Appendix D: Conceptual Decommissioning and Reclamation Plan

Decommissioning & Site Reclamation Plan

Crescent Dunes Solar Energy Project (N-86292)

Nye County, Nevada

Tonopah Solar Energy, LLC

03 November 2010

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1. INTRODUCTION

This report presents a Decommissioning & Site Reclamation Plan (Plan) for the Crescent Dunes Solar Energy Project (project), located on United States Department of the Interior, Bureau of Land Management (BLM) administered lands in Nye County, Nevada, and hereinafter referred to as "the Site". This Plan was prepared for Tonopah Solar Energy, LLC (TSE). The purpose of this Plan is to set forth the procedures and practices that would be employed by TSE to meet federal and state requirements for the reclamation of the site affected during construction of the project and for the rehabilitation and revegetation of the project site after decommissioning.

TSE submitted an Application for Transportation and Utility Systems and Facilities on Federal Lands (Standard Form 299) to the BLM to secure a Right-of-Way (ROW) Grant on November 5, 2008 to permit, build, construct, and operate a solar power generating facility based on concentrating solar power technology (CSP). The BLM is responsible for processing right-of-way (ROW) applications for projects on its land under the Federal Land Policy Management Act (FLPMA) conducting the federal environmental review under the National Environmental Policy Act (NEPA) and administering resulting requirements and mitigation. In compliance with NEPA, the BLM has since prepared a Draft Environmental Impact Statement (EIS) that analyzes the environmental impacts of the proposed project. On September 3, 2010 the BLM published a notice in the *Federal Register* opening a 45-day comment period on the Draft EIS which will close on October 18, 2010. It is assumed that a final Record of Decision (ROD) will be issued for the project in December 2010. All activities presented herein will be carried forth in compliance with the requirements of the Federal ROW Grant and associated NEPA review.

FLPMA Title V, requires an applicant for a right-of-way on BLM-administered lands to submit a plan including "rehabilitation for such right-of-way" and further requires the holder of the right-of-way grant "to furnish a bond, or other security" to secure all of the obligations, including reclamation, under the terms and conditions of the right-of-way grant. Regulations at 43 C.F.R. § 2805.12 detail the terms and conditions for reclamation and the bond securing that obligation.

The BLM Washington Office Instruction Memorandum (IM) No. 2007-0097, as updated by IM-2011-003, provides guidance on the processing and administration of ROW applications for solar energy projects on public lands administered by the BLM. The IM requires a bond for solar energy development ROW grants to ensure compliance with the terms and conditions of the authorizations and the requirements of the regulations including reclamation.

The nature and size of the disturbed areas for the project and linear facilities associated with the project are based on the Plan of Development (POD) and EIS for the project. As with any large, mulit-year project, there are potential changes that may affect the POD and operational measures that will be occasioned by unanticipated constructability measure or external factors (resource protection). Because these changes could affect the rehabilitation and Revegetation measures, and anticipated schedules, this Plan also includes procedures for modifying methods or criteria, if the project owner or the responsible agencies find the need to do so.

The following components are included in this Plan:

- A description of existing site conditions;

- Conceptual procedures for demolition and removal of equipment and above ground structures;
- Procedures for management of each material/waste stream, including handling procedures and standard disposition practices (disposal and recycling);
- A surface management plan;
- A reclamation plan that includes conceptual plans for soil and drainage preparation and restoration; weed management; and monitoring and reporting;
- A description of financing of decommissioning and restoration activities;
- A cost estimate methodology discussion and cost breakdown including activities to decommission, demolish, remove and reclaim the structures within the Project and the site to acceptable conditions as outlined within this plan.

This Plan begins with an overview of current project site conditions (prior to construction) and a brief overview of the proposed project description, including proposed project structures. The remainder of the Plan addresses decommissioning and reclamation (interim and final) criteria, objectives, methodology, implementation and monitoring procedures.

2. SITE CONDITIONS

2.1 Location

The proposed project site is located in south-central Nevada, approximately 13.5 miles northwest of Tonopah, in Nye County. The project is located within the southern portion of the Big Smoky Valley, north of US Highway 95/6 along Poleline Road (State Highway 89). The proposed project would be built on lands administered by BLM.

The proposed project site, transmission line (TL), and borrow pit (temporary during construction) are located in south-central Nevada, west of Tonopah, in Nye County. The proposed project encompasses approximately 2,950 acres (**Figure 1**), as located in the lands described by aliquot parts in the below table. While the proposed project encompasses approximately 2,950 acres, the project is expected be constructed on and disturb only a portion of this area.

Proposed Project Site (N-86292)	
Township 4 North, Range 41 East:	Western half of Sections 12 and 13
	Sections 11 and 14
	Northwestern, northeastern, and southeastern quarters of Section 15
	Southwestern, northeastern, and southeastern quarters of Section 10
	Southern half of the northwestern quarter of Section 10
	Eastern half of the southwestern quarter of Section 15
TL and Substation (N-87933)	
Township 4 North, Range 41 East:	Eastern half of Section 9
	Northwestern, southwestern, and southeastern quarters of Section 4
Township 5 North, Range 41 East:	Northwestern, southwestern, and northeastern quarters of Section 33
	Eastern half of Section 28
	Section 22
	Southeastern quarter of Section 15
	Western half of Section 14
	Southwestern, southeastern, and northeastern quarters of Section 11
	Eastern half of Section 2
	Northwestern quarter of Section 27

Borrow/Gravel Pit	
Township 5 North, Range 41 East:	Northeastern quarter of Section 19
	Western half of the northwestern quarter of Section 20
	Southern half of the southeastern quarter of Section 18

