats the process as it is operated in a closed loop system. The turbine rotates at between 1,800 and 3,600 rpm and drives a generator, which produces grid compatible power.

The binary cycle would produce the same amount of non-condensable gas (NCG) that the flash system would generate since about 95 percent of the NCGs come out of solution in the HP separator and would have to be removed when the steam is condensed in the ORC heat exchangers. The ORC unit would produce a small amount of NCG, which would be periodically vented to a vapor recovery unit. This vapor recovery unit removes the volatile organic compounds (VOCs) from the non-condensable vent gases. The NCG is extracted periodically during normal operation from the ORC unit condenser.

Geothermal Combined Cycle

A geothermal combined cycle utilizes both flash and binary systems working together as a single unit. The size and design of the exact arrangement would be optimized during the detail design phase, once resource data is obtained in the drilling program. A likely configuration would operate with the two-phase brine being separated in the HP separators into the HP steam and HP brine lines. The HP steam would be transferred into an extraction steam turbine that discharges the steam at a pressure between 10-40 pounds per square inch gauge (psig) instead of a backpressure near 0 psig as in the flash system. The extracted steam, that would otherwise be condensed using water from the cooling towers for heat rejection, is sent to a binary ORC unit that condenses the steam as heat is transferred to the binary system to power the ORC cycle. Instead of being flashed in a LP separator, brine from the HP separator would be transferred to additional binary ORC units and combined with the steam condensate after the first ORC unit to provide additional power

generation. The combined cycle would allow for better resource utilization of the brine as additional heat extraction would generate greater overall efficiencies than the flash system would provide for electrical generation. The ORC unit would use a secondary (that is, binary) organic working fluid, such as pentane or a refrigerant such as R245fa, which would be sent through a vaporizer and pre-heater and then condensed in an air cooled condensers. The turbines would drive a generator, which produces electricity.

The combined cycle would produce the same amount of NCG that the flash or the binary system would generate. The ORC unit would produce a small amount of NCG, which would be periodically vented to a vapor recovery unit. This vapor recovery unit removes the VOCs from the non-condensable vent gases. The NCG is extracted periodically during normal operation from the ORC unit condenser.

Heat Rejection System

Each of the three plant designs describe (flash, binary and geothermal combined-cycle) would use a dry cooling system or a hybrid cooling system. Using dry cooling technologies would allow for the elimination of evaporating water in the cooling cycle. In direct dry cooling systems, also known as air-cooled condenser, fans blow air over a radiator system to remove heat from the system via convective heat transfer (instead of once-through cooling or evaporative heat transfer). In the direct dry cooling system, exhaust steam or vapor from the turbine exhausts directly to a manifold radiator system that rejects heat to the atmosphere by forcing air over the copper tubes, condensing the vapor inside the radiator. This is the most common dry cooling system in use in the United States.

In the flash system, air cooling would provide several technical difficulties adjusting

to the high variations of backpressure caused by the changing air temperatures. The design of the STG is greatly affected by the discharge pressure changes on the backpressure designed steam turbines. The high variability of the air cooled condensers on the steam turbines may cause the blades to vibrate, fracture and break, creating several unplanned and long repair shut downs. Control would be put into place to prevent this, but would cause the plant to shut down when air temperatures reach above a certain degree in the summer when the power is required the most from the utilities. These technical difficulties may require the use of a limited amount of water (up to 500 acre-feet per year, which is less than the 3,400 acre-feet per year that a wet-cooling system may have lost through evaporation) during hot weather conditions.

The addition of a limited amount of water to a dry-cooling system creates a hybrid cooling systems. A hybrid cooling system combines wet and dry cooling technologies. These systems reduce cooling water quantities by 85 percent from that needed for wet cooling (from 3,400 acre-feet per year down to 500 acre-feet per year).

Examples of hybrid-cooling systems could include: I) a parallel system (using dry and wet in parallel), or ii) misting system adding water to the air inlet of an air-cooled condenser or iii) a packing system design to load moisture into the air inlet. The hybrid-system would be capable of protecting equipment during hot weather condition and/or increase system performance.

Spray-enhanced dry cooling is a type of hybrid water conservation cooling system through which the inlet ambient air is pre-cooled and humidified with spray, or forced through a humidifying packing material before it reaches the air-cooled condensers. This system uses about 15 percent of the water used for wet cooling systems, but reduces the capacity loss that occurs with

an all dry cooling system and can help protect the equipment during certain hot weather conditions.

Variations of spray-enhanced dry cooling have been tested at the Mammoth Pacific geothermal power facility in California, which is one of the world's first air-cooled geothermal binary cycle power plants. To date, there have been no hybrid cooling systems utilized at traditional flash geothermal facilities.

A parallel system combines a traditional dry cooling system to a smaller wet cooling system used mainly during hot and dry weather conditions.

(c) The economics of various alternatives.

As in all construction projects of the magnitude being considered, economics is a pivotal factor. The construction of a geothermal power plant is typically financed through a combination of debt and equity. A lender or lenders will independently evaluate the viability of the project from the standpoint of resource adequacy, access to transmission, the power sale and purchase agreement and a variety of other considerations. The technology selected for the operation of the plant will be dictated primarily by the quality and quantity of the resource. Terra-Gen has over 22 years of operating experience at Dixie Valley and believes that the Coyote Canyon resource will be similar to the resource being utilized at the nearby Dixie Valley Plant. As such, there is an expectation that any of the three technologies being considered may be a viable option. A final decision on the design of the plant cannot be determined until a sufficient number of exploration wells have been successfully completed and flow-tested that confirm that there is commercial resource adequacy for the operation of the plant over the life of the contract.

11. An explanation of how the location of the proposed utility facility conforms to applicable state and local laws and regulations, including a list of all permits, licenses and approvals required by federal, state and local statutes, regulations and ordinances. The explantion must include a list that indicates:

(a) All permits, licenses and approvals the applicant has obtained, including copies thereof.

(1) The Environmental Assessment for Geothermal Exploration described in Section B.3. above, dated April, 2010.

(2) The Environmental Assessment for Geothermal Utilization described in Section B.3. above, dated November, 2010.

(3) TGP has obtained five geothermal leases from BLM for the Coyote Canyon Project. See, Exhibit "4."

(4) A special use permit from Churchill County, dated January 19, 2011. See, Exhibit "9."

(5) BLM Geothermal Drilling Permits. See, Exhibit "10."

(b) All permits, licenses and approvals the applicant is in the process of obtaining to commence construction of the proposed utility facility. The applicant must provide an estimated timeline for obtaining these permits, licenses and approvals.

A table of these licenses, permits, and approvals is attached hereto as Exhibit "11."

12. An explanation of how the proposed utility facility will serve the public interest, including:

(a) The economic benefits that the proposed utility facility will bring to the applicant and this State.

The Coyote Canyon project will require approximately 250 jobs during the construction phase of the project. In addition, the project will require 16 full time positions for ongoing operations and maintenance of the facility. Churchill County will see an increase in its tax base which will result in an increase in tax revenue to the county. The BLM will receive ongoing