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Bureau of Land Management

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DOE/EA-1921

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Silver Peak Area
Geothermal Exploration Project
ENVIRONMENTAL ASSESSMENT

Geothermal Lease: NVN-87008

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BLM Mission Statement

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

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1. INTRODUCTION

1.1 LOCATION AND SUMMARY OF PROPOSED ACTION

Rockwood Lithium Inc (Rockwood), formerly doing business as Chemetall Foote Corporation, is proposing to construct, operate, and maintain the Silver Peak Area Geothermal Exploration Project (Project) within Esmeralda County, Nevada (see Figure 1) to determine subsurface temperatures, confirm the existence of geothermal resources, and confirm the existence of a commercial geothermal reservoir at the proposed well sites within federal geothermal lease NVN-87008. The area to be explored (project area) consists of federal geothermal lease NVN-87008 and is within portions of Sections 23-24, Township 2 South (T.2S.), Range 39 East (R.39E.), Mount Diablo Baseline and Meridian (MDB&M) (see Figure 2). Appendix B contains the lease referenced in this document and the respective approval, effective date, terms, conditions, and stipulations.

An Operations Plan for the construction, operation, and maintenance of these exploration wells was submitted to the Bureau of Land Management (BLM) Tonopah Field Office (TFO) in July 2011 and finalized in November 2011. Geothermal drilling permits would be submitted for the drilling of the exploration wells. Should this exploration project encounter and prove that a suitable geothermal resource is present, Rockwood would pursue development of the resource with the intent of providing electrical power for their adjacent lithium processing facilities. Given the uncertainties associated with geothermal exploration and the fact that most geothermal exploration on BLM land does not lead to the identification of geothermal resources that prove viable at a commercial scale, future development of the resource is not considered reasonably foreseeable for the purposes of compliance with the NEPA.

Rockwood has requested to obtain aggregate from Tonopah Sand and Gravel's Tonopah Airport Pit (N-80954) for well pad construction. The total aggregate required for the project is approximately 7,000 cubic yards.

The source of water needed for well drilling is from the freshwater supply system associated with the nearby Rockwood lithium processing facility, which acquires water from wells located at SW1/4, NE1/4, Section 28, T.2S., R.39E.

1.2 PURPOSE AND NEED

1.2.1 BLM PURPOSE AND NEED

Under the terms of the Geothermal Steam Act, its revisions of 2007, and its implementing regulations and the Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States and its Record of Decision of December 2008, BLM must respond to the proposed plans, applications and programs submitted by a geothermal lessee. BLM's need is to comply with its Statutory and regulatory obligations to respond to the Operations Plan submitted by Rockwood to conduct geothermal exploration and either approve the plan as submitted, approve the plan with required modification, or deny the plan. The BLM's project purpose is to provide Rockwood with an approved Operations Plan for geothermal exploration on their federal geothermal lease in the Silver Peak Area of Nevada. This approved Operations Plan would meet BLM's responsibility to ensure that provisions of geothermal regulations in 43 Code of Federal Regulations (CFR) 3200 (et seq.) are fulfilled. The plan would also ensure that development of the geothermal resource would be conducted without significant impact to the environment. This project would also further the purpose of Secretarial Order 3285A1 (March

11, 2009) that establishes the development of environmentally responsible renewable energy as a priority for the Department of the Interior.

1.2.2 DOE PURPOSE AND NEED

As part of the *American Recovery and Reinvestment Act of 2009* (Recovery Act) (Public Law 111-5, 123 Stat. 115), DOE's National Energy Technology Laboratory (NETL), on behalf of the Office of Energy Efficiency and Renewable Energy's Vehicle Technologies Program, is providing up to $2 billion in federal funding nationwide under competitively awarded agreements to facilitate the construction of U.S. manufacturing plants (including increases in production capacity at existing plants) that produce advanced batteries and electric drive components.

The federal action of providing funding for these projects, known as the Electric Drive Vehicle Battery and Component Manufacturing Initiative, requires compliance with the *National Environmental Policy Act of 1969* (NEPA) (42 U.S.C. §§ 4321 et seq.), the Council on Environmental Quality regulations (40 CFR Parts 1500 to 1508) and DOE's NEPA implementing procedures (10 CFR Part 1021). Accordingly, DOE is participating with BLM in the preparation of this EA to evaluate the potential environmental consequences of providing a grant under this initiative. Pursuant to a cost-sharing agreement with the project proponent, approximately $4.47 million in DOE financial assistance would be provided under the Proposed Action.

The overall purpose and need for DOE action, pursuant to the Vehicle Technologies Program and the funding opportunity under the Recovery Act, is to accelerate the development and production of various electric drive vehicle systems, through building or increasing domestic manufacturing capacity for advanced automotive batteries, battery components, recycling facilities, and electric drive vehicle components, in addition to stimulating the U.S. economy. The selected projects are needed to reduce the U.S. petroleum consumption through investment in and deployment of alternative vehicle technologies. Rockwood's proposed project will also assist with the nation's economic recovery by creating jobs in the United States in accordance with the objectives of the Recovery Act.

For a more complete explanation of the DOE's program, purposes and needs, please see the Final Environmental Assessment (EA) for *Chemetall Foote Corporation, Electric Drive Vehicle Battery and Component Manufacturing Initiative, Kings Mountain, NC and Silver Peak, NV* (DOE/EA-1715). This previous EA covered (1) the establishment and operation of a new 5,000 metric tons per year lithium hydroxide plant at an existing Rockwood facility in Kings Mountain, North Carolina; and (2) an upgrade to an existing lithium brine field production system, brine evaporation pond system, and a lithium carbonate plant in Silver Peak, Nevada. One part of the planned upgrades at the Silver Peak site is to explore and, if feasible, develop a geothermal resource for the production of electricity that would serve the lithium processing plant. Lithium is a critical element used in lithium-ion batteries, which are expected to play a major role in future electric-drive and hybrid-electric drive vehicles, as well as many applications for electronic devices.

1.3 PLAN CONFORMANCE

The public land within the project area is administered by the BLM, Tonopah Field Office. The Proposed Action is in conformance with the Tonopah Resource Management Plan (RMP) and Record of Decision approved on October 2, 1997.

- The Fluid Minerals Objective in the Tonopah RMP is "to provide opportunity for exploration and development of fluid minerals such as oil, gas, and geothermal resources, using appropriate stipulations to allow for the preservation and enhancement of fragile and unique resources". The proposed Project is within an area that is designated as "open to fluid minerals leasing subject to standard lease terms and conditions" (BLM 1997, page 22).

- The Mineral Materials Objective in the Tonopah RMP is "to provide for the extraction of mineral materials such as sand, gravel, building stone, cinders, etc., to meet public demand." The proposed Project is within an area that is designated as "open to mineral material disposal under standard terms and conditions" (BLM 1997, page 23). All mineral material disposals are discretionary. Appropriate terms and conditions are applied to ensure that the permittee would comply with all applicable laws and environmental safeguards.

The Proposed Action conforms to the land use plan terms and conditions as required by 43 CFR 1610.5.

1.4 RELATIONSHIP TO LAWS, REGULATIONS, POLICIES OR PLANS

This EA has been prepared in accordance with the following statutes, implementing regulations, and guidance:

- The National Environmental Policy Act (NEPA) of 1969, as amended (Public Law [PL] 91 190, 42 USC (United States Code) 4321, et seq.)
  - 40 CFR 1500, et seq. Council of Environmental Quality Regulations for Implementing the Procedural Provisions of the NEPA.
- U.S. Department of the Interior requirements (Departmental Manual 516, Environmental Quality)
- BLM NEPA Handbook (H-1790), as updated in 2008
- Considering Cumulative Effects under the NEPA
- Geothermal Steam Act of 1970 (30 USC 1001-1025), its revisions of 2007
  - 43 CFR 3200, Geothermal Resources Leasing and Operations; Final Rule, May 2, 2007
- The 2005 Energy Policy Act
- The National Energy Policy, Executive Order 13212
- Best Management Practices as defined in the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, the Gold Book, Fourth Edition – Revised 2007 (USDI and USDA 2007)
- The Materials Act of July 31, 1947, as amended (61 Stat 681, 30 USC 601, et. seq.)
- The Multiple Use Mining Act of July 23, 1955, Public Law 167 (69 Stat 367, 30 USC 601, et seq)
- Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States (BLM 2008)
- The National Energy Policy, Executive Order 13212, and
- The Geothermal Energy Research, Development, Demonstration Act of 1974 (PL 93-140, 30 USC 1101, et seq.)

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

The data shown on the map uses the Universal Transmercator (Zone11N) Coordinate system and uses the NAD83 projection.

Map Date: 02/15/2012

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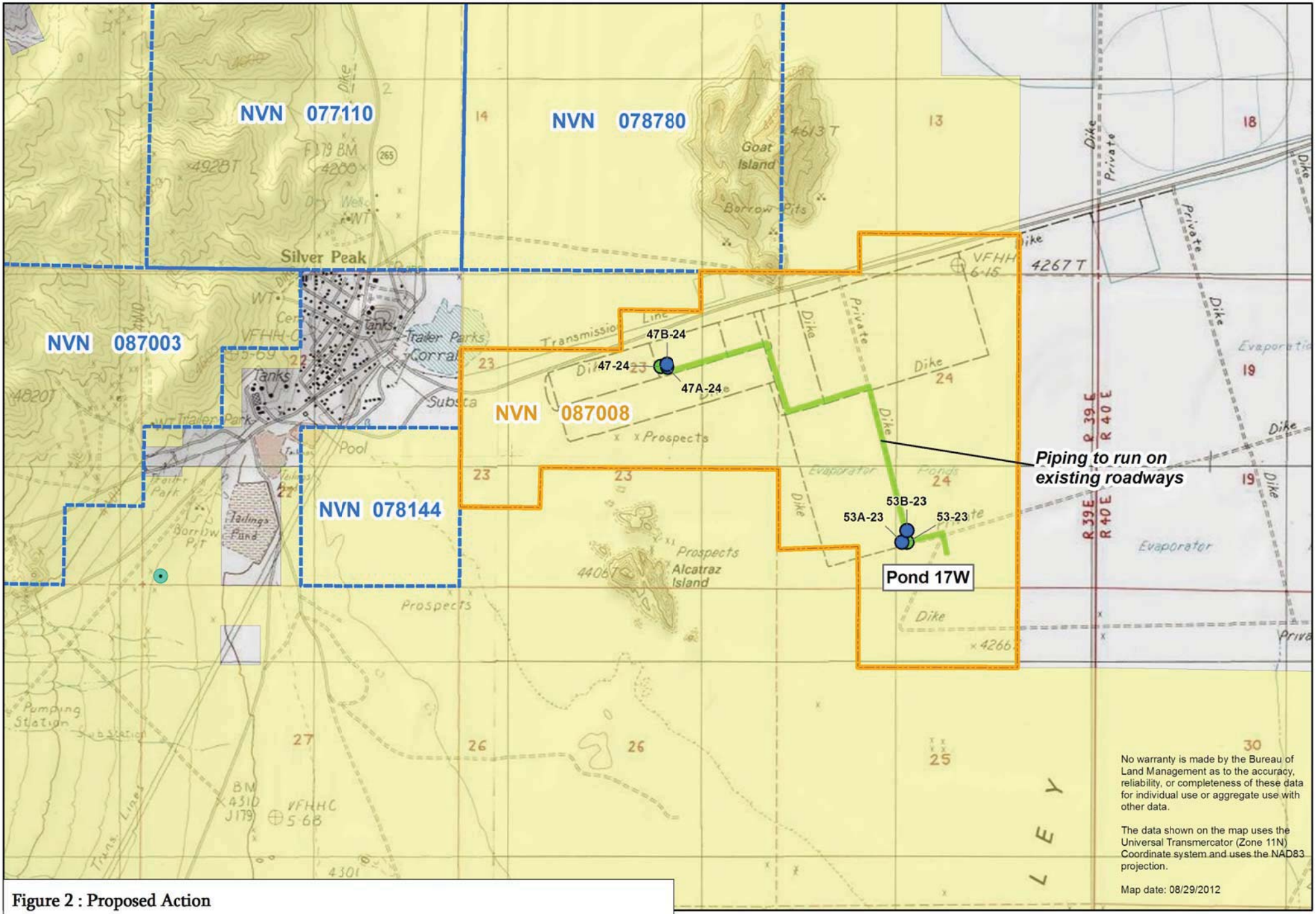

Figure 2 : Proposed Action

- Full-Size Well
- Observation Well
- Fresh Water Well
- Rockwood Lease
- Geothermal Leases

Land Status

- Bureau of Land Management
- Private

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2. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

Rockwood is proposing to construct, operate, and maintain the Silver Peak Area Geothermal Exploration Project (Project) to determine subsurface temperatures, confirm the existence of geothermal resources, and confirm the existence of a commercial geothermal reservoir at the proposed well sites within federal geothermal lease NVN-87008. DOE's Proposed Action is to provide a grant to partially fund Rockwood's proposed Project to explore for, and if feasible, develop a geothermal resource for the production of electricity that would serve the lithium processing plant. This EA reviews the potential impacts associated with the drilling and testing of two observation wells and four full-sized wells. If the geothermal resource and wells indicate that an economical power plant could be developed, another EA would be prepared to address the potential impacts and possible mitigation measures associated with the power plant construction and operations.

