CHAPTER 2 – ALTERNATIVES AND PROPOSED FEDERAL ACTIONS

2.1 INTRODUCTION

This chapter describes the Applicant's Proposed Project, proposed Federal actions, and the Applicant's site selection and screening methods. These methods were used to determine which alternatives would be carried forward for analysis.

This Draft EIS considers three Project alternatives: the No Action Alternative; the Applicant's Proposed Project (a dry-cooled alternative); and Alternative 1 – a hybrid (wet- and dry-cooled) alternative. Alternative 1, the hybrid option, would generally incorporate the same construction, operational, decommissioning, and reclamation components as the Applicant's Proposed Project, but would use an alternative cooling technology. To avoid redundancy, this section will present a single Project description that identifies the elements common to all action alternatives, and then separately identify the elements unique to Alternative 1.

If Western chooses to allow interconnection of QSE's proposed solar facility, under either the dry- or hybrid cooled alternative, Western would construct and operate a new 161/230-kV switchyard to interconnect the solar facility to Western's existing Bouse-Kofa 161-kV transmission line. Western would need to upgrade its communication system to provide dual and redundant communications to deliver signals to operate the switchyard equipment from control centers and other remote locations and to report metering. Western's proposed switchyard and telecommunication options are described in Section 2.2.4.

2.1.1 Federal Agency Proposed Action

Western's proposed action is to approve QSE's request to interconnect to Western's Bouse-Kofa 161-kV transmission line. Should Western grant QSE's interconnection request, Western would select a telecommunications alternative: fiber-optic or microwave. These alternatives are described in Section 2.2.4.

The BLM's proposed action as it relates to the Applicant's Proposed Project is to decide whether or not to amend the YFO RMP and to approve, approve with modifications, or deny issuance of the ROW grant for the Project. In order to approve either the Applicant's Proposed Project or Alternative 1, the BLM has to decide concurrently to approve the proposed YFO RMP amendment. The proposed RMP amendment is presented in Appendix A to this EIS.

The decisions of both Western and the BLM will be documented in separate RODs and published in the *Federal Register*.

2.1.2 Regulatory Framework for Alternatives

Federal agencies are required by NEPA to evaluate not only the Applicant's Proposed Project, but reasonable alternatives such as the No Action Alternative (40 CFR §1502.14). Section 1502.14(a) requires Federal agencies to explore a reasonable range of alternatives, "and for alternatives that were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." The CEQ Guidance concerning NEPA regulations adds that reasonable alternatives include those that are "practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant" (CEQ 1981).

When granting a ROW, FLPMA Title V, Section 505, requires the BLM to include in the ROW terms and conditions that minimize environmental impacts. Specifically, such terms shall "minimize damage to scenic and esthetic values and fish and wildlife habitat and otherwise protect the environment…require compliance with applicable air and water quality standards established by or pursuant to applicable Federal or State law; and…require compliance with State standards for public health and safety, environmental protection, and siting, construction, operation and maintenance of" the ROW. Consideration of such terms and conditions will be part of the alternatives analyzed in this EIS.

2.2 ALTERNATIVES DEVELOPMENT AND SCREENING

Based on public comments received during scoping, interdisciplinary interaction among resource professionals, and collaboration with interested agencies, a range of potential alternatives to be considered in the EIS was identified and evaluated by Western and the BLM. A screening process was used to identify which alternatives would or would not be carried forward for analysis in this EIS. The process included:

- Develop an understanding of the Project; identify the basic objective of the Project; and describe its beneficial and adverse impacts.
- Explore and evaluate all reasonable alternatives that meet QSE's objectives and Western and the BLM's purpose and need and are feasible from a technical and economic perspective.
- Of those reasonable alternatives, identify those that would avoid or minimize adverse impacts or enhance the quality of the human environment.
- Evaluate the impacts of not amending the YFO RMP and not constructing the Project (No Action Alternative).

2.2.1 Consideration of Alternative Sites

CSP tower technology has specific siting requirements. As part of its siting process, QSE used a refined set of criteria to screen, identify, and prioritize potential land sites for eventual solar development. Criteria include the physical characteristics of the site, environmental considerations, proximity to transmission, and other siting factors that impact project costs and economics. Each of these criteria was applied during the screening phase of the Project, which led to the selection of the current site.

These criteria included:

- **Solar Resources –** The site needs to be located where high solar direct normal insolation, or exposure to the sun's rays is available to maximize the plant's output and allow efficient utilization of the land area affected by Project development. For a project to be economically viable, only the highest of solar insolation levels are desirable.

- **Size and Shape –** The site must be large enough (minimum area of four contiguous square miles [a 2- by 2-mile square]), allowing for uninterrupted placement of the solar collection field (i.e., heliostat mirrors) to support an efficient and cost-effective layout of the Project facilities.

- **Slope –** The site should be relatively flat, with a slope of 3 percent or less, to minimize the need for extensive grading and a large volume of cut and fill.

- **Environmental Consideration –** It is preferable to select sites that avoid or minimize impacts to known cultural resources, threatened and endangered species, and other sensitive resources.