2.2 Land Use

Existing land use conditions in the area of analysis are characterized primarily by open desert, utility corridors and facilities, grazing allotment, recreation, and transportation and access. BLM administers the vast majority of land in the proposed project area through the BLM Tonopah Field Office (TFO). According to the Tonopah Resource Management Plan (RMP) (BLM 1997), the area of analysis for the proposed project is subject to the following authorizations or restrictions:

• San Antone grazing allotment (covers entire area of analysis)

• A ROW avoidance area (Classification 2—other),

• Off-highway vehicle restriction (limited to existing roads and trails and closed to competitive events)

• Visual resource management (Class 4) (covers entire area of analysis)

• A utility corridor

• Mineral leasing restrictions (no surface occupancy)

• Avoidance of Crescent Sand Dunes (Special Resource Management Area [SRMA])

In addition, based on a data search within BLM's GeoCommunicator (BLM 2010b), the area of analysis is contained within a DOD Airspace Consultation Area.

2.3 Topography

The topography of the Proposed Area is generally flat with elevations ranging from approximately 5,000–5,060 feet. Steeply sloping elevations in the background distances range between 9,100 and 11,000 feet. The topography in the borrow pit area is generally flat, with an elevation of approximately 4,881– 4,972 feet. The topography along the TL and substation corridor rises slightly from the valley floor to the location of the substation, with an elevation of approximately 4,880–5,200 feet.

2.4 Geology

The principal geologic units in southern Big Smoky Valley are consolidated rocks (bedrock) and unconsolidated basin-fill deposits. Bedrock units include volcanic, sedimentary and granitic rocks which underlie the basin fill deposits and are exposed in mountains surrounding the valley. Unconsolidated basin fill material includes Quaternary playa, channel, and alluvial fan deposits. These unconsolidated deposits of gravel, sand, silt, and clay lenses can be up to 5,000 feet thick in the Tonopah Flat Subarea.

The Quaternary basin fill deposits consist of inter-bedded playa, distal fluvial, aeolian sands, and alluvial fan sediments. The alluvial fan deposits occur along the flanks of the valley and are composed of sediments eroded from the bedrock terranes of the local mountain ranges. The fans deposits generally become finer grained away from the mountain fronts toward the valley floor. The surficial playa lake deposits occur within the center and relatively flat regions of the valley. However, relatively older subsurface playa deposits occur at depth beneath older alluvial fan deposits toward the mountain fronts.

Many of the Basin and Range Geomorphic Province (BRGP) valley sinks contained lakes during the glacial maximums of the Pleistocene (Morrison, 1991; Reheis, 1999; Reheis et. al., 2007). Typical pluvial deposits likely occur within the Tonopah Flat region further toward the center of the valley where the ancient lakes would have been deeper (Briggs, et. al, 2005; Morrison, 1991; Dohrenwend, 1991).

The principal structural features of the basin are surface contours of the bounding consolidated rock that may provide conduits or obstructions to groundwater flow. In addition, mountain range bounding faults that generally occur near the edge of the valley sediments and the mountain fronts may provide obstructions to groundwater flow.

2.5 Climate and Hydrology

The project is located within the South Central Nevada climatological division, a semi arid to arid desert climate. Temperatures are mild, rarely exceeding 100°F in the summer and cold in the winter. Daily temperature ranges may be as much as 40°F (Rush and Schroer, 1971).

Two seasonal weather patterns bring precipitation to south central Nevada, winter cold fronts and summer monsoons. The winter cold fronts are characterized by long duration, low intensity broad storms while summer monsoons are short in duration, high Intensity, localized events. It is common to have months of no precipitation between the two periods (Jeton, 2006). Big Smoky Valley occurs in a rain shadow east of a series of major mountain ranges. The rain shadow effect is the most important variable influencing the latitude and elevation distribution of precipitation. In general, precipitation increases with land surface altitude. The air is cooled about 5°F for every 100 feet of lift (Rush and Schroer, 1971).

The Tonopah Flat Subarea receives a total of approximately 580,000 acre-feet of precipitation annually, with most moisture falling in the winter (Water for Nevada, 1971). Average annual precipitation is 4-8 inches per year falling over the basin with the least occurring in the valleys. Higher mountains generally receive 20 inches or more per year, mostly as winter snowfall (Rush and Schroer, 1971). The average evaporation rate exceeds precipitation with as much as 90 to 95 percent of the total annual precipitation is lost through evaporation and transpiration (Buqo, 2004).

Drainage in the Tonopah Flat hydrographic area is internal and terminates in playas located in the lowest portions of the valley floor. The lowest part of the valley floor is located approximately 18 miles southwest of the Project site. Surface drainage to the playas is from the surrounding mountains and toward the south and southwest along the valley floor. In addition, Tonopah Flat receives surface water inflow from Ione Valley to the northwest and Royston Valley to the west.

Most of the precipitation in the area falls on the mountains that surround Tonopah Flat. Because more precipitation falls on the higher mountains, the primary source of surface water in Tonopah Flat consists of runoff in streams originating in the Toyabe Range or flowing southeastward into Tonopah

Flat from Lone Valley. These streams include Knickerbocker, Cloverdale, Cottonwood and Peavine Creeks. Peavine Creek terminates approximately 2 miles west and downslope of the Project site. These streams are generally gaining flow in the mountains and losing flow on the alluvial aprons that ring the valley floor. Thus, the streams have their maximum flow at the mountain front and then infiltrate into the basin alluvium or are diverted near the canyon mouths and used for irrigation of local ranches.

Maximum stream flows occur in the spring and early summer and are derived from snowmelt. Flow generally does not reach the valley floor, except during periods of maximum runoff or during infrequent intense rain events. Flow during wet years is nearly twice the average annual flow, and dry year flows are typically at about 75% of the average flows. The largest stream draining from the Toiyabe Range to Tonopah Flat is Peavine Creek, with an average discharge rate of 2.8 cubic feet per second (CFS) and a maximum discharge rate of 13.6 CFS.