2.1.1 Overview and Location of Proposed Project

The Project is within Esmeralda County, Nevada and includes well and drill pad site preparation, geothermal well drilling and testing, and other necessary actions to support these activities. The proposed wells would be located within federal geothermal lease NVN-87008 on public lands managed by the BLM (see Figure 2 and Table 1).The lease area is within an evaporation pond that is part of the brine evaporation system associated with Rockwood's ongoing lithium operations. The evaporation pond is currently not in use (i.e. dry) and would not be used throughout the life of this geothermal exploration Project.

The Project would include:

- Construction activities and surface disturbance (see Section 2.1.2)
  - Constructing two drill pads and drilling an observation well and 2 full size geothermal exploration wells from each pad. Approximately 2.8 acres are required for each well pad. The surface disturbance associated with new well pad construction would be approximately 5.6 acres total.
  - Drill pad preparation activities including clearing, earthwork, drainage, containment basins (reserve pits), fencing reserve pits, and other site improvements;
- Well drilling and testing (see Section 2.1.3)
  - Short-term well testing;
  - Long-term well testing;
- Water requirements and source (see Section 2.1.5)
  - As much as 10,000 – 25,000 gallons of water per day would be required for drilling;
  - As much as 10,000 gallons of water per day would be required for grading, construction, and dust control;
  - Each well site would have a portable water tank(s) with at least 10,000 gallons;
  - Water would be obtained from the freshwater supply system associated with the nearby Rockwood lithium processing facility;
  - The total estimated water usage for project construction and implementation is 21.03 – 41.89 acre-feet;
- Aggregate requirements and source (see Section 2.1.6)

  - The total aggregate required for well pad construction would be 7,000 cubic yards;
- Surface reclamation (see Section 2.1.7 and Appendix A)

Rockwood expects that up to 1 observation well and 2 full size geothermal exploration wells would be drilled and tested from each pad within the federal geothermal lease (see Figure 2 and Table 1).

Table 1: Geothermal Exploration Wells

Kettleman Number	Section Number (and Aliquot part)	Well Type	Approximate UTM Coordinates (NAD83)	
			Easting (m)	Northing (m)
From Pad 1				
53-23	SWNE Section 23	Observation Well	446969	4177817
53A-23	SWNE Section 23	Full-Sized Well	446944	4177817
53B-23	SWNE Section 23	Full-Sized Well	446969	4177878
From Pad 2				
47-24	SESW Section 24	Observation Well	445702	4178719
47A-24	SESW Section 24	Full-Sized Well	445735	4178716
47B-24	SESW Section 24	Full-Sized Well	445732	4178731

2.1.2 Construction Procedures and Surface Disturbance

Each well pad would be approximately 400 feet by 300 feet (approximately 2.8 acres per pad). A diagram of a typical well pad layout is provided as Figure 3. Total surface disturbance associated with new well pad construction would be approximately 5.6 acres (2 pads at approximately 2.8 acres per pad).

The selected drill sites are located within an existing evaporation pond that contains unconsolidated sediments and evaporite deposits, on land that is already heavily disturbed. In order to provide stable support for the drill rigs, if any evaporates/precipitates are present on the surface, they would be scraped away and deposited adjacent to the pads (but would remain within the evaporation pond). Though it is unlikely, should any surface material be salvageable, it would be stockpiled adjacent to the pads for use during subsequent reclamation to fill the reserve pit (see Section 2.1.7 and Appendix A). Additional drill pad preparation activities could include earthwork using materials within the pond to raise the level of the well pad above the floor of the pond, topping the well pad with aggregate, drainage, and other improvements necessary for efficient and safe operation and fire prevention.

Each drill pad would be prepared to create a level pad for the drill rig and a graded surface for the support equipment. Storm water runoff from areas around the constructed drill pads would be directed into ditches and away from the drill pad. The well pad would be graded to prevent the movement of storm water from the pad off the constructed site and would be designed for a 100-year storm event.

A reserve pit would be constructed within each pad in accordance with best management practices identified in the Gold Book (USDI and USDA 2007) for the containment and temporary storage of water, drill cuttings and waste drilling mud during drilling operations. (See Section 2.1.3 for a description of well testing procedures.)

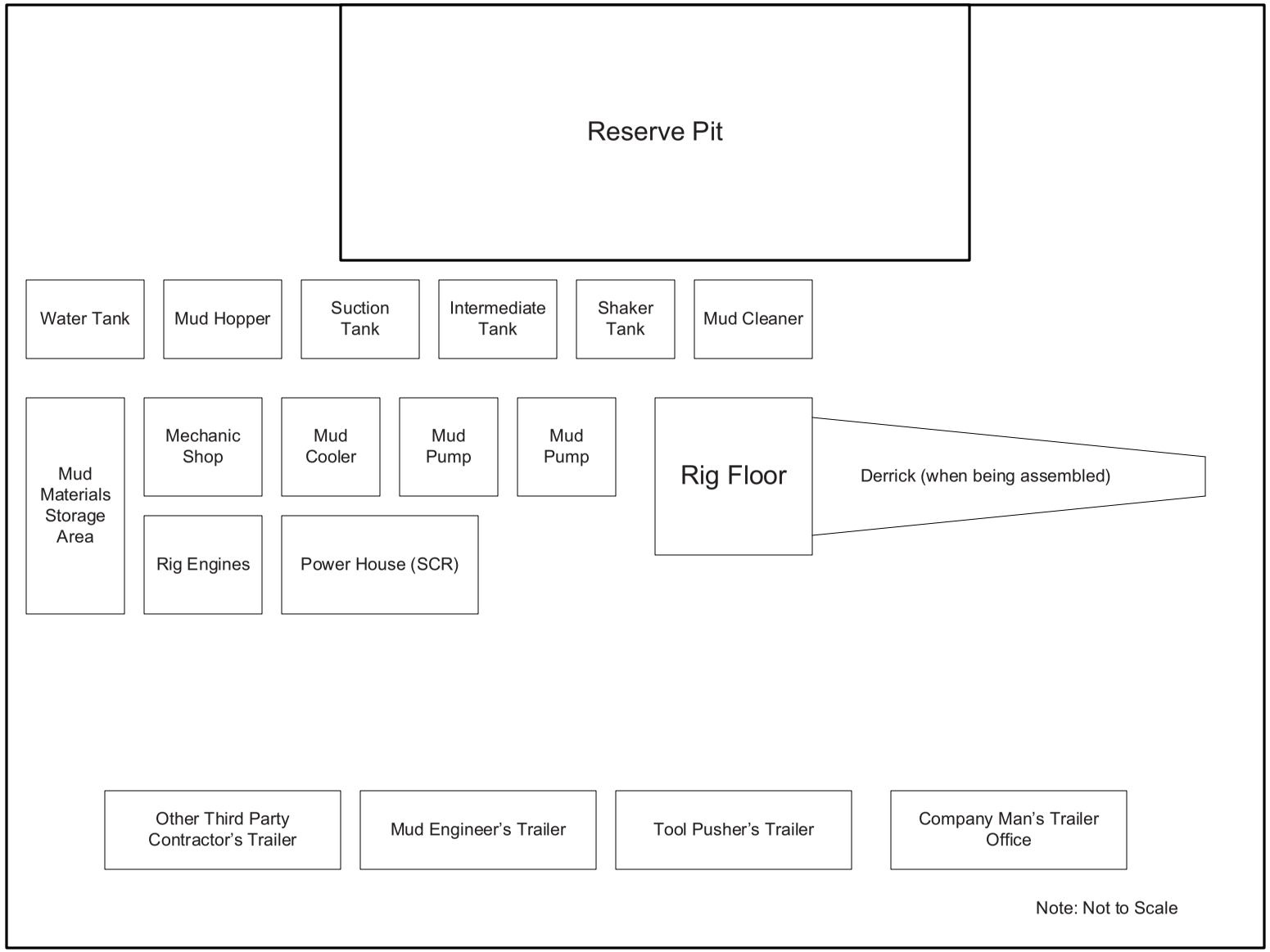

Figure 3: Typical Well Pad Layout

The reserve pits would be fenced with an exclosure fence on three sides and then fenced on the fourth side once drilling has been completed to further prevent access by persons, wildlife or livestock. The fence would remain in place until pit reclamation begins. Each reserve pit would measure approximately 200 feet by 80 feet by 10 feet deep. A 2 foot freeboard would be maintained at all times. The volume of each reserve pit is 957,500 gallons, with a 2 foot freeboard (200 ft x 80 ft x 8 ft x 7.4805 gallons/cu. ft. = 957,504 gallons). At least 50 percent of the reserve pit would be constructed below ground level to help prevent failure of the pit dike.

See Section 2.1.7 and Appendix A for a description of reclamation procedures.

2.1.3 Well Drilling and Testing

Prior to the drilling of a geothermal well on federally managed land, a Geothermal Drilling Permit (GDP) application (form 3260-2) will be submitted and approved by the BLM Nevada State Office's Petroleum Engineer and the Nevada Division of Minerals Geothermal Program lead. The final authority to approve or reject the application will rest with the BLM Authorized Officer in the Tonopah Field Office, Battle Mount District, Nevada. Provided with each GDP application are the specific drilling programs, identification of measures to protect the environment and a set of "contingency" plans. These contingency plans include an Emergency Escape/Evacuation and Sheltering in Place Plan; Rescue and Medical Response Plan; Fire Prevention and Control Plan; Hydrogen Sulfide Contingency Plan; a Spill Containment and Notification Plan; and, a Blowout Action Plan. These contingency plans are also provided as an Appendix to the submitted Operations Plan.

Specific drilling information is provided in Table 2.

Table 2: Well Drilling Specifics, Per Well

Rig Type	Rig Height (ft.)	Trucks Needed Daily (on average)	Drilling Time (days) [1,2]	Workers Onsite Daily (on average)	Depth Drilled (ft.)
Observation Well Drilling					
Small water well rig	60 ft.	3 big trucks/trailers 8 cars/service pickups	40 days	12	5,000 ft.
Full-Sized Well Drilling					
1500 hp rig	180 ft.	3 big trucks/trailers 8 cars/service pickups	60 – 80 days	25	6,000 ft. to 10,000 ft.
[1] Difficulties encountered during the drilling process, including the need to re-drill the well, could as much as double the time required to successfully complete each well. [2] Drilling would be conducted 24 hours a day, 7 days a week.					

Any staging or laydown areas would occur on constructed well pads. The drilling supervisor and mud logger would typically stay in a trailer on the active well site while the well is being drilled.

Each well would be equipped with appropriately designed and installed "blow out" prevention equipment, as required by the BLM (43 CFR 3261.13 and 3262.10). Specifications of blow out prevention equipment and action plans are required as a condition of approval for the BLM GDP for each well.

During drilling operations for the observation wells, water would be delivered by one of the site's 2,000 – 3,000 gallon water trucks as needed. During drilling operations for the full-size wells, a minimum of 10,000 gallons of fresh water and 12,000 pounds of inert, non-toxic, non-hazardous

barite (barium sulfate) would be stored at each well site for use in preventing uncontrolled well flow ("killing the well"), as necessary.

The well bore would be drilled using non-toxic, temperature-stable drilling mud composed of a bentonite clay-water or polymer-water mix for all wells. Materials and chemicals commonly used during well drilling and stored on site are described below in Table 3. Specific materials and quantities to be used would be determined based on conditions encountered during drilling. Variable concentrations of additives would be added to the drilling mud as needed to prevent corrosion, increase mud weight, and prevent mud loss. Additional drilling mud would be mixed and added to the mud system as needed to maintain the required quantities.