- **Transmission Infrastructure –** To minimize cost and potential environmental impacts, the site should be located where interconnection to an existing high-voltage transmission system is possible without the construction of lengthy generation tie-lines. In addition, the site should be in reasonable proximity to suitable transportation infrastructure to allow easier access during both construction and operation without creating the need for additional road construction.

- **Water Resources –** Since the CSP technology requires water for cooling, the site should be located where surface and/or groundwater is available.

- **Site Control –** The land must be available for sale or lease/ROW at a reasonable cost and be free of conflicting surface and subsurface encumbrances. In addition, the site must be located in an area that does not interfere with civilian or military flight paths and airport operations.

QSE initially identified the region in the vicinity of Quartzsite, Arizona, with high potential for a CSP project due to high direct normal insolation, large contiguous tracts of land with relatively flat topography, and potential access to high-capacity transmission lines. QSE next conducted field reconnaissance to look at large blocks of land on both the east and west sides of SR 95 near Quartzsite. These field surveys included evaluation of topography, drainage, and biological diversity, which served to characterize biological sensitivity in the area. A records search of the archaeological files was also completed to assess cultural resource sensitivity of the area. Following these evaluations, QSE identified two potentially available sites:

- A parcel approximately 13 miles north of Quartzsite on State Trust Land administered by the Arizona State Land Department ("State Land Site")

- The ROW application area, located approximately 10 miles north of the Town of Quartzsite ("Project area") on BLM-administered land

Initial screening of the State Land Site and the BLM ROW application area indicated that both sites offered high direct normal insolation, favorable topography, and existing transportation access. In addition, water supplies in the area are not restricted or in an Active Management Area for water resources. Both sites also have good access to transmission infrastructure via Western's existing 161-kV Bouse-Kofa transmission line, thereby reducing the potential for environmental impacts that would be associated with the construction of a new, lengthy transmission line to interconnect the Project with the electrical grid.

State Trust Land – The State Land Site included an area of approximately 2,240 acres. It was one of the areas QSE initially identified as an alternative site in the preliminary screening stage as having good topography, reduced vegetation (when compared to surrounding areas), and minimum stormwater drainage features. To further characterize the site, additional environmental studies were conducted on the State Land Site. The purpose of these studies and additional field surveys was to characterize dune areas, determine the presence of sensitive species, and draw a correlation between significant dunes and preferred Mojave fringe-toed lizard habitat. These biological and geomorphological surveys concluded that more than 90 percent of the State Land Site consisted of loose, sandy habitat suitable for occupancy by the Mojave fringe-toed lizard (EPG 2009). The survey also cited the increased numbers of Mojave fringe-toed lizard on the State land site due to the prevalence of dune habitat there, which is the lizard's preferred habitat type. Therefore, QSE eliminated this site from further consideration in order to avoid impacts to Mojave fringe-toed lizard habitat.

Right-of-Way Application Area – QSE's ROW application area includes approximately 26,000 acres, encompassing locations on both the west and east sides of SR 95. It is typical for project developers to apply for large land areas, allowing for site control, while additional due diligence studies are performed to determine and finalize the best location for facility development. Following the initial due diligence review, QSE refined the analysis area within the ROW application area based on topography, drainage, biological diversity, and the cultural resources records review.

Alternative Sites West of SR 95 – During preliminary screening and analysis, QSE determined that all sites west of SR 95 demonstrated:

- Less favorable topography and a greater environmental impact from grading and land disturbance; QSE's technology requires contiguous flat land of typically no greater than 3 percent grade in order to minimize land disturbance and associated engineering costs.

- Additional potential eolian dune-type habitat area associated with the rolling topography; based on QSE's efforts to avoid or minimize siting the facility within dune habitat and the associated potential impacts to Mojave Fringe-toed lizard habitat.

- Numerous active mining claims west of SR 95 as shown on Figure 3-6; these claims create the potential for surface access conflicts.

- A greater distance from the existing north-south BLM utility corridor and Western's161-kV transmission line. Given the need to interconnect with the Western transmission line in the existing utility corridor east of SR 95, sites west of SR 95 would create higher generator costs, higher land costs, higher potential land impacts, and potential for difficulty in crossing SR 95 (a major north-south highway).

- No significant improvement in potential visual impact as compared with sites east of SR 95. Based on the evaluation of the entire ROW application area, and given the height of the tower, siting the Project on the west side of SR 95 would not materially improve visual impacts of the Project.

- A higher likelihood of impacts to military operations due to the existence of additional slow speed and visual flight routes identified by the DOD Preliminary Screening Tool. Given the potential incompatibility with commercial and military airspace, QSE evaluated the site and determined the east side of SR 95 provided less physical interference than the west side.

The sites west of SR 95 were therefore abandoned from further consideration for these reasons.

Alternative Sites East of SR 95 – QSE considered two alternative sites on the east side of SR 95 – a "northern site" (which was selected as the Project site), and a "southern site". The southern site is located south of a private parcel of land located within the 26,000-acre ROW application area (see Figure 1-1). When comparing these two sites, the topography of the southern site was not as favorable as the Project site. As previously indicated, QSE's technology requires contiguous flat land of typically no greater than 3 percent grade in order to minimize land disturbance and associated engineering costs. The southern site topography is inconsistent with this criterion, and therefore, it was removed from further consideration.