Average annual discharge from Peavine Creek is reported as 2,800 AFY. Cottonwood and Cloverdale Creeks do not flow during dry years and have average annual discharges of 350 and 325 AFY, respectively. In 1968, surface water inflows from Royston and Ione Valleys were 60 and 300 acre feet, respectively.

At the Project Location, ephemeral surface water flow occurs in westward draining washes that drain down the alluvial apron at the mountain front. As stated previously, flow in these washes is intermittent and limited to runoff from intense rainfall events.

Approximately 30 springs and seeps have been identified near the margins of Tonopah Flat. The closest springs and seeps are located more than 10 miles from the site. Available data regarding spring flows rates range from less than 1 gallon per minute (GPM) to 3 GPM (Rush and Schroer, Table 31, 1971). In general, these springs and seeps are located in the bedrock areas outside the boundaries of the alluvial aquifer system; however, some springs are reported to be located in alluvium. These springs support local phreatophytes and some are used for stock watering or domestic water supply.

2.6 Area Hydrogeology

The Crescent Dunes Solar Energy Project is situated within the southern portion of Big Smoky Valley, located in the Great Basin section of the Basin and Range Physiographic Province. The Great Basin is composed of two types of aquifers: basin fill aquifers and carbonate rock aquifers.

The basin fill aquifer occurs in topographic basins that are physically separated from each other by mountain ranges. The carbonate rock aquifers can extend across topographic basins through the mountain ranges forming multi-basin groundwater flow systems. The carbonate aquifer system is composed of thick sequences of Paleozoic and Mesozoic limestone and underlies a large portion of Nevada. The carbonate aquifer was estimated to reach its western extent along the San Antonio Mountains, which form the eastern edge of the Tonopah Flat Subarea. Thus the Tonopah Flat Subarea is not believed to be hydraulically connected to the carbonate aquifer flow system.

The project site is located in the Central Hydrographic Region, the largest hydrographic region in Nevada, which covers 46,783 square miles in thirteen Nevada counties (Water for Nevada, 1971). The Central Region is located within the larger Basin and Range Groundwater Aquifer System. Basin fill aquifers are composed primarily of alluvial, colluvial and lacustrine deposits with virtually all major groundwater development and withdraw occurring in the upper 500 feet of these aquifers (Buqo, 2004).

The Central region includes 89 valleys and is characterized as a basin of mostly topographically closed valleys (Rush 1968). The Big Smoky Valley area is designated as Hydrographic Area 137 and is broken up into two Subareas, (A) Tonopah Flat and (B) Northern Part. Subarea 137A is bounded by non-water bearing rocks and a low alluvial ridge separates it from Subarea 137B. The Tonopah Flat Subarea (where the Project site is located) has a surface area of 1,603 square miles and encompasses parts of Nye, Esmeralda and Mineral County. Tonopah Flat receives surface inflow from Ione Valley but has no surface water outflow (Rush and Schroer, 1971).

3. PROJECT DESCRIPTION AND STRUCTURES

The proposed solar power project is based on concentrating solar power (CSP) technology. The proposed CSP technology utilizes heliostats/reflecting mirrors to redirect sunlight on a receiver erected in the center of the solar field (the power tower or central receiver). Liquid salt, which has the viscosity and appearance similar to water when heated, is circulated through tubes in the receiver, collecting the energy gathered from the sun. The heated salt is then routed to an insulated storage tank where it can be stored with minimal energy losses. When electricity is to be generated, the hot salt is routed to a heat exchanger (or steam generator) and used to produce steam. The steam is then used to power a conventional Rankine cycle steam turbine/generator, which produces electricity. The exhaust steam from the turbine is condensed and returned via feedwater pumps to the heat exchangers where the high-pressure superheated steam is generated again.

3.1 Site Layout

The overall site layout for the proposed facility includes the following components:

3.1.1 Generating Facility Components

- Solar Collecting Tower – The concrete tower would be approximately 538 feet tall and would house a 100-foot-tall cylindrical solar receiver and a 15-foot maintenance crane. The total height would be approximately 653 feet, and would have appropriate lighting for aviation safety and lightning protection.
- Solar Array – The array would consist of a circular field encompassing an area with a radius of 4,300 feet (approximately 1,330 acres) where the heliostats (or mirrors) would be located.
- Power Block - The power block, in a circular area with a radius of about 400 feet, would house the central receiver tower, storage tanks, steam turbine, cooling tower, ACC, transformers, heat exchangers, power block buildings, and other ancillary equipment.
- Reverse Osmosis Water Treatment System and Evaporation Ponds – These facilities would purify the groundwater to be used in the production of electricity and be used as the means for industrial wastewater disposal.
- Hybrid Cooling System – The system would include an evaporative cooling tower and ACC.
- Thermal Storage System – The storage system would include two large, insulated storage tanks and associated piping for the liquefied salt, one “hot” tank for the storage of the materials prior to use in generating the steam, and a “cool” tank for storing salt prior to resending it to the central tower for heating.

3.1.2 Major Electrical Systems and Equipment

- Generator Step-Up (GSU) Transformer – A GSU Transformer would be designed and installed in accordance with current standards and guidelines for a project of this size. The GSU steps up the voltage to 230 kV for delivery to the electrical grid.
- Unit Auxiliary Transformers (UATs) – UATs would be used to convert electricity to a lower voltage for use in the plant auxiliary systems.