Table 3: Materials and Chemicals Commonly Used During Well Drilling (Quantities Per Well)

Product	Quantity Used (Avg. Daily)	Quantity Stored	Hazardous Material [1]
Drilling Mud Gel (Bentonite Clay)	50,000 lbs	100-lb sacks on pallets	No
Sodium Bicarbonate	1,250 lbs	50-lb sacks on pallets	No
Sodium Carbonate	1,500 lbs	50-lb sacks on pallets	No
Aluminum Distearate	200 lbs	50-lb sacks on pallets	No
Barite ($BaSO_4$)	4,000 lbs	100-lb sacks on pallets	No
Lime (Calcium Hydroxide)	1,500 lbs	50-lb sacks on pallets	Yes[2]
Caustic Soda (Sodium Hydroxide)	1,000 lbs	50-lb sacks on pallets	Yes[2]
Diesel Fuel	6,000 gals	12,000-gal tank	Yes[3]
Lubricants (Motor Oil, Chain Oil, Gear Oil, Hydraulic Oil)	475 gals	55-gal drums and 5-gal buckets	Yes[3]
Anti-Freeze (Ethylene Glycol)	110 gals	55-gal drums	No[4]
Liquid Polymer Emulsion (partially hydrolyzed polyacrylamide/polyacrylate (PHPA) copolymer)	125 gals	5-gal buckets	No
Sodium Polyacrylate	200 gals	5-gal buckets	No

[1] Hazardous materials are defined and regulated in the United States primarily by laws and regulations administered by the EPA, the U.S. Occupational Safety and Health Administration (OSHA), the U.S. Department of Transportation (DOT), and the U.S. Nuclear Regulatory Commission (NRC). Each has its own definition of hazardous material
[2] The material is characteristically hazardous due to its corrosivity
[3] The material is characteristically hazardous due to its flammability
[4] This material is considered orally toxic following ingestion

In the unlikely event a well bore requires re-drilling, efforts may consist of the following:

(1) re-entering and re-drilling the existing well bore; (2) re-entering the existing well bore and drilling and casing a new well bore; or (3) sliding the rig over a few feet on the same well pad and drilling a new well bore through a new conductor casing. While the drill rig is still over the well, the residual drilling mud and cuttings would be flowed from the well bore and discharged to the reserve pit.

Once the well is drilled and well head completed, an industrial grate would be placed over the hole to prevent humans and wildlife from falling into the cellar.

2.1.3.1 Short-term Well Testing

Full size wells would undergo short-term well testing. Each test, lasting approximately four days, would consist of flowing the well while monitoring geothermal fluid temperatures, pressures, flow rates, chemistry and other parameters.

Geothermal steam and noncondensable gases would be separated from produced geothermal fluid and discharged to the atmosphere through a rock muffler (if used) or steam separator. A surface booster pump would pump the residual produced geothermal fluid through a temporary 8" to 10" diameter pipeline to route the produced fluid:

1) to the constructed reserve pit(s); and/or

2) into one or more 500 bbl Baker Tanks contained on the well pad; and/or

3) into one of the other geothermal wells drilled within the project area; and/or

4) into Rockwood's existing Pond 17W, as the primary destination for the produced fluids for well testing. Pond 17W is an existing evaporation pond associated with the existing Rockwood brine evaporation system, and is located southeast of the 53-series wells (see Figure 2). This pond is 314 acres, has a 59-million gallon capacity, and is clay lined which serves to prevent infiltration. Well testing fluids would be allowed to evaporate. Pond 17W is currently almost empty, though during normal use, would be filled to about 2 foot deep. Fluid would be piped via a temporary pipeline. This pipeline would be laid on the surface of the disturbed shoulders of the access roads (see Figure 2).

An "injectivity" test may also be conducted by injecting the produced geothermal fluid from the reserve pit back into the well and the geothermal reservoir. The drill rig would not be moved from the well site following completion of these short-term test(s).

Each short-term well test is expected to flow approximately 7,000 barrels (bbl) of fluid per day (1 barrel = 42 gallons @ 7,000 bbl/day for 4 days = 1,176,000 gallons). Fluid produced during short-term testing would be piped (via the temporary pipeline) primarily to Pond 17W for evaporation and/or stored in a 500 bbl Baker Tank and/or piped to the reserve pit.

2.1.3.2 Long-term Well Testing

One or more long-term flow test of each full size well drilled would likely be conducted following the short-term flow tests to more accurately determine long-term well and geothermal reservoir productivity. Each long-term flow test could last as long as 10 days.

Geothermal steam and noncondensable gases would be separated from produced geothermal fluid and discharged to the atmosphere through a rock muffler (if used) or steam separator. A surface booster pump would pump the residual produced geothermal fluid through a temporary 8" to 10" diameter pipeline to route the produced fluid into one of the other geothermal wells drilled within the project area. Each long-term well flow test is expected to flow approximately 34,000 to 70,000 barrels of fluid (1 barrel = 42 gallons @ 34,000 to 70,000 barrels = 1,428,000 to 2,940,000 gallons).

2.1.3.3 Drilling Schedule

The Drilling Program would commence immediately following construction of the drilling pads. The duration estimates listed below may be shorter or longer than anticipated depending on the conditions encountered.

One observation well would be drilled on each drill pad. A smaller drill rig would be utilized to drill the observation wells. Set-up and take-down of the drill rig would take an estimated 30 days each. The drilling of an observation well is estimated at 40 days. The actual durations of set-up, drilling, testing, and take-down would be affected by the conditions encountered, successful well test results, weather, scheduling, manpower and other factors that are encountered during the efforts. Upon successful completion of the testing of the first observation well, the drill rig would be relocated to the second well pad and the second observation well would be completed. Estimated durations for completion of the second observation well would be similar to the first observation well. Following the successful completion of both observation wells, the drill rig would be released.

Two full-size wells would be drilled on each drill pad. A larger drill rig would be utilized to drill the full-size wells. Set-up and take-down of the drill rig would take an estimated 30 days each. The drilling of a full-size well is estimated at 60 to 80 days. The actual durations of set-up, drilling, testing, and take-down would be affected by the conditions encountered, successful well test results, weather, scheduling, manpower and other factors that are encountered during the efforts. Upon successful completion of the testing of the first full-size well, the drill rig would be relocated to the second location on the same pad, or relocated to the second drill pad and the second well would be completed. Depending on well test results the third and fourth wells would be completed, relocating the drill rig between pads if necessary. Estimated durations for completion of the subsequent 3 full-size wells would be similar to the first full-size well. Following the successful completion of all four full-size wells, the drill rig would be released.

2.1.4 Site Access

The Project site is accessed by traveling northwest on US-6W/US-95N/Veterans Memorial Highway from Tonopah for approximately 34 miles to SR265 (NVCC 01994)/Nivloc Road (N-51529). Turn left onto SR265/Nivloc road and travel south-southeast for approximately 20 miles and turn left onto Silver Peak Road. Continue east-northeast on Silver Peak Road for approximately 1 mile.

Both well pads would be located adjacent to existing access roads (located on the evaporation pond berms, see Figure 2), and no new road construction would be necessary.

2.1.5 Water Requirements and Source

Water required for well drilling would come from the freshwater supply system associated with the nearby Rockwood lithium processing facility. Water required for grading, construction and dust control would be sourced from Rockwood's lithium processing facility which acquires water from wells located at SW1/4, NE1/4, Section 28 T.2S., R.39E.

One or more portable water tank(s) holding a combined total of at least 10,000 gallons would be maintained on the well sites during drilling operations during full-size well drilling. During observation well drilling, and as needed for dust control, water would be delivered by 2,000-3,000 gallon water trucks. It is anticipated that these trucks will either be rented or will be provided by the well driller.

Total water requirements estimated for the Project are shown below in Table 4.

Table 4: Water Use

Water Use	Well Type	Est. No. Drilling Days/Well	Est. Avg. Daily Water Use (gal/day)	Est. Water Use/Well (acre –feet)	No. Wells	Total Est. Water use (acre-feet)
Drilling	Observation	40	10,000 - 25,000	1.23-3.07	2	2.46 – 6.14
Drilling	Full-Size	60 - 80	10,000 – 25,000	1.84 – 6.14	4	7.37 – 24.55
Construction	n/a	365	10,000	11.20	n/a	11.20

Total estimated water use for the Project is assumed to be 21.03 – 41.89 acre-feet.

2.1.6 Aggregate Requirements and Source

Approximately 7,000 cubic yards of aggregate would be needed to surface the well pads.

Aggregate material consisting of sand and gravel would be obtained from Tonopah Sand and Gravel's Tonopah Airport Pit (N-80954), a pit under lease to Tonopah Sand & Gravel from the BLM. Aggregate materials to be obtained from Tonopah Sand & Gravel in the amount of 7,000 cubic yards is covered under EA/DR NV065-2003-055; no further NEPA analysis is necessary.

2.1.7 Surface Reclamation

A reclamation plan for the areas to be reclaimed is included as Appendix A. Following is a general description of reclamation activities.

If the wells constructed for this exploration project successfully encounter and prove a viable geothermal resource, they would remain in-place and be proposed for use in future geothermal development by Rockwood. If the wells are unsuccessful, they would be plugged and abandoned in conformance with the well abandonment requirements of the BLM and NDOM (see below).

After the well drilling and testing operations are completed, the liquids from the reserve pits would either naturally evaporate or be removed as may be necessary to reclaim the reserve pits. The solid contents remaining in each of the reserve pits, typically consisting of non-hazardous, non-toxic drilling mud and rock cuttings, would be tested to confirm that they are not hazardous. Typical tests may include the Toxicity Characteristic Leaching Procedure (TCLP) (EPA Method 1311), tested for heavy metals; pH (EPA method 9045D); Total Petroleum

Hydrocarbons/Diesel (EPA Method 8015B); and Oil and Grease (EPA Method 413.1). If the test results indicate that these solids are non-hazardous, the solids would then be mixed with the excavated rock and soil and buried by backfilling the reserve pit. If test results indicate that these solids are hazardous, then the solids would be removed from the pit and disposed of at an appropriate approved disposal site.

If a well is judged by Rockwood to have no commercial potential, it may continue to be monitored for as long as useful information is obtained, but would eventually be plugged and abandoned (likely after 2 years) in conformance with the well abandonment requirements of the BLM and NDOM. Abandonment typically involves filling the well bore with clean, heavy abandonment mud and cement until the top of the cement is at ground level, which is designed to ensure that fluids would not move across these barriers into different aquifers. The well head (and any other equipment) would then be removed, the casing cut off well below ground surface and the hole backfilled to the surface.

As the well pads would be constructed within an existing evaporation pond, and consume a small percentage of the evaporation pond, they would not be reclaimed as the area is already heavily disturbed. Any stockpiled material, derived from construction of the reserve pit, would be used to fill the reserve pit once the fluids are no longer present .

2.1.8 Adopted Environmental Protection Measures

Rockwood would comply with all special lease stipulations attached to lease NVN-87008 (see Appendix B). In addition, Rockwood would also institute the following:

- Water would be applied to the disturbed ground during the construction and utilization of the drill pads and access roads as necessary to control dust.
- Portable chemical sanitary facilities would be available and used by all personnel during periods of well drilling and/or flow testing. These facilities would be maintained by a local contractor.
- Solid wastes (paper trash and garbage) generated by the operations would be transported offsite to an appropriate permitted landfill facility, likely the Tonopah landfill.

2.1.8.1 Fire Prevention and Control

All construction and operating equipment would be equipped with applicable exhaust spark arresters. Fire extinguishers would be available on the site. Water that is used for construction and dust control would be available for fire fighting. Personnel would be allowed to smoke only in designated areas, and they would be required to follow applicable BLM regulations regarding smoking. A fire response contingency plan is provided in the Operations Plan, Appendix A, subpart D.

2.1.8.2 Surface and Groundwater Protection

Geothermal fluids would not be discharged to the ground under normal operating conditions, except as identified in Section 2.1.3. Further, geothermal wells are cased to minimize the risks

of co-mingling of the geothermal fluids with underground aquifers. A spill and discharge contingency plan is provided in the Operations Plan, Appendix A, subpart F.

2.1.8.3 Wildlife Protection

Due to the lack of vegetation in the proposed area of disturbance no negative effects are expected to occur. When reserve pits contain fluids, Rockwood would monitor for any wildlife takings of birds, and any takings would be reported to NDOW and the BLM. Also, should bird takings be identified during ongoing monitoring, Rockwood would utilize bird deterrence practices (i.e. air cannons).

Speed limits of 25 mph would be observed on all unpaved roads in the project area in order to minimize dust and avoid collision and incidental death of local wildlife.

2.1.8.4 Cultural Resource Protection

The construction of existing evaporation ponds, levees and roads has disturbed and modified the Area of Potential Affect (APE), making the probability of finding intact cultural properties negligible. A cultural survey and treatment of the APE would not be productive and is exempt from inventory requirements (Nevada State Protocol, 2009, section V.A.3.a.).

Rockwood employees, contractors, and suppliers would be reminded that all cultural resources are protected and if uncovered shall be left in place and reported to the Rockwood representative and/or their supervisor. Cultural issues would be covered during daily safety briefings.