Project Area – The Project area was ultimately selected by QSE based on the results of biological and geomorphological surveys performed on both the northern location within the ROW application area as well as the State Land Site. The geomorphological survey provided an indication of the extent of the sand dunes that serve as the basis for Mojave fringe-toed lizard habitat. The findings of the geomorphological survey were combined with the biological survey, which included an assessment of both plants and animals. The only sensitive species identified by field surveys was the Mojave fringe-toed lizard, an AZGFD species of concern (EPG 2009). Within the Project area, the Mojave fringe-toed lizard was observed only on sand ridges. Sand ridges are found in less than 5 percent of the Project area. Thus, the northern site in the BLM application area was selected as the Project area because there were fewer and smaller sand ridges and fewer identified Mojave fringe-toed lizard, minimizing potential impacts to the Mojave fringe-toed lizard.

Within the Project area, facility locations were further refined by shifting the heliostat field slightly to the north and east to avoid both a BLM-designated utility corridor adjacent to SR 95 and sand dunes located in the southeastern corner of the Project area, where the biological survey indicated the presence of Mojave fringe-toed lizard.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

Several alternatives were considered during the EIS process but eliminated from detailed analysis. The specific alternatives that were eliminated from detailed analysis are discussed below, along with the rationale for their elimination. In addition to the alternatives for the Applicant's Proposed Project, the BLM also developed alternatives to the plan amendment that is being considered concurrently with the Project. Those RMP amendment alternatives, including those plan amendment alternatives eliminated from further analysis are described in Appendix A of this EIS.

2.3.1 Reduced MW and/or Footprint Configuration of the Applicant's Proposed Project

Unlike other solar generation technologies such as solar trough or solar photovoltaic, SolarReserve's "power tower" solar thermal technology does not vary in physical size as a function of power output. All solar thermal projects being developed by SolarReserve require a similar number of heliostat mirrors as well as tower and receiver dimensions. The most significant plant variances between projects include generator size, thermal storage capacity, and cooling technology. All of these variances occur within the power block and do not affect total land impact. Stated differently, a smaller output power plant will not be physically smaller than a larger output power plant.

The concentrating solar power system components for the Project, including total heliostat surface area, receiver size and thermal rating, and tower height have been designed and engineered to provide optimum yield and therefore the lowest levelized cost of energy. This optimized solar collection and molten salt system configuration is backed with guarantees and warranties from the manufacturer. These guarantees and warranties require that the technology be deployed per manufacturer's specifications. As a result, the technology proposed for the QSE project will vary only slightly in land impact and annual megawatt-hour energy delivery from project to project, but can vary in megawatt output capacity depending on available transmission capacity and cost for interconnection upgrades. Other differences from project to project will be in cooling technology and thermal energy storage capability to match MW output capacity, and both changes would occur within the power block and would not affect the physical size of any individual project.

SolarReserve submitted an Interconnection Request with Western for project interconnection to the Bouse-Kofa 161-kV line and subsequently held a scoping meeting with Western in accordance with the LGIP. The LGIP provides a standardized methodology allowing SolarReserve to proceed through a series of engineering studies conducted by Western to assess the electrical impact of the Project to Western's grid, and thus the cost to the Proponent to upgrade the network in order to accommodate the expected electrical impacts. The study methodology considers the type of power generation technology being used and its specific generation characteristics. For this Project, Western is considering interconnecting a 100-MW

CSP solar facility to their Bouse-Kofa 161-kV line. This process provides an additional constraint on the size, in MW, of the proposed Project.

2.3.2 Other Alternative Sites

Brownfield Sites – During the public scoping period, several commenters requested the Applicant consider development of the Project on a Brownfield site. Brownfield sites have been previously used as a commercial or industrial site and are available for re-use. The land may be contaminated by low concentrations of hazardous waste or pollution, and has the potential to be reused once it is cleaned up. Redevelopment of such a facility may be complicated by real or perceived environmental contamination and often needs to be restored before use, which can increase the costs for a developer.

A search of the ADEQ website did not identify any Brownfield sites in the vicinity of the Project (ADEQ 2010a). Additionally, no Brownfield sites or sites of marginal quality were identified within the BLM's YFO district (BLM 2010a). Therefore, alternative sites that would utilize Brownfield sites or previously disturbed lands of marginal quality have been eliminated from further consideration.

Private Lands – Comments were received suggesting the use of private property instead of using BLM-administered land. Private property in the Project area and in the vicinity of the Bouse-Kofa transmission line is limited, and none of the properties would meet the size (acreage) requirement of the Project. Most of the private property in the Project area is within the town limits of Quartzsite.

In addition, alternative sites on private land would not meet the purpose and need for the BLM to process the ROW application for the Project and to increase renewable energy resources on public land by 2015, as directed in the EPAct. Therefore, alternative sites on private land have been eliminated from further consideration.

BLM Disposal Land – The BLM YFO RMP has designated approximately 11,900 acres of public land within the planning area as being available for withdrawal, disposal by sale, or exchange. The Yuma RMP states that all public land would be retained in Federal ownership, unless determined that disposal of a particular parcel(s) would serve the public interest (BLM 2010a).