- Electrical Building – A small building would be constructed in the power block to house switchgears, motor controllers, control panels, power and lighting panels, control equipment, a battery back-up system, and other similar items.
- Emergency Power Generator(s) – Diesel-powered generator(s) would be used to provide emergency power in addition to the battery back-up system.
- Lighting Systems – The lighting system for the facility would be limited to those areas required for safe operation of the facility. Where lighting is required, it would be designed and installed to minimize visual impacts in the region.
- Communication Systems – The Supervisory Control and Data Acquisition (SCADA) system, which controls power generation and transmission processes, would use fiber-optic or copper lines in the facility. Other communications during construction and operation would occur through new fiber-optic or copper lines installed in the TL corridors, or through a satellite (dish) system.

3.1.3 Transmission Systems and Interconnections

- Transmission Route – The outgoing TL would follow the proposed project site access road to Pole Line Road, head north along Pole Line Road to where the Millers to Anaconda TL is located, and then parallel the Millers to Anaconda TL to the Anaconda Moly Substation, for a distance of approximately 9.5 miles.
- Interconnections – The project would interconnect to the Anaconda Moly Substation located approximately 6 miles due north of the generating facility location.
- A temporary 55 kV transmission line for construction power, to be located within the permanent ROW.

3.1.4 Civil/Structural Features

- Access Roads – A paved, two-lane access road would extend approximately 1,500 feet from Pole Line Road to the facility. An existing access road that follows the Millers to Anaconda TL, would be used for access during construction and for maintenance of the TL. Pole Line Road would also be used for access to the TL where the TL would follow Pole Line Road.
- Building and Enclosures – A control building, a warehouse, and other buildings would be developed within the project area to support operations of the facility.
- Storage Tanks – Tanks would be constructed to store demineralized water, non-demineralized water, salt or HTF, lube oil, and other materials for the power block.
- Site Drainage – The heliostat array would be graded such that existing drainage patterns will be maintained, but the area in the power block will graded to divert Stormwater to ditches.

4. DECOMMISSIONING & RECLAMATION

4.1 Criteria and Planning

The goal of project decommissioning and both interim and final reclamation is to remove the installed power generation equipment and return the site to a condition as close to a pre-construction state as feasible. The procedures described for decommissioning and reclamation are designed to ensure public health and safety, environmental protection, and compliance with applicable regulations. The procedures outlined for reclamation include a description of the proposed activities for reclamation to be undertaken during and after completion of project operation and measures to be taken to prevent unnecessary or undue degradation.

The objective of interim reclamation is to restore vegetative cover and a portion of the landform sufficient to maintain healthy, biologically active topsoil; control erosion; and minimize habitat, visual, and forage loss during the life of the well or facilities.

The long-term objective of final reclamation is to return the land to a condition approximating that which existed prior to disturbance. This includes restoration of the landform and natural vegetative community, hydrologic systems, visual resources, and wildlife habitats. To ensure that the long-term objective will be reached through human and natural processes, actions will be taken to ensure standards are met for site stability, visual quality, hydrological functioning, and vegetative productivity.

The major activities required for the decommissioning and reclamation are:

- Heliostat and power block removal
- Electrical system removal
- Structural foundation removal per ROW grant requirements
- Road removal
- Re-grading
- Re-vegetation

The proposed implementation strategy to achieve the goals for site decommissioning and reclamation would include the following:

- Use of industry standard demolition means and methods to decrease personnel and environmental safety exposures by minimizing time and keeping personnel from close proximity to actual demolition activities to the extent practical;
- Plan each component of the decommissioning project such that personnel and environmental safety are maintained while efficiently executing the work;
- Conduct pre-decommissioning activities such as final decommissioning and restoration planning that addresses the “as-found” site conditions at the start of the project;
- Remove all residual materials and chemicals from the Site prior to demolition for reuse at other facilities or for proper disposal at licensed facilities;

- Demolition of the above-ground structures (dismantling and removal of improvements and materials) in a phased approach while still using some items until close to the end of the project. For instance, the water supply, administrative building and some electrical power components will be modified to be used until very late in the decommissioning project;
- Demolition and removal of below-ground facilities (floor slabs, footings, and underground utilities) as needed to meet the decommissioning goals;
- Soils cleanup, if needed, with special attention applied to retention pond and hazardous materials use/storage areas to ensure that clean closure is achieved;
- Disposal of materials in appropriate facilities for treatment / disposal or recycling;
- Recontouring of lines and grades to match the natural gradient and function of the site; and
- Revegetation with native plants.

These activities are discussed in more detail in the subsequent sections. The specific requirements and approach for each activity is an estimate, since the technologies and construction techniques available when the project is decommissioned are expected to change.

4.1.1 Schedule

It is assumed that decommissioning of the permanent plant facilities would begin 30 years after the commercial operation date of the project. Decommissioning of temporary facilities including but not limited to temporary septic systems, temporary underground conduit, temporary power poles, temporary concrete pads, and similar items will be completed during the plant commissioning timeframe or within the first 6 to 12 months of facility operation following completion and start up of the project.

Decommissioning will be competed using traditional heavy construction equipment including but not limited to front end loaders, cranes, track mounted and rubber tired excavators, bull dozers, and scrapers. Although various types of decommissioning and demolition equipment will be utilized to dismantle each type of structure or equipment, dismantling will proceed according to the following general staging process. The first stage consists of dismantling and demolition of above-ground structures to be removed. The second stage consists of concrete removal as needed to ensure that no concrete structure remains within 3 feet of final grade (i.e., floor slabs, below-ground walls, and footings) as appropriate. The third stage consists of removal/dismantling of underground utilities within 3 feet of final grade. The fourth stage is excavation and removal of soils, and final stage is site contouring to return the originally disturbed area of the site to near original conditions while disturbing as little of the other site areas as is practical.

A proposed schedule of the time for initiation of surface disturbance activities and completion of activities for reclamation is presented below.