If cultural resources (historic or prehistoric site or object) are discovered by Rockwood, or any person working on their behalf, on public or Federal land it shall be immediately reported to the Tonopah Field Office at (775) 482-7800. Rockwood would suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Authorized Officer. An evaluation of the discovery would be made by the Authorized Officer to determine appropriate actions to prevent the loss of significant cultural or scientific values.

2.1.8.5 Minimization of Air Pollution

As proposed surface disturbance is greater than 5 acres, a Surface Area Disturbance (SAD) permit would be needed from the Nevada Department of Environmental Protection – Bureau of Air Pollution Control (NDEP-BAPC). Rockwood would comply with any air quality requirements required by the NDEP-BAPC. Water would be applied to the ground during the construction of the drill pads and access roads as necessary to control fugitive dust.

Each well would be equipped with controls and alarms for detecting and warning of hazardous gas emissions (such as H_2S) from deep geothermal fluids. A hazardous gas contingency plan is provided in Appendix A, subpart C of the Operations Plan. These measures are required by the BLM for geothermal well drilling (43 CFR 3262.10 & 3262.11).

2.1.8.6 Minimization of Noise Pollution

To abate noise pollution, mufflers would be used on all drilling rig engines. Each well pad may have one rock muffler or an equivalent alternative noise abatement measure. Rock mufflers are approximately 30 feet tall with a diameter of about 10 feet and are used to attenuate steam venting noise during well testing.

2.1.8.7 Minimization of Hazards to Public Health and Safety

Construction and operation activities would be conducted in a manner to minimize the potential for creating any hazards to public health and safety. The emergency contingency plans contained in the Operations Plan, Appendix A include a section for Emergency Contact Numbers (subpart A and Attachment 2), Injury Contingency Plan (subpart C), Hazardous Gas Contingency Plan (subpart E), Fire Response Contingency Plan (subpart D), and Spill and Discharge Contingency Plan (subpart F).

2.1.8.8 Standard Operating Procedures for Geothermal Well Drilling

In addition to the adopted environmental protection measures listed above, the following Standard Operating Procedures (SOPs) would be implemented as part of the Project:

- The operator shall obtain and maintain all necessary State of Nevada and local permits applicable to drilling exploration drill holes.
- The reserve pit shall be fenced in conformance with the *Gold Book* (USDI and USDA 2007).
- Trash shall be contained onsite and hauled to an approved landfill. Burial of trash onsite is not permitted.
- Portable chemical toilets shall be used for human waste. Human waste may not be buried on site.
- Upon abandonment, the operator shall:
  - Remove all trash and debris from the site and disposed of it properly.
  - Re-contour the reserve pit to as near the original grade as possible, and spread any salvaged material over the covered pit and pad.
  - All reclamation of the disturbed areas shall be completed within 1 year from the date of the proper plugging and abandonment of the well. The Authorized Officer of the BLM shall be notified in writing when reclamation operations commence and when reclamation is complete and shall accept the reclamation in writing once a site inspection has been completed and verification that all reclamation has been successful.

2.2 ALTERNATIVES TO THE PROPOSED ACTION

NEPA requires that a reasonable range of alternatives to the Proposed Action be considered that could feasibly meet the objectives of the Proposed Action as defined in the purpose and need for the Project (40 CFR 1502.14[a]). The range of alternatives required is governed by a

rule of reason (i.e., only those feasible alternatives necessary to permit a reasoned choice need be considered). Reasonable alternatives are those that are practical or feasible based on technical and economic considerations (46 *Federal Register* 18026 [March 23, 1981], as amended; 51 *Federal Register* 15618 [April 25, 1986]).

Alternatives to the Proposed Action must be considered and assessed whenever there are unresolved conflicts involving alternative uses of available resources (BLM NEPA Handbook H-1790-1, page 79 (BLM 2008)).

Two alternatives to the Proposed Action were considered, and subsequently dismissed from further analysis: utilization of brackish water for well drilling, and utilization of an alternative renewable resource technology (i.e. wind or solar) instead of ultimately relying on geothermal power.

Utilization of brackish water for well drilling was dismissed from further consideration as brackish water would introduce an expected compositional variance resulting in the need to use increased levels of additives to the mud during drilling. Further, it has the potential to require longer drilling times, resulting in higher costs during the drilling phase of the Project.

Utilization of an alternative renewable resource technology was also considered, and subsequently dismissed from further analysis. At Project inception, Rockwood carefully considered renewable resource power options (such as solar or wind) as a means of providing power to their ongoing lithium operations. However, neither of these renewable technologies provide the consistent, baseload power that geothermal affords, and these other renewable options would offer a reduced return on investment.

Both of the above alternatives were considered and dismissed, and no unresolved conflicts regarding the Proposed Action have been identified to drive the creation of any alternatives that would still meet Rockwood's purpose for the proposed Project: to determine subsurface temperatures, confirm the existence of geothermal resources, and confirm the existence of a commercial geothermal reservoir at the proposed drill sites within the federal geothermal leases. Therefore, no alternatives (other than the No Action Alternative) are further analyzed in this EA.

2.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the BLM would deny Rockwood's proposal to conduct the proposed Project on public lands and the DOE would not provide funds for this Project. The environmental effects from implementation of the proposed Project would not occur. The project area is within Rockwood's existing evaporation pond system, though the evaporation pond associated with the geothermal exploration Project is not currently in use. Should the No Action Alternative be selected, the area would continue to be used for Rockwood's lithium mining operations. Implementation of the No Action Alternative would not meet Rockwood's purpose and need for the proposed Project.

3. AFFECTED ENVIRONMENT

3.1 SUPPLEMENTAL AUTHORITIES

To comply with the NEPA, the BLM is required to address specific elements of the environment that are subject to requirements specified in statute or regulation or by executive order (BLM 2008). The following table outlines elements of the environment associated with supplemental authorities that must be addressed in all BLM environmental analyses, and indicates which elements, potentially affected by the Proposed Action, are analyzed in the EA (see Table 5). For the purposes of the analysis, the project area includes Rockwood's lease boundary shown in Figure 2.

Table 5: Resources Affected by the Proposed Action

Element	Present Yes/No	Affected Yes/No	Rationale
Air Quality	Yes	Yes	See discussions in Sections 3.3.1, 4.1.1, and 5.4.1.
Area of Critical Environmental Concern (ACEC)	No	No	The proposed Project is not located in or near any ACECs.
Cultural Resources	Yes	No	See discussion in Sections 3.3.2, 4.1.2 and 5.4.2.
Environmental Justice	No	No	The proposed Project was evaluated in accordance with Executive Order 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. While there are minority and low-income populations in the vicinity, the proposed Project would not have a disproportionally adverse impact on these groups..
Fish Habitat	No	No	There is no fish habitat in the project area.
Floodplains	Yes	No	According to the FIRM, FEMA classifies the project area as unmapped (FEMA 2012). No river floodplains exist on the site; therefore no adverse impacts would occur to river floodplains.
Forest and Rangelands	No	No	There are no forested areas or grazing allotments in the project area.
Human Health and Safety	No	No	The proposed Project would not contribute to human health and safety concerns per Executive Order 13045, as very few children live within 1 mile from the proposed Project.
Noxious Weeds	No	Yes	See discussion in Sections 3.3.10, 4.1.10 and 5.4.10.
Migratory Birds	Yes	No	See discussion in Sections 3.3.7, 4.1.7, and 5.4.7.
Native American Religious Concerns	Yes	No	See discussion in Sections 3.3.3, 4.1.3, and 5.4.3.
Prime or Unique Farmlands	No	No	The proposed Project is not located in or near any prime or unique farmlands.
Threatened, and/or Endangered, Species (plants and animals)	No	No	See discussion in Section 3.3.8, 4.1.8 and 5.4.8.
Wastes, Hazardous or Solids	Yes	Yes	See discussion in Sections 3.3.4, 4.1.4, and 5.4.4.
Water Quality (Surface and Ground)	Yes	Yes	See discussion in Sections 3.3.5, 4.1.5, and 5.4.5.

Element	Present Yes/No	Affected Yes/No	Rationale
Wetlands and Riparian Zones	Yes	No	National Wetlands Inventory maps indicate the presence of a lake within the project area. This feature is part of the natural playa landform within the project area and surrounding region, which has been since modified into a series of brine ponds utilized by Rockwood for industrial processes. Because the existing playa within the project area is considered non-jurisdictional and the project area is located within a closed drainage basin, no impacts would occur to wetland resources protected under Section 404 of the Clean Water Act.
Wild and Scenic Rivers	No	No	The proposed Project is not located in or near any wild and scenic rivers.
Wilderness	No	No	The proposed Project is not located in or near any Wilderness areas or Wilderness Study Areas.

As outlined above, the following elements of the human and natural environment are not further analyzed in this EA: ACECs; Environmental Justice; Fish Habitat; Floodplains; Forests and Rangelands; Prime or Unique Farmlands; Human Health and Safety; Wetlands and Riparian Zones; Wild and Scenic Rivers; and Wilderness.

3.2 OTHER RESOURCES

Other resources of the human and natural environment that have been considered for this EA and elements that may be affected are further described in the EA. Rationale for those elements that would not be affected by the Proposed Action and Alternatives is listed in Table 5 below.

Table 6: Other Resources Affected by the Proposed Action

Other Resources	Present Yes/No	Affected Yes/No	Comments
Minerals	Yes	Yes	See discussion in Sections 3.3.6, 4.1.6, and 5.4.6
Soils	Yes	No	The project area is heavily disturbed and no negative effects are expected to occur.
Vegetation	No	No	Due to the lack of vegetation in the proposed area of disturbance no negative effects are expected to occur.
Special Status Species	No	No	The closest special status species to the project area is the Eastwood milkweed, which is over 8 miles north. The project area is also heavily heavily disturbed and covered with saline sediments and does not easily support life.
Wildlife Resources	Yes	Yes	See discussion in Sections 3.3.9, 4.1.9, and 5.4.9
Rangeland Management	No	No	The project area is not located within a grazing allotment.
Paleontological Resources	No	No	No outcrops of fossil-bearing strata have been identified in the area of potential effect.
Recreation	Yes	Yes	See discussion in Sections 3.3.11, 4.1.11, and 5.4.11
Visual Resources	Yes	Yes	See discussion in Sections 3.3.12, 4.1.12, and 5.4.12
Socio-Economic Values	Yes	Yes	See discussion in Sections 3.3.13, 4.1.13, and 5.4.13
Land Use Authorization	Yes	Yes	See discussion in Sections 3.3.14, 4.1.14, and 5.4.14
Forestry	No	No	The project area is not located within forested areas.
Wild Horse and Burro	No	No	The project area is not located within a Herd Management Area.
Fire Management	No	No	The Project is not located within town boundaries. The project area is also heavily heavily disturbed and covered with saline sediments and lacks vegetation.

As outlined above, the following other resources are not brought forward for further analysis in this EA: Soils; Vegetation; Special Status Species; Rangeland Management; Paleontological Resources; Forestry; Wild Horse and Burro; and Fire Management.

3.3 RESOURCES REQUIRING FURTHER ANALYSIS

3.3.1 Air Quality

Air quality in the project area has been designated as attainment/unclassified, which means it either meets or is assumed to meet the applicable federal ambient air quality standards, for all criteria air pollutants (EPA 2011). The Nevada Department of Conservation and Natural Resources (NDCNR) and the NDEP-BAPC have been delegated responsibility by both the federal EPA and the state of Nevada to regulate air pollution concentrations and the emissions of air pollutants in the project area. The project area is not located in or adjacent to any mandatory Class I (most restrictive) federal air quality areas, U.S. Fish and Wildlife Service (USFWS) Class I air quality units, or American Indian Class I air quality lands.

3.3.2 Cultural Resources

The construction of existing evaporation ponds, levees and roads has disturbed and modified the Area of Potential Affect (APE), making the probability of finding intact cultural properties negligible. A cultural survey and treatment of the APE would not be productive and is exempt from inventory requirements (Nevada State Protocol, 2009, section V.A.3.a.).

3.3.3 Native American Religious Concerns

Information sharing is on-going with the Death Valley Timbisha Shoshone Tribe of California, and will continue throughout the life of the Project. A letter describing the Project and offering the opportunity for consultation was sent via certified mail to the aforementioned Tribe on August 10, 2011. On January 3, 2012, a phone call was placed to the Tribe. Chairman George Gholson stated that the letter had been received, and that he had no comment or questions at this time. The Timbisha Shoshone Tribal representatives will be kept updated on all projects in the Clayton Valley area.

3.3.4 Hazardous Materials and Wastes

There are no hazardous material storage facilities in the project area and no hazardous materials are known to be routinely used in the project area.