There are approximately 6,000 acres of disposal land in and around the Town of Quartzsite. These disposal lands basically surround Quartzsite on the east, north, and west sides. The Town of Quartzsite has already included these disposal lands within their Town Limits, with the area designated as Rural Residential. BLM disposal land does not meet QSE's requirement of a 2- by 2-mile area or their desire to locate a project on State/Federal land away from population centers. None of the other disposal lands within the BLM YFO were of sufficient size to meet QSE's minimum acreage requirements. Therefore, alternative sites utilizing BLM disposal land have been eliminated from further consideration.

BLM Visual Resource Management Class IV Land – The Project, as proposed, is located in a VRM Class III management area. A comment suggested locating the Project within BLM VRM

Class IV land. The current RMP for the YFO identifies that of 1,318,000 acres managed by the YFO for one of the four VRM classes, there are only 19,200 acres of VRM Class IV available in the BLM Yuma District (BLM 2010a). The majority of Class IV land is identified south of Quartzsite and Interstate 10 (I-10), along US 95, in an area of intensive camping and recreational use along with several designated long-term visitor use areas. Other large VRM Class IV lands are located on the north and east sides of the Town of Quartzsite, Arizona. Construction and operation of the Applicant's Proposed Project on VRM Class IV lands in these areas would result in greater visual and noise impacts to recreation users in the intensive camping and recreation use areas, and to residents in the Town of Quartzsite.

The BLM is considering an amendment to the YFO RMP to change the management objective of areas along the northern extent of the YFO planning area from VRM Class III to VRM Class IV.

2.3.3 Alternative Power Generating Technologies

During the scoping period, several commenters requested QSE consider other power generating technologies such as distributed generation and solar photovoltaic (PV) generation or increased energy efficiency. The following section describes other power generating technologies considered by QSE. It is important to note that Western has no authority/jurisdiction over the type of generation technology that an applicant chooses to interconnect to a Western facility. As described in section 2.1.1, Western's proposed action is to either grant or deny QSE's request to interconnect to Western's Bouse-Kofa 161-kV transmission line. Similarly, such alternative technologies do not respond to BLM's proposed action to consider an application for the authorized use of public lands for a specific renewable energy technology, like the one submitted by QSE for the Project.

2.3.3.1 Wet-Cooling Alternative

QSE's original Plan of Development identified a wet-cooled solar thermal power plant as the preferred alternative. However, following extensive due diligence that took into account unique environmental and ecological considerations—including water conservation—and State and Federal government renewable energy initiatives and policies, it was determined that a dry-cooling solar thermal power plant would be the best technology option for the Project area.

While wet-cooling is typically the lowest cost system and provides the highest steam turbine efficiency, the evaporative cooling process results in higher water use than other cooling methods. Operational water requirements under the wet-cooled alternative would be approximately 1,200 to 1,500 acre-feet of water per year. Therefore, the wet-cooled option has been eliminated from further consideration.

2.3.3.2 Photovoltaic Power Generation (Utility Scale)

Photovoltaic technologies use special semiconductor devices (frequently called cells) to directly convert solar energy (sunlight) into electrical energy. PV cells are currently made of semiconductor materials such as silicon, which is the most commonly used material. When light strikes the solar cell, a certain portion of it is absorbed within the cell material. The energy of the absorbed light (photons) is transferred to the semiconductor. This energy releases electrons, allowing them to flow freely. This flow of electrons creates an electrical current.

While SolarReserve (QSE's parent company) develops up to 20-MW projects using PV technology in other locations with smaller acreage and lower distribution-level voltages, the characteristics of the Project area make it ideally suited for meeting QSE's objective (i.e., to develop a solar energy project using the Applicant's proprietary CSP thermal storage technology that would allow the flexible and non-intermittent production of renewable power during peak and/or off-peak demand periods). PV cannot provide energy storage for reliable dispatchable generation. At the Project area, the availability of a large parcel of land, its proximity to Western's Bouse-Kofa 161-kV transmission line, and the availability of significant electrical capacity on that line, make the site a more natural fit for the deployment of QSE's larger CSP technology.

2.3.3.3 **Residential (Rooftop) Photovoltaic Energy Production, Distributed Generation, and Energy Conservation**

Several comments received during the scoping process suggested consideration of other power generating technologies, such as distributed generation, rooftop PV power generation, or increased energy efficiency, as opposed to, or in addition to, the development of centralized, utility-scale solar energy facilities. Distributed generation refers to the installation of small-scale solar energy facilities at individual locations at or near the point of consumption (e.g., use of solar PV panels on a business or home to generate electricity for on-site consumption). Distributed generation systems typically generate less than 10,000 kW. Other terms for distributed generation include on-site generation, dispersed generation, distributed energy, and others. QSE did not consider these alternatives as viable, as they do not manufacture, install, or operate such distributed generation systems.

Also, neither Western nor the BLM have decision-making authority regarding the use and implementation of distributed generation, rooftop PV, and energy conservation in private homes or commercial buildings. Residential rooftop or distributed energy production are at the discretion of the private homeowner/business owner and other entities (e.g., local, county, and state governments).