Activity	Estimated Date/Timeframe (in working days)
Interim Reclamation	

Activity	Estimated Date/Timeframe (in working days)
Regrade	20 Days
Revegetate	10 Days
Recontour	10 Days
Decommissioning	
Temporary facility decommissioning	20 Days
dismantle & demolition of above grade structures	110 Days
concrete removal	110 Days
removal & dismantle underground utilities	88 Days
excavation & removal of soil	66 Days
Reclamation	
Regrade	66 Days
Revegetation	66 Days
final site contour	66 Days

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

4.1.2 Future Land Use

Future land use will be guided by the BLM's TFO RMP. Should the land no longer be under the administration of the BLM at the time of decommissioning, land use will be guided by the Nye County General Plan.

4.2 Process Description

4.2.1 Stage 1: Dismantle & Demolition of Above Grade Structures

Above ground demolition entails breakdown and removal of above-ground structures and facilities. Residual materials from these activities would be transported via heavy haul dump truck to one or more central recycling / staging areas where the debris will be processed for transport to an off site recycler

The strategy for demolition consists of the use of mechanized equipment and trained personnel in the safe dismantling and removal of the following above-ground structure:

- Heliostats and related equipment using low environmental impact equipment;

- Towers using explosives to put the towers on the ground, then conventional heavy equipment to size reduce and transport for recycling (this is the industry standard for safe demolition of large towers and massive concrete structures);
- Removal of the turbine generators, condensers and related equipment (including salt tanks), transmission lines and towers, and above ground pipelines using conventional demolition equipment and techniques; and
- Near the very end of the project, the removal of site related fencing.

4.2.2 Stage 2: Concrete Removal

A project recycle center (either at the power unit as the work progresses or at the central admin area) would be established to:

- Size reduce and stage metals and mirrors for transport to an off site recycler:
- Crush concrete and remove rebar;
- Stockpile concrete for later use at the Site;
- Stage rebar for transport to an off site recycler; and
- Temporarily store and act as a shipping point for any hazardous materials to an approved TSD facility.

4.2.3 Stage 3: Remove & Dismantle Underground Utilities

The below-ground facilities to be removed include concrete slabs and footings that would remain within 3 feet of final grade at the end of the project. It is anticipated that any and all site related piping and utilities, including water lines, below ground electric / control / communication lines, and gas lines would be completely removed, regardless of the depth below final grade. These materials would be excavated and transported to the recycling area(s) for processing and ultimate recycling. The resulting trenches would be backfilled with suitable material of similar consistency and permeability as the surrounding native materials and compacted to 85 percent relative compaction.

4.2.4 Stage 4: Excavation & Removal of Soil

The need for, depth and extent of contaminated soil excavation will be based on observation of conditions and analysis of soil samples after removal of the evaporation pond and hazardous materials storage areas, and upon closure of the recycling center(s) and waste storage areas using during decommissioning. At this time, removal of contaminated soil is assumed not to be needed. To ensure worker safety, the hot and cold HTF tank areas are designed such that any release will be contained in a basin. The construction SWPPP will specify procedures to prevent contact between HTF and storm water during processing of this material prior to plant startup. In addition, the processing area would be cleaned to assure residual HTF is removed from surface soil after processing. If required, removal would be conducted to the extent feasible and as required to meet regulatory cleanup criteria for the protection of groundwater and the environment. If contaminated soil removal is required, the resulting excavations would be backfilled with native soil of similar permeability and consistency as the surrounding materials and compacted to 85 percent relative compaction.

4.2.5 Stage 5: Final Site Contour

Recontouring of the site would be conducted using standard grading equipment to return the land to match within reason the previously existing surface and surrounding grade and function. Grading activities would be limited to previously disturbed areas that require recontouring. Efforts would be made to disturb as little of the natural drainage and vegetation as possible. Concrete rubble, crushed to approximately 2-inch minus size, would be placed in the lower portions of fills, at depths at least 3 feet below final grade. Over excavation of an expansive area will be implemented to create voids for concrete rubble on site as needed. Fills would be compacted to approximately 85 percent relative compaction by wheel or track rolling to avoid over-compaction of the soils. To the extent feasible, efforts would be made to place a layer of coarser materials at the ground surface to add stability.

5. INTERIM RECLAMATION

5.1 Recontouring

Interim reclamation actions will be completed no later than 12 months from commencement of operation, weather permitting. The portions of the cleared site not needed for active operational and safety purposes will be recontoured to the original contour if feasible, or if not feasible, to an interim contour that blends with the surrounding topography as much as possible. Sufficient semi-level area will remain for setup of a workover rig and to park equipment. In some cases, rig anchors may need to be pulled and reset after recontouring to allow for maximum interim reclamation.

Roads and production equipment, such as tanks, treaters, separators, vents, electrical boxes, and equipment associated with operation, will be placed on location so as to permit maximum interim reclamation of disturbed areas. If equipment is found to interfere with the proper interim reclamation of disturbed areas, the equipment will be moved so proper recontouring and revegetation can occur.

5.2 Application of Topsoil & Revegetation:

Topsoil will be evenly respread and aggressively revegetated over the entire disturbed area not needed for all-weather operations including road cuts & fills and to within a few feet of the production facilities, unless an all-weather, surfaced, access route or small “teardrop” turnaround is needed.

In order to inspect and operate the project or complete workover operations, it may be necessary to drive, park, and operate equipment on restored, interim vegetation within the previously disturbed area. Damage to soils and interim vegetation will be repaired and reclaimed following use. To prevent soil compaction, under some situations, such as the presence of moist, clay soils, the vegetation and topsoil will be removed prior to workover operations and restored and reclaimed following workover operations.