3.3.5 Water Quality (Surface and Ground) and Water Quantity

The proposed Project is located within the Clayton Valley Hydrographic Area, designated as area 143 of the Central Region, Hydrographic Basin 10. The Clayton Valley Hydrographic Area covers 555 square miles. Clayton Valley is a topographically closed basin bounded by low to medium altitude mountain ranges. Clayton Valley is a graben structure. Seismic and gravity surveys reveal numerous horst and graben features with the basin deepening to the east-southeast. Extensive faulting has created hydrologic barriers resulting in the accumulation of

lithium brines below the playa surface. Jennings (2010) states that satellite imagery and recent geological mapping identify several parallel north-south trending faults that are semi-permeable barriers separating the fresh water aquifer on the west from the brines beneath the playa. Stratigraphic barriers occur around much of the playa, isolating it from significant freshwater inflows originating in the mountains.

Recharge occurs as underflow into the basin from Big Smoky Valley in the north and Alkali Spring Valley in the west. Recharge derived from precipitation in the basin is low due to high evapotranspiration rates and low preciptiation.

Rockwood's water requirements for drilling 6 geothermal exploration wells (2 observation wells and 4 full sized wells) and for dust control totals approximately 21.03 – 41.89 acre-feet over the life of the Project (see Section 2.1.5). Water required for well drilling would come from the freshwater supply system associated with the nearby Rockwood lithium processing facility. Water required for grading, construction and dust control would also be sourced from Rockwood's lithium processing facility. This water is acquired from wells located at SW1/4, NE1/4, Section 28, T.2S., R.39E, and would be obtained via a waiver for the temporary use of ground water from the State Engineer's Office of the Nevada Department of Water Resources.

3.3.6 Minerals

The project area is currently used for Rockwood's lithium operations. Rockwood extracts lithium salts by brine evaporation. The brine is pumped from salt-rich aquifers beneath the desert and evaporated in large ponds on the desert surface. The concentrated brine is then pumped to a production plant where it is converted into lithium carbonate, the basic raw material for lithium compounds (Chemetall 2010). The proposed geothermal exploration Project is located within Rockwood's existing evaporation pond system.

There are 39 active placer mining claims within Sections 23 and 24, T.2S., R.39E. Rockwood is identified as the claimant on all 39 claims (BLM 2011a and 2011b).

3.3.7 Migratory Birds

A migratory bird, as defined by the Migratory Bird Treaty Act (16 USC 701-718h), is any species of bird listed in 50 CFR 10.13. This is generally considered any species of bird except upland game species, feral pigeons, European starlings, and English house sparrows. Provisions of the Migratory Bird Treaty Act prohibit the killing of any migratory birds, including the taking of any nest or egg, without a permit. Executive Order 13186, titled *Responsibilities of Federal Agencies to Protect Migratory Birds*, was signed on October 1, 2001 to further enhance and ensure the protection of migratory birds.

Various species of raptors, which use diverse habitat types, may be present in the vicinity of the project area. American kestrel, bald eagle, barn owl, burrowing owl, Cooper's hawk, ferruginous hawk, golden eagle, great horned owl, long-eared owl, Merlin, northern goshawk, northern harrier, northern saw-whet owl, osprey, peregrine falcon, prairie falcon and red-tailed hawk, rough-legged hawk, sharp-shinned hawk, short-eared owl, Swainson's hawk, and turkey vulture have distribution ranges that include the project area. Furthermore, American kestrel, golden eagle, peregrine falcon, prairie falcon and red-tailed hawk has been directly observed in the vicinity of the project area (NDOW 2012). However, these species do not reside or forage in the project area given the heavily denuded nature of the existing evaporation pond.

3.3.8 Threatened or Endangered Species

Section 7(c) of the Endangered Species Act of 1973, as amended, requires federal agencies to consult with the USFWS concerning species listed under the Act. Consistent with this requirement and the applicable general stipulations appended to the leases (see Section 2.1.8), on June 6, 2011 a letter requesting information regarding threatened and endangered species which may occur in the sections comprising the project area was sent to the USFWS. The USFWS responded in a letter dated July 5, 2011 that, to the best of their knowledge, no listed, proposed or candidate species existed in the project area (USFWS 2011).

3.3.9 Wildlife Resources

A variety of wildlife species may occur within the project area vicinity. Common wildlife known to inhabit the area include coyote (*Canis latrans*), kit fox (*Vulpes macrotis*), badger (*Taxidea taxus*), chukar (*Alectoris chukar*), and several different lizard, snake, raptor, and migratory bird species (BLM 2011c).

Bighorn sheep and mule deer distributions exist outside of the project area in the Silver Peak Range in the northwestern portion of the three-mile buffer area. There are no known elk or pronghorn antelope distributions in the vicinity of the project area, nor are there greater sage-grouse distributions or leks in the vicinity of the project area (NDOW 2012).

3.3.10 Noxious Weeds

Noxious weeds and invasive species are typically nonnative plants that infest and/or invade areas of fresh soil/ground disturbance. Noxious weed species typically have attributes which allow them to rapidly out-compete native vegetation for vital natural resources. Noxious weeds, invasive and nonnative species impact native ecosystems by reducing overall biodiversity, by altering local hydrologic and soil characteristics and can immediately increase fire intensity. On a smaller scale, noxious weeds interfere with native plant successional pathways by competing for pollinators, being prolific seed producers and inundating the surrounding soil with weed seed, displacing rare plant species, serving as reservoirs of plant pathogens and converting complex plant communities into simple plant communities.

Noxious weed, invasive and nonnative species seed or vegetative plant parts are carried, transported or deposited into and infest weed-free areas by people, equipment, livestock/wildlife or by abiotic means (wind, water).

As of 2011, the State of Nevada under Nevada Administrative Code 555.010 listed 47 species on the Nevada Noxious Weed List.

The project area is within an existing series of evaporation ponds and is heavily heavily disturbed and covered with saline sediments. No noxious weeds are currently present within the project area. The potential for the presence of invasive, nonnative species is low.

3.3.11 Recreation

There are no designated trails or developed recreational facilities in the project area. The nearest undeveloped recreation site is Clayton Valley Sand Dunes, located several miles south

of the project area. Dispersed recreation activities occur in the vicinity and primarily include OHV use and camping.

3.3.12 Visual Resources

The project area is within the Great Basin section of the Basin and Range Province and characterized by linear desert mountains, separated by large desert plains, and dominant stands of low-growing vegetation such as sagebrush and yucca. In the specific project area, the well pads are located within an existing evaporation pond, and the area is heavily disturbed and covered with saline sediments.

Modifications in the vicinity that affect the natural landscape include a sprawling lithium mining operation (Rockwood's lithium mine) and electrical transmission and distribution lines.

The BLM initiated the visual resource management (VRM) process to manage the quality of landscapes on public land and to evaluate the potential impacts to visual resources resulting from development activities. VRM class designations are determined by assessing the scenic value of the landscape, viewer sensitivity to the scenery, and the distance of the viewer to the 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 (BLM 1986).

The proposed project area is located in a VRM Class IV area (Seley 2011). The objective of Class IV is to provide for management activities that require major modification to the existing character of the landscape. The level of change to the characteristic landscape can be high. Management activities may dominate the view and be the major focus of viewer attention. Every attempt, however, should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic landscape elements (BLM 1986).

3.3.13 Socio-Economic Values

The project area is located in Esmeralda County. As of the year 2010, Esmeralda County had a total population of 783 (BLM, BMDO 2011). The closest Census Designated Places (CDPs) to the project area are the city of Tonopah, in adjacent Nye County, having a year 2010 population of 2,478 (U.S. Census Bureau 2011) and the community of Silver Peak, having a year 2010 population of 107 (U.S. Census Bureau 2012).

As of 2009, Esmeralda County had 860 housing units. Approximately 52 percent of these units were occupied (BLM, BMDO 2011). The Tonopah CDP had 1,576 housing units, of which approximately 66.8 percent of these units were occupied. (U.S. Census Bureau 2011). The Silver Peak CDP had 133 housing units, of which 41.4% were occupied (U.S. Census Bureau 2012).

The total employment (2005-2009) for Esmeralda County was estimated to be 399 persons. Esmeralda County's leading employers included the agriculture/forestry/fishing and hunting/mining industries (25.8 percent), and public administration (16.5%) (BLM, BMDO 2011). The labor force for the Tonopah CDP was estimated in the year 2010 to be 1,308 persons. The Tonopah CDP leading employers included the service occupations (35.2 percent);

management, business, science and arts (23.8 percent); and natural resources, construction and maintenance occupations (26.9 percent); and the sales and office occupations (18.3 percent) (U.S. Census Bureau 2011). The U.S. Census provided a "2006-2010 American Community Survey 5-Year Estimate" for the Silver Peak CDP which estimated that 121 people were in the labor force with a +/-52 person margin of error (U.S. Census Bureau 2012).

3.3.14 Land Use Authorization

The project area is on public lands managed by the BLM. The proposed Project would be located within Rockwood's existing evaporation pond system. Land use within the vicinity of the proposed geothermal exploration wells includes existing access roads, power lines, industrial/extraction operations, and additional geothermal exploration activities.

Ten BLM authorizations have been granted within Sections 23 and 24, T.2S., R.39E.; these authorizations include:

- NVN-42582, a 10,710.94 acre site to Foote Mineral Company for lithium brine extraction;
- NVN-72542, a 620 acre site to Chemetall Foote Corporation for lithium extraction;
- NVN-002169, a 7.49 acre ROW to Sierra Pacific Power Company for a power transmission line;
- NVN-002552, a 0.12 acre ROW to Sierra Pacific Power Company for a power transmission line;
- NVN-051529, a 27.27 acre road ROW to Homestead Minerals;
- NVN-087008, a 900-acre geothermal lease to Chemetall Foote Corp.;
- NVN-089289, a 0.5 acre area to Chemetall Foote Corp. for geophysical exploration;
- NVN-089442, a 42.15 acre road ROW to the Esmeralda County Road Department;
- NVN-0043264, a 2,127.14 acre ROW to Sierra Pacific Power Company for a power transmission line; and
- NVN-0066325, a 4.591 acre site to Foote Mineral co. for plant watering.

4. ENVIRONMENTAL CONSEQUENCES

4.1 PROPOSED ACTION

4.1.1 Air Quality

The primary pollutant of concern during construction activities would be particulates in the form of fugitive dust, which would be generated during earth-moving activities and travel on unpaved roads during construction and drilling activities. Based on implementation of environmental protection measures specified by Rockwood, water would be applied to the ground during the construction and utilization of the drill pads and access roads as necessary to control dust and speed limits of 25 mph would be observed on all unpaved roads in the project area in order to minimize dust (see Section 2.1.8). These measures would minimize fugitive dust emissions during construction and drilling activities.

A SAD Permit, which documents the areas of proposed disturbance and the best practical dust control methods to be used, will be required for the Project as the amount of surface disturbance would be greater than 5 acres (see Section 2.1.8.5). Implementation of the applicable best practical dust control methods, through compliance with the SAD Permit would minimize fugitive dust emissions during construction and operation of the Project.

Combustion emissions of criteria air pollutants [nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), and particulate matter less than or equal to 10 microns in diameter (PM_{10})], criteria air pollutant precursors [volatile organic compounds (VOCs)] and air toxics (small quantities of diesel PM, acetaldehyde, benzene, and formaldehyde) would be released during well drilling and construction activities from the diesel engines used.

Small quantities of naturally occurring non-condensable gases, such as carbon dioxide (CO_2), hydrogen sulfide (H_2S), nitrogen (N_2), and methane (CH_4), would be emitted to the air during geothermal well testing. Each well would be equipped with controls and alarms for detecting and warning of hazardous gas emissions (such as H_2S) from deep geothermal fluids. A hazardous gas contingency plan is provided in Appendix A, subpart C of the Operations Plan. These measures are required by the BLM for geothermal well drilling (43 CFR 3262.11). Carbon dioxide and methane are greenhouse gases. Although the Proposed Action would contribute an increase in greenhouse gases in the atmosphere, these emissions would be extremely small relative to state, national, and global greenhouse gas emissions. Any resultant effects would also be extremely small and cannot be reliably estimated.

The proposed Project is not expected to contribute to any violation of federal or Nevada ambient air quality standards and no residual air quality impacts are expected because there would be no further fugitive dust or combustion emissions once activities ceased.

4.1.2 Cultural Resources

Rockwood employees, contractors, and suppliers would be reminded that all cultural resources are protected and if uncovered shall be left in place and reported to the Rockwood representative and/or their supervisor. As a condition of the GDP, cultural issues would be covered during daily safety briefings. BLM would review the content of the daily briefings to ensure that the protection of cultural resources is discussed.