Additionally, the applicable Federal orders and mandates providing the drivers for specific actions being evaluated in EIS compel the BLM to evaluate utility-scale solar energy development on public lands. As discussed in Section 1.4.2, the Energy Policy Act of 2005 (PL 109-58) requires the Secretary of the Interior to seek to approve non-hydropower renewable energy projects on public lands with a generation capacity of at least 10,000 MW of electricity by 2015; this level of renewable energy generation cannot be achieved through distributed generation systems. In addition, Order 3285A1 issued by the Secretary of the Interior requires the BLM and other Interior agencies to undertake multiple actions to facilitate large-scale solar energy production (Secretary of the Interior 2010). Accordingly, the BLM's purpose and need for agency action in this EIS is focused on the siting and management of utility-scale solar energy development on public lands and, therefore, alternatives incorporating distributed generation with utility-scale generation or looking exclusively at distributed generation, do not respond to either Western's or the BLM's purpose and need for agency action in this EIS.

2.4 PROPOSED PROJECT AND ALTERNATIVES

Based on project scoping meetings and discussions with resource professionals and Project staff at Western, BLM and QSE, three alternatives were chosen to be evaluated in detail in the EIS. These include: (1) No Action Alternative; (2) Applicant's Proposed Project – a dry-cooled option; and (3) Alternative 1 – a hybrid (wet- and dry-cooled) option. Comparative information about these two alternatives is provided in Table 2-1.

Table 2-1 Facility Features of Each Action Alternative

Feature/Facility	Applicant's Proposed Project (Dry-Cooled Option)	Alternative 1 Hybrid Wet- and Dry-Cooled Option
Technology Type	Dry-cooled CSP plant	CSP plant with an air-cooled condenser (dry-cooled) augmented with an evaporative cooling tower (wet-cooled).
Nominal Capacity	100 MW nominal; daily operating hours would vary by season and solar potential. Plant is estimated to have a capacity factor of approximately 50 percent, generating an estimated 450,000 MWh per year.	Similar to the dry-cooled option with additional operating hours and MWh production, due to increased efficiency (approximately 5 percent overall increased efficiency).
Project Disturbance (a) Size of area subject to permanent disturbance (b) Size of area subject to temporary disturbance	 (a) Up to 1,675 acres (b) Up to 70 acres	 (a) Up to 1,685 acres to accommodate larger evaporation ponds. (b-d) Same as the dry-cooled option.
(c) Size of offsite construction parking area (d) Size of offsite construction office, laydown, and heliostat assembly area	(c) Up to 10 acres (d) Up to 35 acres	
Solar Array	The array would consist of a circular field encompassing an area with a radius of 4,650 feet (approximately 1,550 acres), where as many as 17,500 heliostats (or mirrors) would be located.	Same as the dry-cooled option.

Table 2-1 Facility Features of Each Action Alternative		
Feature/Facility	**Applicant's Proposed Project (Dry-Cooled Option)**	**Alternative 1 Hybrid Wet- and Dry-Cooled Option**
Power Block	The power block, in a circular area with a radius of approximately 400 feet would house the solar collecting tower, storage tanks, steam turbine, air-cooled condenser, transformers, heat exchangers, power block buildings, and other ancillary equipment.	Same as the dry-cooled option, except the air-cooled condenser would be approximately one-quarter the size, and an evaporative cooling tower (approximately 45 feet wide and 135 feet long) would be added. The total duty on the cooling system would be split between the two coolers, with an increase in water consumption for the addition of the evaporative cooling tower from 200 acre-feet per year to 600 acre-feet per year. Same 400-foot radius utilized as under the Applicant's Proposed Project.
Solar Collecting Tower	Base diameter approximately 115 feet; maximum tower height – overall 653 feet (538-foot concrete tower, 100-foot solar receiver, 15-foot crane)	Same as the dry-cooled option.
Reverse Osmosis (RO) Treatment System and Evaporation Ponds	RO facility to be located within the power block. Up to three 4-acre evaporation ponds would be required. Ponds to be located at the southwestern end of the solar field.	Same as the dry-cooled option, but larger evaporation ponds required (up to three 6-acre evaporation ponds)
Molten Salt Storage	Up to 70 million pounds or approximately 4.4 million gallons of molten salt (sodium nitrate-potassium nitrate mixture) at 550 degrees Fahrenheit (°F). Two 40-foot-tall hot and cold storage tanks made from high nickel alloy stainless steel for compatibility with liquefied salt. Hot tank with approximately 170 feet inside diameter; cold tank with approximately 160 feet inside diameter. Insulation is approximately 2 feet thick.	Same as the dry-cooled option.
Access Road	A new paved, two-lane access road would extend approximately 2,800 feet east from SR 95 to the western edge of the facility.	Same as the dry-cooled option.