5.3 Visual Resources Mitigation

To provide roadside screening, trees or cactus, if present, and tall vegetation will be left along the edges of the roads whenever feasible.

6. EVAPORATION POND RECLAMATION

The preliminary closure activities for the evaporation ponds include the following processes:

- Removal of Wastewater;
- Removal of Solids / sludge;
- Removal of any hard surface / protective layer and granular fill;
- Removal of high density polyethylene (HDPE) liners, drainage layers and leak detection system; then
- Site restoration, including soil rehabilitation as necessary.

Further information on each process is provided in the following sections.

Details concerning soil rehabilitation are presented below.

The evaporation ponds will be backfilled with native soil to match the existing surrounding grade and restore drainage function. The berm surrounding each evaporation pond will be the primary backfill material. The upper 6 inches of soil will be decompacted as necessary to prepare the soil for revegetation.

6.1 Closure Strategy

The Final Closure Maintenance Plan will outline in detail how each major task will be performed, however the overall closure strategy shall contain the following major elements:

- Conducting pre-closure activities, such as final closure and restoration planning, that addresses the “as-found” site conditions at the start of the Project;
- Documenting and establishing health and safety procedures;
- Use industry standard demolition methods, which shall allow personnel to efficiently undertake demolition activities, minimizing the environmental safety exposures;
- Demolishing the aboveground structures, liner materials, and leak detection and recovery system (dismantling and removing of improvements and materials) in a phased approach while still using some items until the end of the Project.
- Demolishing and removing of belowground facilities (underground utilities) as needed to meet the closure goals;
- Sealing any underground utilities to be left in place with grout;
- Cleaning up of soils, if needed, to ensure that clean closure is achieved;
- Disposing of materials in appropriate facilities for treatment/disposal or recycling; and
- Re-contouring lines and grades to match the natural gradient and function.
- Evaluate the execution of the decommissioning and restoration plan through project oversight and quality assurance; and

- Document implementation of the plan and compliance with environmental requirements.

The Final Closure Plan will be for clean closure of the evaporation ponds, by completely removing all residue wastes, including sludges and liner materials and discharging them to an approved Unit.

6.1.1 WASTEWATER DISPOSAL/USE

Wastewater will be consolidated into one evaporation pond or until that one pond is full, as the minimum two feet of freeboard must be maintained. Wastewater remaining in the other evaporation ponds will be allowed to evaporate to the atmosphere. As long as liquids remain in the evaporation ponds, the monitoring and reporting requirements included in the permit requirements will be followed.

TSE may obtain permission to use the consolidated wastewater for dust control during removal activities of the other two evaporation ponds (within the containments). Any wastewater that is not evaporated or utilized for dust control will be characterized for off-site disposal then loaded into containers/trucks, handled, and transported by a licensed waste hauler to an approved disposal facility following all federal, state, and local requirements.

6.1.2 Solids Removal

Samples of the precipitated solids/sludge shall be collected from each evaporation pond for characterization in accordance with EPA SW-846 and the receiving facility requirements, and profiled for disposal. The characterized solids/sludge will then be loaded into trucks and handled as appropriate by a licensed waste hauler and transported to an approved disposal facility, following all federal, state and local requirements.

6.1.3 HARD SURFACE/PROTECTIVE LAYER

The ramp, which may be constructed of a hard protective layer of roller compacted concrete or approved equivalent, will be removed using best engineering practices. Three samples of concrete will be collected from each evaporation pond to determine if the concrete can be recycled. If recyclable, the concrete will be crushed on site and transported to construction site(s) for use, such as road base material or used as backfill material at depths of greater than three feet below final grade. Handling and disposition of the material will abide by all federal, state and local requirements.

The granular fill beneath the hard surface protective layer will be removed. The material will be transported to an on-site facility to be washed. Water generated from the washing activities will be loaded in appropriate containers, handled, and transported by a licensed waste hauler to an approved disposal facility following all federal, state, and local requirements. The washed material will be reused on site as granular fill.

6.1.4 HDPE LINERS, DRAINAGE LAYERS AND MONITORING EQUIPMENT

In each evaporation pond, the HDPE liners, drainage layers and leak detection, collection and recovery sumps will be removed. The materials will be sent to a disposal facility. Handling and disposition of the material will abide by all federal, state and local requirements.

6.1.5 Base layer

Confirmation sampling will be conducted on the soil base layer of the evaporation pond liner system after the removal of the 40 mil HDPE geomembrane. If a GCL is used in the final design, the native materials below the GCL will be sampled after the removal of the overlying GCL. Samples will be collected from each of the former pond footprints on 100-foot by 100-foot grid spacing. Laboratory analysis will include Title 22 metals, biphenyl, diphenyl oxide, and general chemistry.

6.2 Site Restoration

The evaporation ponds will be backfilled with native soil to match the existing surrounding grade and restore drainage function. The berm surrounding each evaporation pond and the washed granular material will be the primary backfill material. The upper 6 inches of soil will be decompacted as necessary and remediated to the accepted conditions.

6.3 Evaporation Pond Closure Schedule

A closure schedule and final closure date will be determined at a future date and provided in the Final Closure Maintenance Plan.

It is assumed that closure would begin 30 to 50 years after the commercial operation date of the Project. It is also assumed that closure of the facility would occur in a phased sequential manner. Closure work would commence at the first pond, followed by similar work at the second pond, which would be followed by work on the third pond.

6.4 SITE SECURITY

There will be existing security measures on site which restrict public access during operations, including closure of the evaporation ponds. The entire site will have chain-link security fencing around the site perimeter, power block and other areas requiring controlled access. Controlled access gates will be located at the entrances to the facility and access through the main gate will require an electronic swipe card, preventing unaccompanied visitors from accessing the Facility. All Facility personnel, contractors and visitors will be logged in and out of the Facility at the main office during normal business hours. Visitors and non-TSE employees will be allowed entry only with approval from a staff member at the Facility.