If cultural resource (historic or prehistoric site or object) are discovered by Rockwood, or any person working on their behalf, on public or Federal land it shall be immediately reported to the Tonopah Field Office at (775) 482-7800. Rockwood would suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Authorized Officer. An evaluation of the discovery would be made by the Authorized Officer to determine appropriate actions to prevent the loss of significant cultural or scientific values.

4.1.3 Native American Religious Concerns

To date, the Timbisha Shoshone Tribe has not expressed any concerns about this Project. There are no known Native American religious concerns associated with the proposed Project.

During the project activities, if any cultural properties, items, or artifacts (stone tools, projectile points, etc.) are encountered, it would be stressed to those involved that such items are not to be collected. As a condition of the GDP, cultural issues would be covered during daily safety briefings. BLM would review the content of the daily briefings to ensure that the protection of cultural resources is discussed. Cultural and Archaeological resources are protected under the Archaeological Resources Protection Act (16 USC 470ii) and FLPMA (43 USC 1701). The above language is applicable to previously identified artifacts and site locations, surface artifacts possibly missed during the original survey, and any subsurface artifacts (below ground).

Though the possibility of disturbing Native American grave sites within most project areas is extremely low, inadvertent discovery procedures must be noted. In accordance with the Native American Graves Protection and Repatriation Act, Section (3)(d)(1), Rockwood would notify the BLM in writing of such a discovery. If the discovery occurs in connection with an authorized use, the activity, which caused the discovery, is to cease and the materials are to be protected until the land manager can respond to the situation.

If any traditional cultural properties or artifacts are identified before or during exploration activities, a protective “buffer zone” may be acceptable, where physical avoidance is an issue, and if doing so satisfies the needs of the BLM, the proponent, and affected Tribe. The size of any “buffer zone” would be determined through coordination and communication between all participating entities.

If, as a result of the Project, additional drilling is proposed or a development plan is submitted to the Tonopah Field Office, BLM would again initiate communication and coordination with the Death Valley Timbisha Shoshone Tribe of California or any other Tribe(s) who demonstrate an interest in any geothermal development/production within this specific area.

4.1.4 Hazardous Materials and Wastes

Diesel fuel, lubricants, hydraulic fluids and drilling chemicals (drilling mud, caustic soda, barite, etc.) needed for the Project would be transported to the drill site on trucks and stored on pallets or in tanks, drums, or buckets, subject to applicable federal and state regulations

Materials and chemicals commonly used during well drilling are shown in Table 3 (see Section 2.1.3). The storage and use of these materials may result in minor, incidental spills. The proposed Project includes a hazardous material spill and disposal contingency plan that describes the methods for cleanup and abatement of any petroleum hydrocarbon or other hazardous material spill. These contingency plans are also attached to the GDP and are

required as conditions of approval. Further, the Project is located within an existing bermed evaporation pond, so in the event of a materials spill, it is unlikely that any spilled materials would overtop the berm and result in offsite impacts.

Many of the materials used during drilling are also flammable. Rockwood has developed an Emergency Fire Response/Preparedness and Action Plan that addresses mitigation of hazards and effective response. The goals of this plan are to protect personnel, the public and the environment and to protect the assets of Rockwood. The elements of the Emergency Fire Response/Preparedness and Action Plan include employee training in emergency notification and communication, rescue and medical response, evacuation, accountability, fire prevention and control, hazardous materials management, and working within the local authorities and Incident Command Structure.

The proposed Project would comply with BLM requirements to ensure that any geothermal fluid encountered during the drilling does not flow uncontrolled to the surface. These include the use of blow-out prevention equipment during drilling and the installation of well casing cemented into the ground. Each well would be equipped with appropriately designed and installed blow-out prevention equipment, as required by the BLM (43 CFR 3261.13 & 3262.10). Specifications of blow-out prevention equipment and action plans are required as a condition of approval for the BLM Geothermal Drilling Permit for each well

After drilling operations are completed, the liquids from the reserve pits would either naturally evaporate, or be removed as may be necessary to reclaim the reserve pits. Removed fluids would be taken to a facility designed to accept such waste. The non-hazardous, non-toxic residual solid contents of the pits would be mixed with the excavated rock and soil and buried by backfilling the reserve pit. The small quantities of solid wastes (paper trash and garbage) generated by the proposed Project would be transported offsite to an appropriate permitted landfill facility, likely the Tonopah landfill. Portable chemical toilet wastes would be removed by a local contractor. Because of these waste containment and disposal practices, no impacts are anticipated to result from solid or hazardous wastes generated by the proposed Project. The disposal of these wastes would be a residual effect of the proposed Project.

4.1.5 Water Quality (Surface and Ground) and Water Quantity

Records of water surface elevations of wells in the fresh water aquifer demonstrate a decline over time. This indicates withdrawals are exceeding recharge. There has been concern over the rate of decline of the fresh water aquifer. A 1998 study by Cyprus Foote Mineral Co. conducted two analyses of the fresh water aquifer: 1) a static/pumping water level decline analysis over time, and 2) a volumetric analysis. The study assumed that brine water exist at the 4200 foot elevation. Potable water was found as deep as 3980 feet [above sea level] (Jennings 2010). The study determined that at the then current rate of decline, 1.25 feet/year, the fresh water aquifer had a life of 27 years. The volumetric analysis predicted a life of 14 years. It should be noted that the volumetric analysis did not account for recharge to the fresh aquifer. The volumetric analysis was updated to include recharge. The assumed life of the fresh water aquifer was then calculated to be approximately 27 years.

A study of the fresh water aquifer conducted by Jennings (2010) based on data from 1998-2010 determined the rates of decline for the Rockwood wells at 0.5 feet/year, Silver Peak Well 1 at 0.17 feet/year and the Rockwood monitoring well (2002-2010) at 0.27 feet/year. The report

states that pumping rates are directly related to production of lithium and in recent years lithium production rates have declined.

Analysis of pumping and water surface elevation data for the Silver Peak wells and Rockwood supply and monitoring wells indicate that the additional water required by Rockwood, 21.03 – 41.89 acre-feet (7.01 – 13.96 acre-feet/year) over the anticipated 3-year life of the exploration Project, would increase the rate of decline of the fresh water aquifer. The estimated decrease in water surface elevations in the fresh water aquifer was calculated as approximately 0.02 – 0.04 ft/year over the life of the Project.

This analysis is based on Rockwood pumping and water surface elevation data for 2000-2010, the period for which data was available. A second analysis involved using a modified version of the volumetric analysis in the 1998 report. The volumetric analysis requires assumption regarding the lateral extent and specific yield of the aquifer. The aquifer is conceptualized as a homogeneous block. The analysis included recharge based on PRISM precipitation data and methods described in Eakin et al (1951).

In an effort to protect water resources, the following applicant committed practices would be utilized:

- Each observation and full-sized well would be cased with steel casing cemented into the ground, which is designed to prevent contamination of any groundwater by the geothermal fluid and prevent the loss of any geothermal resource into other aquifers.

- Each observation and full-sized well would be drilled using non-toxic drilling mud to prevent loss of substantial drilling fluids into the rock.

- Reserve pits would be constructed at each site for the containment and temporary storage of drilling mud, drill cuttings and storm water runoff from the constructed well pad. The well driller would maintain a minimum of two feet of freeboard at all times in the reserve pits.

- Any injection test conducted on the exploration wells would only inject produced geothermal fluid through the cased well back into the geothermal reservoir from which it originated, ensuring that there would be no affect on the quality of groundwater. Chemical analyses of the produced geothermal fluid would be conducted to characterize the geothermal fluids.

Figure 2 shows that the proposed well pads are located within dikes. These well pads would be constructed using aggregate resulting in the pads being elevated up to 3 feet above the grade of the ponds. Most precipitation falls in the mountains with surface runoff being collected and routed through ephemeral stream channels to the playa. In the event that storm runoff reached the valley floor, the dikes surrounding the well pads would prevent them from receiving this runoff. No impacts from storm water runoff are anticipated.

Precipitation from storms can fall directly within the diked area. The possibility of the pads flooding as a result of direct rainfall is extremely low. NOAA point precipitation frequency estimates for the 100 year event in the area of the pads are: 15 minutes = 0.658 inches, 30 minutes = 0.886 inches, 60 minutes = 1.1 inches. In the unlikely event that water within the diked area threatens to flood the well pads, the water will be pumped to other nearby evaporation ponds or to the playa. No impacts from a 100-year rainfall event are anticipated.

4.1.6 Minerals

Rockwood holds placer mining claims to lithium in 39 parcels of land at and near the proposed project site as well as the geothermal lease for the proposed project. Other parties have acquired mineral claims or geothermal leases in the vicinity of the proposed project.

The possibility and rate of heat recovery in the proposed target zone for this project has not been determined. The geothermal exploration under the Proposed Action aims to better characterize the resource and the potential for its development. Under the Proposed Action, well drilling and geothermal testing would be limited to the project area and the subsurface directly beneath it. There is little potential for the well drilling and testing to affect other mineral claims or geothermal leases in the immediate vicinity of the project.

4.1.7 Migratory Birds

No direct effects to migratory birds are anticipated given the nature of the project area and the lack of existing habitat.

Noise and other indirect effects associated with construction and drilling could keep some migratory birds away from areas containing these activities. The indirect effects would be temporary and short-term, given the temporary nature of the proposed Project. No impacts are anticipated. See also Section 2.1.8.3 for a description of adaptive management techniques which would be utilized should monitoring demonstrate that there are impacts to migratory birds.

4.1.8 Threatened or Endangered Species

There would be no impacts to threatened or endangered species, as they are not known to exist within the project area.

4.1.9 Wildlife Resources

No direct effects to wildlife resources are anticipated given the nature of the project area and the lack of existing habitat.

Noise and other indirect effects associated with construction and drilling could keep some wildlife away from areas containing these activities. The indirect effects would be temporary and short-term, given the temporary nature of the proposed Project. No impacts are anticipated.

4.1.10 Noxious Weeds

The selected drill sites are located within an existing evaporation pond on land that is heavily disturbed and covered with saline sediments. Invasive, noxious, and non-native species are currently not present and their growth is not expected. Given the composition of the evaporation ponds and the lack of productive soil, the area does not easily support life. The potential for establishment of invasive, nonnative species onsite is low.

As weeds and invasive species could also 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, Rockwood has committed to cleaning the undercarriages of heavy equipment prior to use to reduce the potential for introduction of noxious weeds or other undesirable non-native species. Further, Rockwood has committed to monitor the project area for noxious weeds over the life of the project. These commitments are documented in the completed reclamation plan (see Appendix A). Mitigation measures have also been recommended to ensure that these commitments are adhered to (see Section 6).

4.1.11 Recreation

As there is no recreational use within the proposed project area, impacts to recreational users are not anticipated.

4.1.12 Visual Resources

The total estimated area of new surface disturbance required for construction of the drilling pads would be approximately 5.6 acres.

During the approximately 40 day observation well drilling process, the top of the drill rig derrick would be about 60 feet above the ground surface (depending on the drill rig used). During the approximately 60-80 day drilling process for each full-size well, the top of the drill rig derrick would be approximately 180 feet above the ground surface. Drilling would be conducted 24-hours a day, so that the lights used when drilling at night could be visible at a distance. Mitigation measures have been recommended to reduce the visual impacts related to nighttime lighting of the Project (see Section 6). Following implementation of this mitigation, impacts would be minimal.

The Proposed Action would be consistent with the Class IV VRM classification of the area. Impacts to visual resources would be temporary and would primarily affect the elements of line and color. As the well pads are proposed within an existing evaporation pond and the area is already heavily disturbed, the potential for visual impacts would be low.

4.1.13 Socio-Economic Values

The construction and drilling workforce is expected to average up to 12 and 25 workers for the observation and full-sized well drilling, respectively. Drilling of each observation well is anticipated to require approximately 40 days; drilling of each full-sized well is anticipated to require approximately 60-80 days. Some of these workers may be recruited locally, though most would be specialized workers from outside of the local area. Typically, non-local skilled workers do not bring families with them on short-term projects. It is anticipated that the drilling supervisor and mud logger would live in a trailer on site, thus reducing potential need for localized accommodations.

The proposed Project is short-term and temporary and would not cause population growth in the area. The proposed Project would neither create nor provide any infrastructure that would indirectly cause substantial population growth.

Non-local construction and drilling workers typically are paid a *per diem* rate for daily housing and meal costs. Workers normally spend the *per diem* on motel accommodations or recreational

vehicle campground space rent, restaurants, groceries, gasoline, and entertainment. In addition, Rockwood likely would rent some portion of the equipment and supplies required to drill and complete the wells (such as grading equipment, fuel and tools) from local suppliers. Aggregate would be purchased from Tonopah Sand and Gravel. This spending activity associated with the proposed Project construction and drilling would have a positive effect on local businesses in Esmeralda and Nye Counties.