Table 2-1 Facility Features of Each Action Alternative		
Feature/Facility	**Applicant's Proposed Project (Dry-Cooled Option)**	**Alternative 1 Hybrid Wet- and Dry-Cooled Option**
Transmission Line	A new 230-kV design generation tie-line would interconnect to Western's existing 161-kV transmission line located on the east side of SR 95. Line may be up to 1.5 miles in length. Estimated pole height is 85 feet, and no taller than 115 feet. Poles would be steel monopoles. An additional 69-kV line to provide backup power to the facility would run parallel to the generation tie-line and would connect to the existing 69-kV Arizona Public Service transmission line. Future engineering would determine if the backup line would run on the same poles as the generation tie-line or if additional poles would be required.	Same as the dry-cooled option.
Electrical Switchyard (to be constructed and owned by Western)	A new switchyard would be constructed to 230-kV standards west of the solar facility adjacent to the existing transmission line, and operated at 16- kV. Preliminary dimensions – 300 feet by 400 feet.	Same as the dry-cooled option.
Water Service	Up to three onsite wells would be used to provide Project water. During construction up to 1,000 acre-feet[1] per year would be needed requiring a pumping rate of 1,293 gpm. During operations, up to 200 acre-feet per year would be required, with a pumping rate of 254 gpm. Water would be split between the wells.	Same as the dry-cooled option, except the operational water use would be up to 600 acre-feet per year requiring a pumping rate of 761 gpm.

[1] *An acre-foot equals 325,000 gallons, which is the amount of water it would take to flood an acre to a depth of one foot. Average household water use annually is 127,400 gallons (American Water Works Association 2011).*

2.4.1 No Action Alternative

NEPA regulations require that EIS alternative analyses "include the alternative of no action" (40 CFR §1502.14[d]). The No Action Alternative is included in the analysis so that the EIS clearly evaluates the effects of not amending the YFO and not developing the Project. In other words, the No Action Alternative provides a baseline for comparison of the environmental effects of the other alternatives. For this analysis, the No Action Alternative includes the following:

- Western would deny the interconnection request and would not build, own, and operate a new electrical switchyard and would not upgrade their telecommunication system to support the proposed Project.

- The BLM would deny the ROW application and not amend the YFO RMP. Existing management of the area would continue in accordance with the BLM's YFO RMP.
- QSE's Project would not be built, and any environmental and socioeconomic impacts associated with construction and operation would not occur.

2.4.2 Applicant's Proposed Project – Dry-cooled

The Project uses CSP technology, which uses heliostats/reflecting mirrors to redirect sunlight onto a receiver erected in the center of the solar field (the solar collecting tower). An HTF is heated as it passes through the receiver, and then circulated through a series of heat exchangers to generate high-pressure, superheated 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. Figure 2-1 presents a conceptual diagram of the process.

Both the central receiver and type of HTF used in the cycle distinguish QSE's technology from other CSP technologies. The HTF consists of a mixture of 60 percent sodium nitrate and 40 percent potassium nitrate salts, with a melting temperature of approximately 460°F. Approximately 35,000 tons is melted to a liquid form (approximately 4.5 million gallons) and circulated through the tubes in the central receiver, collecting the energy gathered from the sun. The heated salt is then routed to an insulated storage tank (hot thermal storage tank), where the energy can be stored for extended periods of time with minimal energy loss. No addition of salt is expected for the system over its operating lifetime.

To generate electricity, the hot salt is routed to the steam generation system (or heat exchanger) and used to produce steam at high temperature. After exiting the steam generator, the salt is sent to a "cold" salt thermal storage tank, and the cycle is repeated.

The thermal storage capability allows the excess heat to be stored until needed for power generation, effectively decoupling energy collection from the energy production process. Thermal storage also can extend the generating period of a power plant to provide a steam heating source after the sun sets, allowing the facility to more closely satisfy the demand for electricity, which typically peaks in the late afternoon and evening hours.

2.4.2.1 **Generating Facility Components**

The general layout for the proposed solar plant and ancillary facilities is shown on Figure 2-2 and includes the following components:

- Solar collecting tower
- The heliostat (mirror) array – a circular field with a radius of approximately 4,650 feet where the heliostats are located