In addition, at each point of access from a public road, an easily visible sign shall be posted indicating the facility name and other pertinent information as required.

Removal of the site security will be undertaken as a separate process to the evaporation ponds, however will not occur until the evaporation ponds are completely closed and certified.

7. GENERAL PROVISIONS

7.1 Housekeeping

A site-specific Health and Safety Plan will be prepared to specify requirements for establishing and maintaining a safe working environment during the implementation of the planned decommissioning and reclamation activities.

Immediately upon completion of each phase, the target location and surrounding areas(s) will be cleared of, and maintained free of, all debris, materials, trash, and equipment not required for decommissioning or reclamation.

No hazardous substances, trash, or litter will be buried or placed on the site.

7.2 Vegetation Clearing

Vegetation removal and the degree of surface disturbance will be minimized wherever possible. During vegetation clearing activities, woody vegetation removed from the power block and access road will be moved aside prior to any soil disturbing activities. Care will be taken to avoid mixing soil with the woody vegetation.

7.3 Topsoil Management

Operations will disturb the minimum amount of surface area necessary to conduct safe and efficient operations. When possible, equipment will be stored and operated on top of vegetated ground to minimize surface disturbance. In areas to be heavily disturbed, the top [eight (8)] inches of soil material, will be stripped and stockpiled around the perimeter of the power block and along the perimeter of the access road to control run-on and run-off, and to make redistribution of topsoil more efficient during interim reclamation. Stockpiled topsoil may include vegetative material. Topsoil will be clearly segregated and stored separately from subsoils.

Earthwork for interim and final reclamation will be completed within 12 months of completion unless a delay is approved in writing by the BLM authorized officer. Salvaging and spreading topsoil will not be performed when the ground or topsoil is frozen or too wet to adequately support construction equipment. If such equipment creates ruts in excess of four (4) inches deep, the soil will be deemed too wet. No major depressions will be left that would trap water and cause ponding unless the purpose is to trap runoff and sediment.

7.4 Seeding

After recontouring, the Site would be revegetated using native plant seeds where appropriate. This would be conducted with a native seed collection company. Initial seedbed preparation will consist of recontouring to the appropriate interim or final reclamation standard. All compacted areas to be seeded will be ripped to a minimum depth of 18 inches with a minimum furrow spacing of 2 feet, followed by recontouring the surface and then evenly spreading the stockpiled topsoil. Prior to seeding, the seedbed will be scarified and left with a rough surface. If broadcast seeding is to be used and is delayed, final seedbed preparation will consist of contour cultivating to a depth of 4 to 6 inches within

24 hours prior to seeding, dozer tracking, or other imprinting in order to loosen up the soil and create seed germination micro-sites.

Seeding will be conducted no more than 24 hours following completion of final seedbed preparation. A certified weed-free seed mix designed by BLM to meet reclamation standards will be used.

7.5 Erosion Control and Mulching

Site preparation in general and soil development prior to planting can optimize the site conditions for establishment of the native plant community and minimization of effects of erosion (i.e. sediment loss and water runoff). Natural, overall drainage and specific drainage for washes will be restored to the original condition by re-contouring disturbed areas. Erosion and sediment control will be monitored during closure activities. Temporary erosion and sediment control measures may be necessary such as applying weed-free mulch or soil stabilizers as needed.

Construction of the project would also be subject to requirements of the state National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction Activities. A Construction Stage Stormwater Pollution Prevention Plan (SWPPP) will be produced and incorporated into the construction documents for construction of the facility. After construction is complete, an Operational Stormwater Pollution Prevention Plan (SWPPP), in accordance with the NPDES General Permit for Stormwater Discharges associated with Operational Activities, will be developed. Best Management Practices will be included in each plan and implemented to provide an effective combination of erosion and sediment controls.

Activities during closure and decommissioning which are considered construction activities and create soil disturbance to stabilized surface areas or have the potential to cause water pollution to stormwater facilities, are subject to the state National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction Activities and require a Construction Stormwater Pollution Prevention Plan to be developed and implemented prior to the commencement of activities. It is expected that the SWPPP plans developed for the construction and operation of the project will form the basis of a SWPPP plan to be implemented for the closure and decommissioning activities, and a Project Closure SWPPP will be developed based on the schedule, actual conditions, facilities and activities to be conducted at the time of closure, decommissioning and reclamation.

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

Weed management for the project during construction and operation will be detailed in a Weed Management Plan filed separately for the project. Similar measures would be applied to reclamation activities, namely to ensure that populations of existing weed species do not increase due to the project closure, and if possible will be suppressed below current levels.

General measures to prevent the spread of weed propagules and inhibit their germination applied during decommissioning and reclamation activities include the following:

- Limiting disturbance areas during closure activities to the minimum required to perform work,
- Limiting ingress and egress to defined routes,
- Maintaining vehicle wash and inspection stations to minimize the potential for weed introduction.

A weed management survey will be conducted at the completion of closure, decommissioning, and reclamation activities to summarize the weed status at the site. The results of this report will be used to determine if additional monitoring or control measures are necessary.

Long-term monitoring reports are required for evaluating monitoring results to determine if revegetation and weed control are successful. Annual monitoring reports will document the success of the weed control and revegetation. Monitoring of ecosystem function could include soil moisture, soil strength using penetrometer measurements, soil organic matter, insect activity measurements (e.g., count of ant mounds), mycorrhizae assays, litter decomposition rates, establishment rates of cryptobiotic crusts, and establishment of native versus invasive species. Ecosystem structure includes factors such as density, diversity, richness, cover, and seedling establishment.