4.1.14 Land Use Authorization

Project facilities would be located away from existing authorizations as identified in Section 3.3.14, and impacts to land use are not anticipated. However, holders of the existing rights-of-way within the vicinity of the proposed Project would be notified of the proposed activities. Rockwood would coordinate their activities with the existing holders as necessary and would obtain required authorizations or permits.

4.2 THE NO ACTION ALTERNATIVE

Under the No Action alternative, the Silver Peak Area Geothermal Exploration Project as currently proposed would not be constructed or operated. The direct and indirect impacts identified for the Proposed Action would not occur. The area would continue to be used as an evaporation pond for Rockwood's lithium mining operations. The existing environmental conditions for all identified resources would remain as described in Sections 3.3.1 through 3.3.14. .

5. CUMULATIVE IMPACTS ANALYSIS

The CEQ regulations for implementing NEPA (40 CFR 1508.7) define cumulative impacts as:

> "...the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

The following analysis identifies other past, present, or reasonably foreseeable future actions that, together with the proposed Project, may incrementally impact the environment, and addresses the potential cumulative impacts of these actions and the proposed Project.

5.1 CUMULATIVE EFFECTS STUDY AREA

The Cumulative Effects Study Area (CESA) for socioeconomic impacts is Esmeralda County and portions of Nye County, particularly the Tonopah Census Designated Place.

The CESA for the remaining resources analyzed in this EA is the Clayton Valley Hydrographic Area (Number 143) of the Central Hydrographic Region (Number 10), as designated by the Division of Water Resources of the Nevada Department of Conservation and Natural Resources (NDCNR-DWR). This hydrographic area totals 380,800 acres (Figure 4).

5.2 PAST AND PRESENT ACTIONS

Past and present activities consist principally of mineral exploration and production activities; geothermal exploration drilling; livestock grazing; and dispersed recreation.

The CESA contains the community of Silver Peak, which is approximately 1 mile west of the project area. The 2006 population of Silver Peak was approximately 117 persons (Esmeralda County 2010).

At various times for more than 100 years, the Silver Peak area has been investigated for precious metals, lithium, potash, water resources, and geothermal resources. This has led to the drilling of a number of wells and small-diameter holes within the CESA, including Rockwood's leasehold.

Blair, now a ghost town, is located 3 miles north of Silver Peak. The site of Blair was established in 1906 when the Pittsburg Silver Peak Gold Mining Company constructed the Blair mill, a 100-stamp mill, in operation from 1907 through 1916.

Rockwood (N-72542) and its predecessor entities currently operate a lithium brine mining and processing facility in the area, and have been extracting lithium from the playa brines since 1965. Rockwood and its predecessor entities have drilled a number of wells within the Clayton Valley basin where the Project is proposed.

There are three active authorized geothermal exploration projects with the CESA. Sierra Geothermal Power (SGP) received BLM approval of the Silver Peak Geothermal Exploration Project in April 2008 to drill up to 14 temperature gradient holes and up to 6 slim wells and 6 full-sized wells within the Silver Peak leases. These leases surround the community of Silver Peak and extend northward approximately five miles. To date, only one geothermal well located approximately 1.7 miles northwest of the proposed project has been constructed on the Silver peak leases. In July 2009, SGP received BLM approval of the Alum Geothermal Exploration Project to drill 32 temperature gradient holes and 17 observation wells within their Alum leases, which are located approximately 11 miles north of the proposed project. To date, two geothermal wells have been drilled on the Alum leases. SGP has since been purchased by Ram Power.

In April 2011, Ram Power received BLM approval of the Clayton Valley Geothermal Exploration Project to drill up to 18 geothermal exploration wells within their Clayton Valley leases, located from 2 to 9 miles north and east of the proposed project. To date, no geothermal wells have been drilled on these leases.

Six miles northwest of Silver Peak, Golden Phoenix Minerals (N-73109) operates the Mineral Ridge Gold Mine within the CESA. The mine is currently working on a heap leach pad, crushing ore, and preparing to begin leaching. The mine has submitted a Mine Plan of Operations amendment to include exploration drilling. The Sunshine Mining Company previously produced ore from the Mineral Ridge Mine, and from Sixteen-to-One Mine in the CESA, 13 miles west southwest of Silver Peak.

Sand, gravel, and stone are produced within the CESA. The Goat Island quarry produces ballast to line Rockwood's pond boundaries and sand and gravel are produced from both south and north of Silver Peak along SR 265.

5.3 REASONABLY FORESEEABLE FUTURE ACTIONS

For this analysis, it is assumed that the foreseeable future is the approximate 3-year period for implementation of the Proposed Action plus a subsequent 3-year period for the completion of reclamation. It is assumed that recreational activities, livestock grazing, and mineral exploration activities associated with the CESA would continue into the reasonably foreseeable future, though the relative intensity of these actions could vary depending on a variety of factors, such as a sluggish economy. Given that the reasonably foreseeable future period is a three year window, it is assumed that the reasonably foreseeable future actions will continue in the same manner and to the same degree as they have been conducted in the present and recent past

Section 368 of the Energy Policy Act of 2005 directs the Secretaries of Agriculture, Commerce, Defense, Energy and the Interior (the agencies) to, under their respective authorities, designate corridors on federal land in the 11 Western States for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities (energy corridors). On November 16, 2007, the Agencies released for public review and comment a Draft Programmatic Environmental Impact Statement (Draft PEIS) addressing the environmental impacts from the Proposed Action and a range of alternatives. Detailed maps show that an energy corridor is proposed within the CESA.

The Mineral Ridge Mine, located 5 miles northwest of Silver Peak has filed a Mine Plan of Operations amendment to include exploration drilling and is currently undergoing NEPA evaluation.

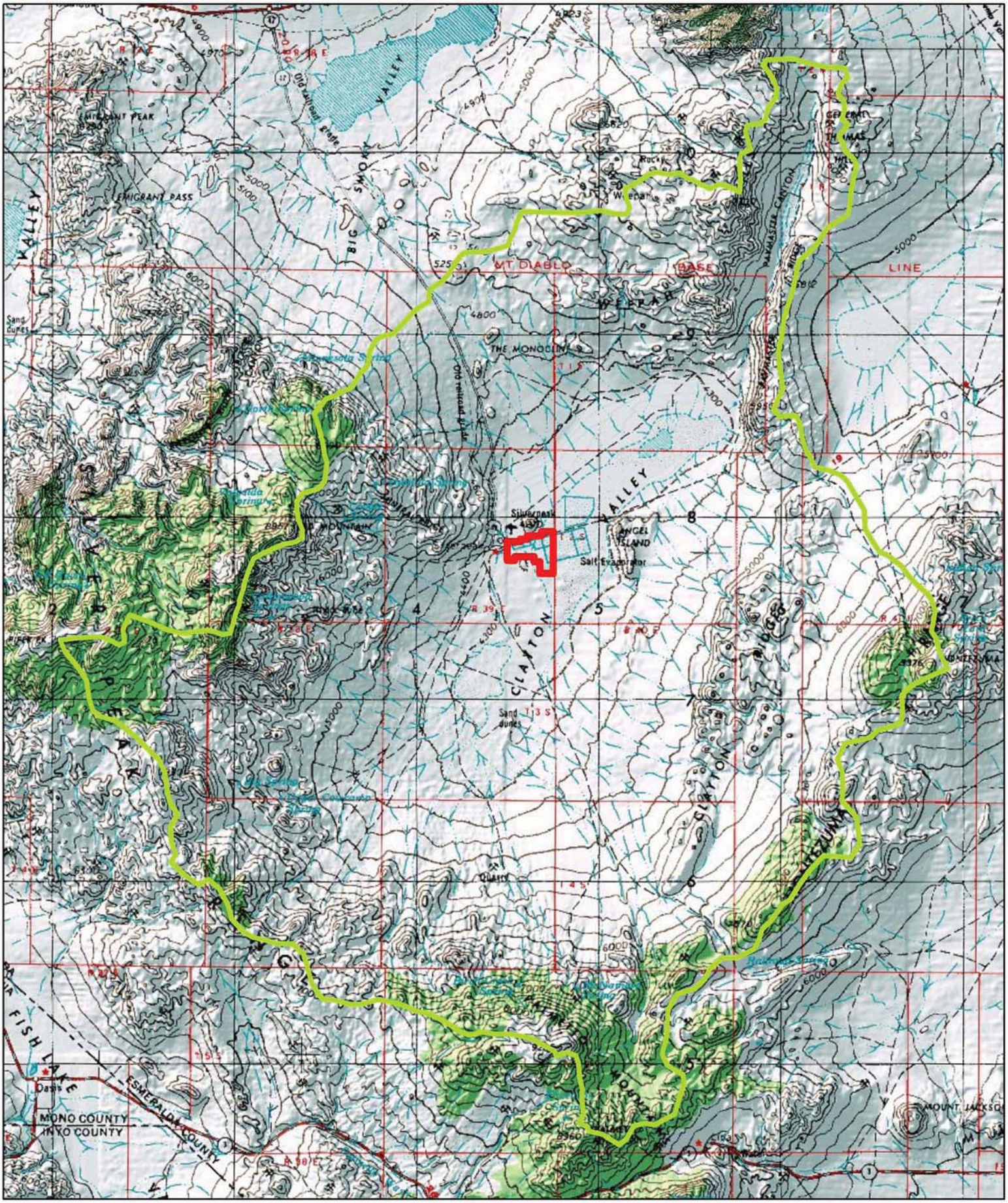

Figure 4 : Cumulative Effects Study Area

Lease Boundary

Hydrographic Area Boundary

0 2.5 5 Miles

United States Department of the Interior
Bureau of Land Management
Tonopah Field Office
P.O. Box 911
Tonopah, NV 89049

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

The data shown on the map uses the Universal Transmercator (Zone11N) Coordinate system and uses the NAD83 projection.

Map Date: 04/20/2012

Rockwood has been approved to drill temperature gradient holes.

Rodinia Lithium Company has submitted a Plan of Operations to the Tonopah Field Office for lithium exploration wells north and south of Rockwood.

Geoxplor currently has a pending notice N-89179 to drill for lithium.

There are no other known or anticipated actions with the potential for creating additional cumulative impacts in the reasonably foreseeable future. All future projects proposed within the CESA would be analyzed in separate site-specific environmental analyses.

5.4 CUMULATIVE IMPACTS FOR THE PROPOSED ACTION

5.4.1 Air Quality

Fugitive dust would be generated from any surface-disturbing activities and travel on unpaved roads during exploration activities. Mineral exploration activities typically minimize fugitive dust by watering the disturbed ground, as necessary. The operation of diesel engines associated with these same activities would also emit small quantities of criteria air pollutants (NO_2, SO_2, CO, and PM_{10}), criteria air pollutant precursors (VOCs), and air toxics (small quantities of diesel PM, acetaldehyde, benzene, and formaldehyde). These emissions are temporary and the air quality standards for this area are not expected to be exceeded. Any cumulative impacts to air quality are anticipated to be negligible.

5.4.2 Cultural Resources

As the Project would have no effect on cultural resources, the Project would not contribute to any cumulative impacts to cultural resources.

5.4.3 Native American Religious Concerns

As no Native American religious concerns were identified for the proposed Project, the Project would not contribute to any cumulative impacts to Native American religious concerns.

5.4.4 Hazardous Materials and Wastes

The Proposed Action would include generation and proper disposal of solid and hazardous wastes. The Project could also result in minor petroleum hydrocarbon or other hazardous material spills. However, no soil, groundwater or surface water contamination is anticipated. No adverse effects to the environment or worker health and safety are anticipated.

Hazardous materials are expected to be used by both the non-renewable and renewable future mineral exploration activities (including Rockwood's lithium mining operations), This includes the use of petroleum fuels (principally diesel fuel), hydraulic fluid, lubricants and drilling chemicals and materials. Non-hazardous solid waste and liquids could also be generated by the other reasonably foreseeable future actions.

Cumulative effects to the environment from hazardous or solid wastes are expected to be negligible.

5.4.5 Water Quality (Surface and Ground) and Water Quantity

Currently, Rockwood and the Town of Silver Peak are pumping from the fresh water aquifer. Projects within the CESA which have the potential to decrease the water level in the aquifer are shown in Table 7 below.