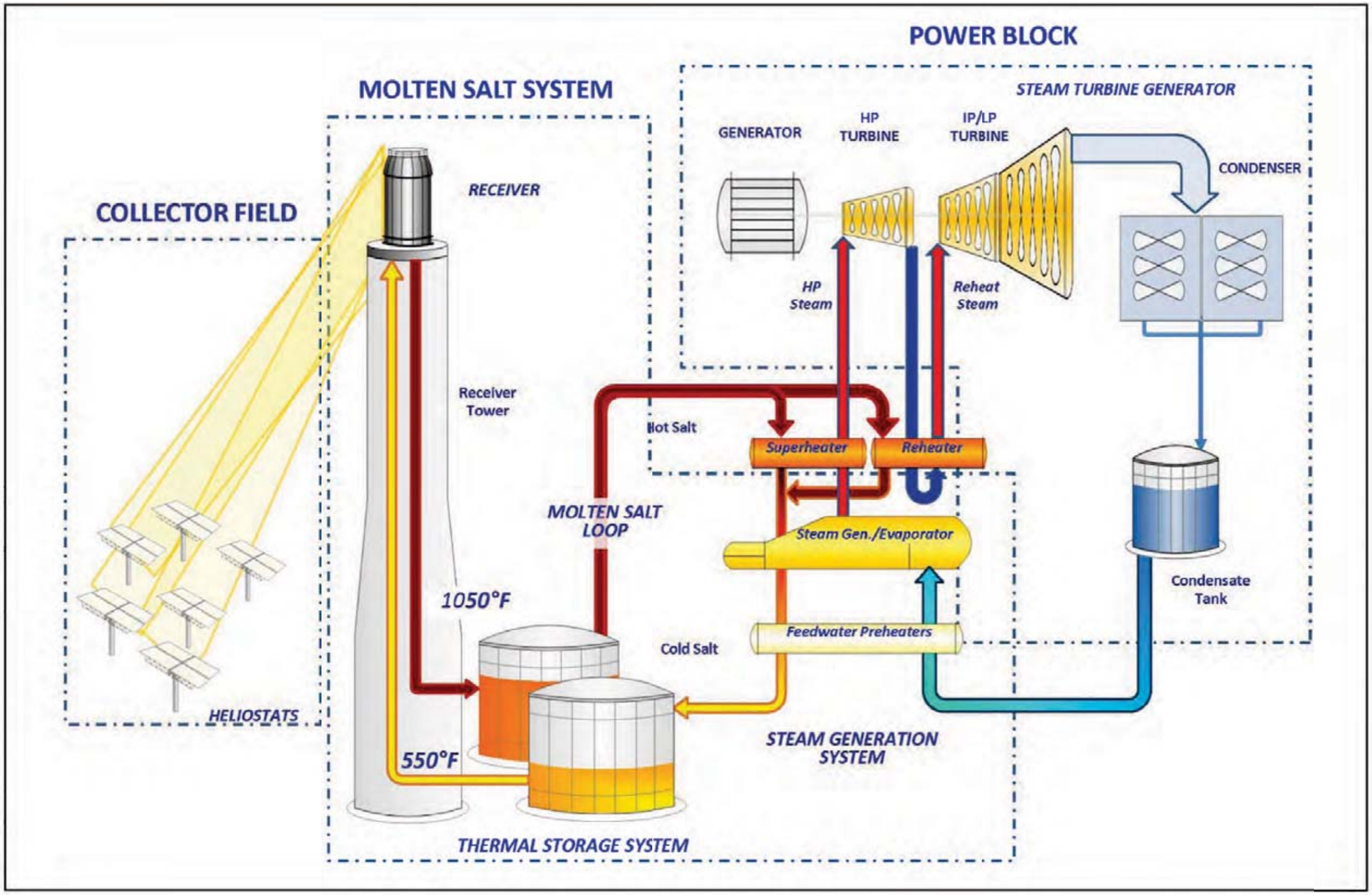
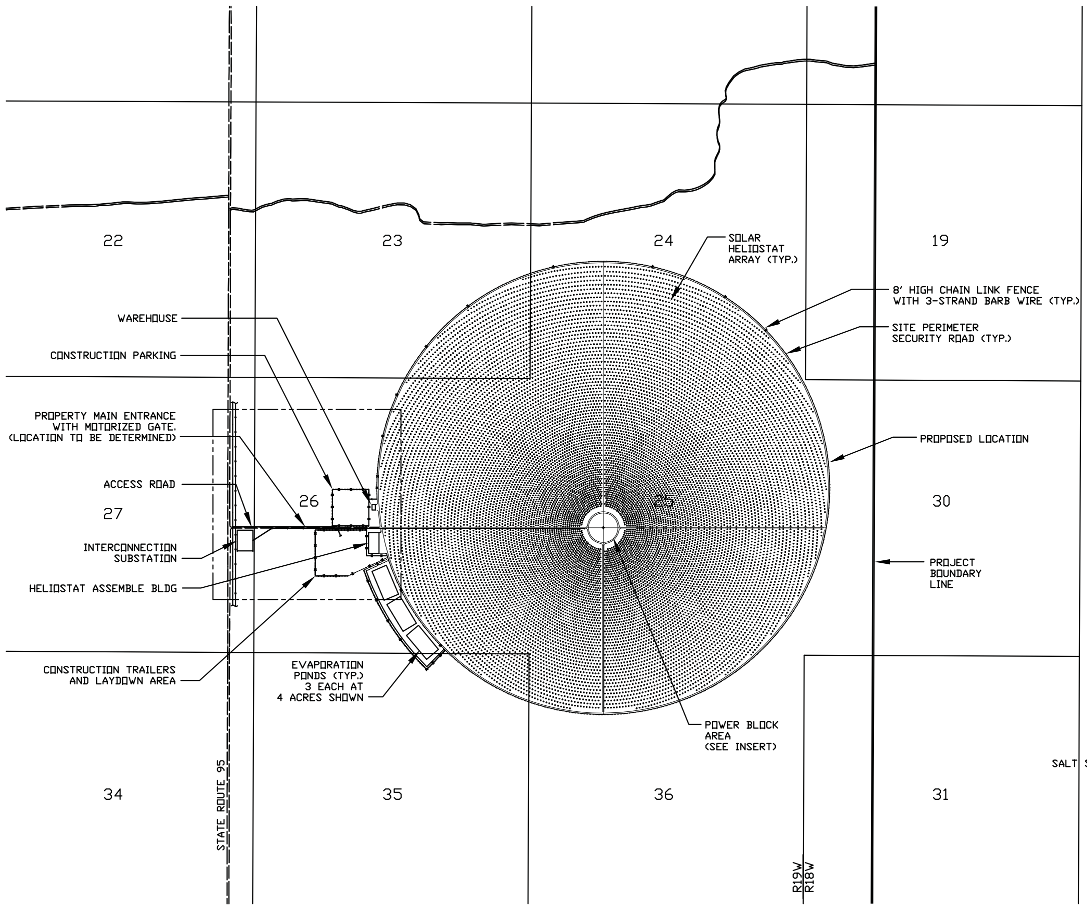