Field monitoring should be conducted using line transect and quadrat techniques. Line transects provide effective cover data, while data from quadrats more effectively evaluate density and reflect the species richness of the plant community. The transect length and quadrat area should be representative of the plant community and large enough to capture 90 percent of the species that are present. A minimum of three 100-foot transects and three 100-square-foot quadrats, equally spaced across each revegetated area, should be identified. These permanent monitoring locations within the restoration area would be recorded using GPS and will be staked in the field. A map will be created, using an aerial photograph as a base layer, showing each monitoring site and photo documentation locations within the sites.

Monitoring will be conducted for a period of 4 years from the date of reclamation and revegetation, except at sites where revegetation is not proceeding satisfactorily. In that case, monitoring may be extended on a year-by-year basis until success criteria are met. Monitoring will be performed annually during the first 2 years following revegetation, and biannually thereafter. Monitoring sessions will occur between March 15 and April 15.

7.7 Recontouring

Re-contouring of the Site will be conducted using standard grading equipment to return the land to match within reason the previously existing surface and surrounding alluvial fan grade and function. Grading activities will be limited to previously disturbed areas that require recon touring. Efforts will be made to disturb as little of the natural drainage and vegetation as possible. Concrete rubble, crushed to approximately 2-inch minus size will be placed in the lower portions of fills, at depths at least 3 feet below final grade. Fills will be compacted to approximately 85 percent relative compaction by wheel or track rolling to avoid over-compaction of the soils. To the extent feasible, efforts will be made to place a layer of coarser materials at the ground surface to add stability.

8. RECLAMATION MONITORING

Reclaimed areas will be monitored annually. Actions will be taken to ensure that reclamation standards are met as quickly as reasonably practical and are maintained during the life of the permit. Reclamation monitoring will be documented in an annual reclamation report submitted to the authorized officer by July 1. The report will document compliance with all aspects of the reclamation objectives and standards, identify whether the reclamation objectives and standards are likely to be achieved in the near future without additional actions, and identify actions that have been or will be taken to meet the objectives and standards. The report will also include acreage figures for: Initial Disturbed Acres; Successful Interim Reclaimed Acres; Successful Final Reclaimed Acres. Annual reports will not be submitted for sites approved by the authorized officer in writing as having met interim or final reclamation standards. Monitoring and reporting continues annually until interim or final reclamation is approved. Any time 30% or more of a reclaimed area is redisturbed, monitoring will be reinitiated.

The authorized officer will be informed when reclamation has been completed, appears to be successful, and the site is ready for final inspection

9. FINANCING OF DECOMMISSIONING AND RESTORATION ACTIVITIES

9.1 Cost Estimate

The Reclamation Cost Estimate (RCE), presented to BLM under separate cover, is an effort to demonstrate the costs associated with demolition and restoration of the project solar field, infrastructure and administration facilities following 30 years of operations. The estimated valuations were derived utilizing RS Means, California construction costs databases and historically accurate cost data and production rates used for the demolition industry at current capture rates. This cost estimate was completed under the accepted standards of an order of magnitude engineers cost estimate.

As applicable, cost estimate indices from the Nevada Standardized Cost Estimator database were incorporated to generate portions of the RCE. This database reflects the approved BLM estimating guidelines and unit costs used primarily for mining operations. *See IM- 2011-003.*

For decommissioning, the cost estimate addresses the pre-decommissioning activities; the dismantling of equipment and demolition of aboveground structures; removal of belowground facilities and utilities; debris management and disposal/hauling; recontouring of the land; and hazardous waste management. For restoration, the cost estimate addresses cost of site preparation; plant and soil management; testing and monitoring; and site revegetation. Salvage value or re-sale value of equipment is not included in the cost estimate (for example re-sale of an emergency generator with very low run hours, or re-sale of pumps or other plant components). However, the raw products used for construction, such as structural steel, aluminum, copper, stainless steel, and other materials that are directly recyclable and the value of which is normally credited to demolition projects will be included in a separate report provided to the BLM.

No “time value of money” adjustments were made to this estimate. Only present value costs are included. As with any work conducted after 30 years of operation, the misapplication or misunderstanding of any escalation or inflation adjustments can far outweigh any precision thought to be included with the estimate. By leaving foundations at greater than 3 feet below final grade, approximately 40% of the concrete used in the demolition effort is saved. Otherwise an appreciable increase in demolition and concrete processing costs will be incurred. Likewise, if the option to leave clean concrete rubble buried on site (at greater than 3 feet deep and not interfering with re-vegetation) is not permitted, transport and disposal of this low value/high mass waste stream will increase the cost of the project. As such, it is assumed that approximately 40% of the mass of the poured concrete at the Site will be left in situ, i.e., not broken up, since it will ultimately be covered by greater than three feet of native soils in the recontouring process to place the land in its near-original condition.

9.2 Statement of Responsibility

As required by BLM, TSE will purchase a performance bond, which will be issued either by an insurance company or a financial institution to guarantee the satisfactory decommissioning and reclamation of the project site. The bond will be obtained prior to start of construction and will be structured so the funds will be returned to the project owner upon completion of the decommissioning and reclamation activities (with an amount held in reserve until the reclamation monitoring is

completed). It will also be structured in such a manner that BLM will be able to access those funds to pay for the decommissioning and reclamation of the site, in the event that the project owner becomes insolvent, or that the duration of a temporary closure continues long enough that the closure is considered permanent.

Figures

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CRESCENT DUNES SOLAR ENERGY PROJECT
TONOPAH SOLAR ENERGY, LLC
BLM CASE NO. N86292

WorleyParsons
resources & energy

CRESCENT DUNES
NYE COUNTY, NV
VICINITY MAP

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