Table 7 Effects of Pumping to Aquifer

		Acre-feet/year	Approximate Decrease Water Level (feet/year)
1	Jennings (2010) 1998-2010	Not Reported	0.4
2	Rockwood Geothermal Exploration	7.01 – 13.96	0.02 – 0.04
3	Clayton Valley Geothermal Exploration Pjt.	67	0.2
4	Rockwood Additional Pumping	160	0.5
5	Lithium Exploration (Rodinia and Geoxplor)	11	0.04
6	Proposed Increases	245.01 – 251.96[1]	0.76 – 0.78[1]
	Cumulative Total	503.92	1.18[2]

1 This represents the total of lines 2-5.
2 This represents the total of lines 1 and 6.

Any rate of pumping that exceeds the rate of recharge of the fresh water aquifer would decrease the amount of fresh water stored in the aquifer. Increasing the rate of withdrawal would shorten the life of the aquifer as a potable water supply.

Rockwood's withdrawal of water would lower the water surface elevation of the aquifer approximately 0.02 – 0.04 feet/year over the life of the Project, which represents less than 1% of the total water pumped based on data for the period 1998-2010. This represents a negligible impact on the operation of the Rockwood or Silver Peak wells. The reduction in water surface elevations as result of this project would not result in an increase in the cost of pumping or resetting the pump intakes. Water surface elevations would remain well above the bottoms of the well screens.

There is little water quality data available for the Silver Peak wells. Data on Total Dissolved Solids (TDS) was first collected on 8/14/2006. The TDS was measured at 680 mg/l (pumping ~ 34 gpm). A constant discharge pump test, 250 gpm, was conducted in October 2009. The measured TDS was 719 mg/l. The next test result available, 9/07/2010, showed a TDS of 690 mg/l. It appears that TDS levels dropped with a reduction in pumping. The TDS levels did not exceed the Nevada standard, 1000 mg/l. Based on these few water quality data and given the continued current and reasonably foreseeable future pumping of water from the aquifer, it is probable that water quality will decline over time. However, the minimal increase of 42 acre-feet at the proposed pumping rate over the three-year projected life of the Proposed Action will have a negligible cumulative effect on water quality.

5.4.6 Minerals

Under the proposed Project, only 5.6 acres of land is proposed to be disturbed. As such, there is little potential for any conflict between the Proposed Action and any future locatable mineral claim activity that may be proposed on these same lands during the same period. Neither party (the geothermal lessee nor potential future mineral claimants) may proceed with operations on

leased or claimed public lands without notice to the BLM. The potential for any cumulative effects is low.

5.4.7 Migratory Birds

As the Project would have no direct impacts to migratory birds given the nature of the project area and lack of vegetation, the Project would not contribute to any cumulative impacts to migratory birds.

5.4.8 Threatened or Endangered Species

As the Project would have no effect on threatened and endangered species, the Project would not contribute to any cumulative impacts to threatened and endangered species.

5.4.9 Wildlife Resources

As the Project would have no direct impacts to wildlife given the nature of the project area and lack of vegetation, the Project would not contribute to any cumulative impacts to wildlife resources.

5.4.10 Noxious Weeds

As the Project would have no direct impacts related to noxious weeds given that the project area does not currently contain noxious weeds and the likelihood of their establishment is low, the Project would not contribute to any cumulative impacts related to noxious weeds.

5.4.11 Recreation

As the Project would have no effect on recreation, the Project would not contribute to any cumulative impacts to recreational users.

5.4.12 Visual Resources

Potential cumulative visual impacts would result from the well pad construction and well drilling operations of the proposed Project in the context of current and proposed projects within Clayton Valley. The majority of existing projects in the CESA have similar visual effects as compared to the proposed Project. Although the existing town of Silver Peak is within the study area and the existing lithium brine mining comprises a significant footprint of the valley, the overall character of the valley is generally perceived to be natural.

The proposed Project is considered temporary and reclamation and mitigation of the individual well sites are proposed. Despite these measures, the short-term modifications to the CESA by the proposed Project, along with the past, present, and reasonably foreseeable future projects would change the visual character of the valley by introducing modifications to form, line, color, and texture that could provide contrast in the landscape during the life of the Project. When considering the proposed mitigation measures, the existing visual setting, and the VRM Class IV

designation and compliance, the proposed Project would not substantially add to the cumulative effects.

5.4.13 Socio-Economic Values

Economic impacts would be expected from the exploration activities. Most of the exploration work force would be specialized workers from outside the area, although some of the mineral exploration construction materials could be purchased from local merchants. Some impacts may be realized from the purchase of meals, entertainment, and other goods and services by construction workers. The contribution of the proposed Project to these cumulative effects on economic values would be positive, small and short term.

5.4.14 Land Use Authorizations

As the Project would have no effect on land use authorizations, the Project would not contribute to any cumulative impacts to land use authorizations. The valid, existing rights of the federal geothermal leases noted in Section 1.1 would be addressed when granting new approvals within the project area.

5.5 NO ACTION ALTERNATIVE

None of the proposed geothermal drilling Project activities would be undertaken if the No Action Alternative is selected. There would be no cumulative effects from the proposed Project on any of the identified resources or activities from implementation of the No Action Alternative.

5.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Ground water or mineral resources could be damaged if wells leak or if the subsurface flow paths are changed as a result of geothermal exploration. To minimize this potential, geothermal wells would be designed, constructed, and operated in accordance with BLM and State of Nevada requirements. Although unlikely, such incidents could occur, and the resultant damage would be irreversible. Heat extracted from geothermal fluids during well testing would constitute an irreversible and irretrievable commitment of the thermal resource.

6. RECOMMENDED MITIGATION AND MONITORING

The BLM requires that decisions be implemented in accordance with the appropriate decision document (Decision Record/Finding of No Significant Impact). Monitoring is needed to ensure that actions taken comply with the terms, conditions, and mitigation measures identified in the decision. The BLM would fulfill this responsibility by monitoring the implementation of mitigation measures adopted as conditions of approval to the submitted Operations Plan and Geothermal Drilling Permits, as well as the stipulations attached to the geothermal lease.

The following recommended mitigation and monitoring measures were developed through the analysis conducted in this EA.

- The reserve pit shall maintain a minimum two feet of freeboard at all times.

- Initial ground-disturbing activities would not be conducted during the migratory bird nesting season (March 30 through August 15), unless necessary, and only after a qualified biologist first inventories for migratory birds and nests. This survey would be conducted to identify either breeding adult birds or nesting sites within 100 m. of the specific areas to be disturbed. If active nests are present within these areas to be disturbed, Rockwood would coordinate with the BLM or appropriate state officials, as applicable, to develop appropriate protection measures, which may include avoidance, construction constraints, and/or the establishment of buffers.

- Wellhead equipment left on the drill site following the completion of drilling would be painted a color which would blend with the landscape, pursuant to BLM Instructional Memorandum (IM) 2007-021 and the Gold Book (USDI and USDA 2007). Prior to paint selection, Rockwood would contact the Tonopah Field Office Project lead for concurrence.

- Given the importance of maintaining dark sky conditions, conscious efforts would be made to protect the current dark skies from light pollution. All drill rig and 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.

- To minimize the potential for the spread of noxious and invasive weeds in the project area, all construction vehicles and equipment would be cleaned of all soil and plant material using high-pressure equipment (compressed air or water) prior to arrival at the work site.

- The Project site would be monitored over the life of the Project to determine the presence of any invasive, noxious, and non-native species. Invasive, noxious, and non-native species that have been identified during monitoring would be promptly treated and controlled. A Pesticide Use Proposal (PUP) would be submitted to the BLM Tonopah Field Office for approval prior to the use of herbicides.

7. COORDINATION AND CONSULTATION

7.1 LIST OF PREPARERS

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BLM Tonopah Field Office
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John Hartley, Planning and Environmental Coordinator
Marc Pointel, Supervisory Rangeland Management Specialist
Susan Rigby, Cultural Resources Specialist

U.S. Department of Energy, National Energy Technology Laboratory
William J. Gwilliam, Physical Scientist/Project Manager
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Environmental Management Associates
Heather Altman, Senior Environmental Specialist
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Erin Wielenga, Environmental Specialist

7.2 AGENCIES, GROUPS, AND INDIVIDUALS CONTACTED

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Mike Stevens, Project Manager

Jacobs
James Miller, Project Manager

Nevada Natural Heritage Program
Eric Misgow, Data Manager

8. REFERENCES

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Appendix A: Reclamation Plan

Reclamation Plan

October 2012

Rockwood Lithium Inc (Rockwood), formerly doing business as Chemetall Foote Corporation, is proposing to construct, operate, and maintain the Silver Peak Area Geothermal Exploration Project (Project) within Esmeralda County, Nevada. Reclamation is required for the two geothermal well pads located on public lands managed by the Bureau of Land Management (BLM).

Reclamation Objectives:

The long-term objective of reclamation is to return the land to a condition approximating to that which existed prior to pre-drill conditions, cleaning the pad and filling the mud pit. It is expected that the geothermal wells would be integrated into a geothermal power project. If the wells are productive, areas adjacent to the wells would remain graveled to allow maintenance access to the wells. If the wells are not productive, the wells would be abandoned in conformance with the well abandonment requirements of the BLM and NDOM.

Reclamation Actions:

Procedure:

- The BLM would be notified 24 hours prior to commencement of any reclamation operations.

Housekeeping:

- Immediately upon well completion, the well location and surrounding areas(s) would be cleared of, and maintained free of, all debris, materials, trash, and equipment not required for production.
- No hazardous substances, trash, or litter would be buried or placed in pits. Upon well completion, any hydrocarbons in the pit would be remediated or removed.

Surface Management:

- Operations would disturb the minimum amount of surface area necessary to conduct safe and efficient operations. As the area proposed for construction is within an existing evaporation pond and devoid of vegetation, no vegetation removal is anticipated.
- The selected drill sites are located within an existing evaporation pond on land that is already heavily disturbed. Surface material, comprised largely from construction of the reserve pits, would be removed and salvaged during construction, as feasible.
- Earthwork for reclamation would be completed within 6 months of final well completion or plugging unless a delay is approved in writing by the BLM Authorized Officer.

Pit Closure:

- Reserve pits would be closed and backfilled within six months of release of the rig.
- All reserve pits remaining open after six months would require written authorization of the Authorized Officer.
- Immediately upon well completion, any hydrocarbons or trash in the pit would be removed. Pits would be allowed to dry, be pumped dry, or solidified in-situ prior to backfilling.

- Following completion activities, when dry, the pit would be backfilled with a minimum of 5 feet of soil material. The pit area would be slightly mounded above the surrounding grade to allow for settling and to promote surface drainage away from the backfilled pit.
- All exclosure fencing around the reserve pits would be removed.

Well Abandonment:

- A well with no commercial potential may continue to be monitored, but will eventually be plugged and abandoned in conformance with the well abandonment requirements of the BLM and NDOM. Abandonment typically involves filling the well bore with clean, heavy abandonment mud and cement until the top of the cement is at ground level. The well head (and any other equipment) will then be removed, the casing cut off well below ground surface and the hole backfilled to the surface.

Management of Invasive, Noxious, and Non-Native Species:

- The selected drill sites are located within an existing evaporation pond on land that is already heavily disturbed and covered with saline sediments. Invasive, noxious, and non-native species are currently not present and their growth is not expected.
- Rockwood would perform a noxious weed monitoring program of the project area during the course of the project including the reclamation period to ensure the continued absence of any noxious weed species.
- All reclamation equipment would be cleaned prior to use to reduce the potential for introduction of noxious weeds or other undesirable non-native species.

Visual Resources Mitigation:

- To reduce the view of well head facilities from visibility corridors and private residences, facilities would not be placed in visually exposed locations (such as ridgelines and hilltops).

Final reclamation:

- Final reclamation actions would be completed within 6 months of long-term well testing, weather permitting.
- Final abandonment of temporary pipelines and flowlines would involve flushing and properly disposing of any fluids in the lines. All surface lines and any lines that are buried close to the surface that may become exposed in the foreseeable future due to water or wind erosion, soil movement, or anticipated subsequent use, would be removed.

<u>Reclamation Monitoring and Final Abandonment Approval</u>

- Reclaimed areas would be monitored annually. Actions would be taken to ensure that reclamation standards are met as quickly as reasonably practical and are maintained during the life of the Project.
- Reclamation monitoring would be documented in an annual reclamation report submitted to the authorized officer by [March 1]. The report would document compliance with all aspects of the reclamation objectives, identify whether the reclamation objectives are likely to be achieved in the near future without additional actions, and identify actions that have been or would be taken to meet the objectives. The report would also include acreage figures for: Initial Disturbed Acresand Successful Final Reclaimed Acres.
- Annual reports would not be submitted for sites approved by the Authorized Officer in writing as having met final reclamation standards.

- Monitoring and reporting continues annually until final reclamation is approved. Any time 30% or more of a reclaimed area is re-disturbed, monitoring would be reinitiated.
- The Authorized Officer would be informed when reclamation has been completed, appears to be successful, and the site is ready for final inspection.

Appendix B: Federal Geothermal Lease Stipulations

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