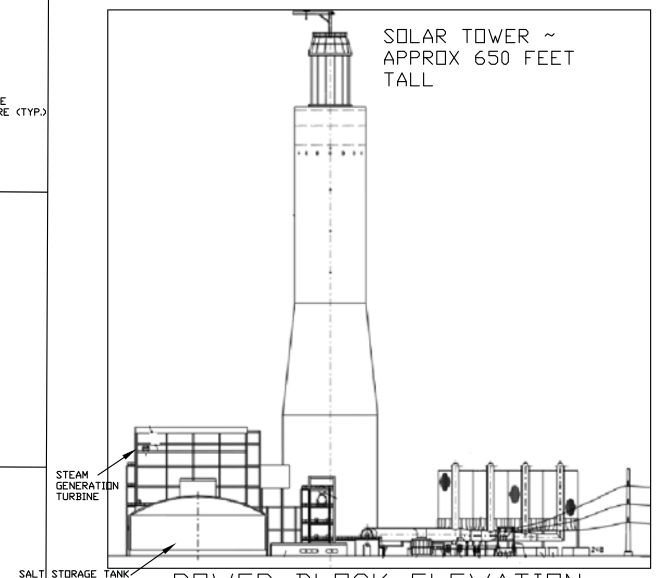
Figure 2-1 Conceptual Process Diagram
Quartzsite Solar Energy Project

Source: Solar Reserve



NOTES:

1. THE FINAL LOCATION OF THE SOLAR FIELD WILL BE WITHIN THE PROJECT BOUNDARY, LOCATED GENERALLY AS SHOWN, AND ADJUSTED IN LOCATION TO MINIMIZE DISTURBANCE OF SENSATIVE RESOURCES.
2. TOTAL APPROXIMATE AREA WITHIN THE PERIMETER FENCE IS 1,620 ACRES,
3. THE FINAL SIZE OF THE EVAPORATION PONDS IS TO BE DETERMINED. SHOWN AS THREE PONDS AT 4 ACRES EACH FOR DEMONSTRATION ONLY (TYPICAL SIZE).



POWER BLOCK ELEVATION

N

1000 0 1000 2000 3000

QUARTZSITE SOLAR ENERGY LLC
QUARTZSITE SOLAR ENERGY PROJECT

WorleyParsons
resources & energy

General Solar Power Plant Arrangement	11/2010	**Figure 2-2**

- The power block – a circle with a radius of approximately 400 feet that houses the solar collecting tower, steam turbine generator, steam heat rejection and condensing equipment, transformers, steam generating system, heat exchangers, thermal storage system, buildings, and other ancillary equipment
- Electrical, lighting, and communication systems
- Western's transmission system, switchyard, and interconnections
- Access road
- Administration and maintenance buildings, which would be located along the outside perimeter of the solar array
- Water supply, storage, and treatment system

A brief summary of the various components and aspects of the Project is provided in the following sections.

Solar Collecting Tower

The solar collecting tower would be a 538-foot concrete structure that supports a 100-foot cylindrical receiver mounted on the top of the tower. The receiver would be composed of tube panels through which the liquid salt (also referred to as HTF) flows. Therefore, the top of the receiver would be at a height of 638 feet. A maintenance crane also would be mounted on top of the receiver, which would be 15-feet tall, for an overall height of 653 feet.

Heliostat (Mirror) Array

The solar collecting tower/central receiver system generates electric power from sunlight by focusing concentrated solar radiation on a tower-mounted receiver. The system would use thousands of sun-tracking mirrors called heliostats, which would be arranged concentrically around the solar collecting tower and reflect the incident sunlight onto the receiver.

Up to 17,500 heliostats arranged in concentric circles around the solar collecting tower would occupy approximately 1,550 acres. Each heliostat would be configured with a mirror array hung in a landscape orientation.

Each mirror array would be 24-feet high by 28-feet wide, providing a reflective surface of 672 square feet per heliostat. Each heliostat has a 12-foot high post or pier-type pedestal mounted on a foundation to support and anchor the unit. The overall height of the heliostats would be approximately 26 feet when they are facing near vertically, with approximately 2 feet of ground clearance. The heliostat power and control cables would be direct-bury cables (or similar) in the field, up to each individual heliostat unit. Depictions of the heliostats are shown on Figure 2-3.

The arrangement of the heliostats within the field would be optimized to maximize the amount of solar energy that could be collected by the field, and would be arranged to avoid interference among heliostats as they track the sun during the day. The heliostats would be arranged asymmetrically in arcs around the solar receiver.

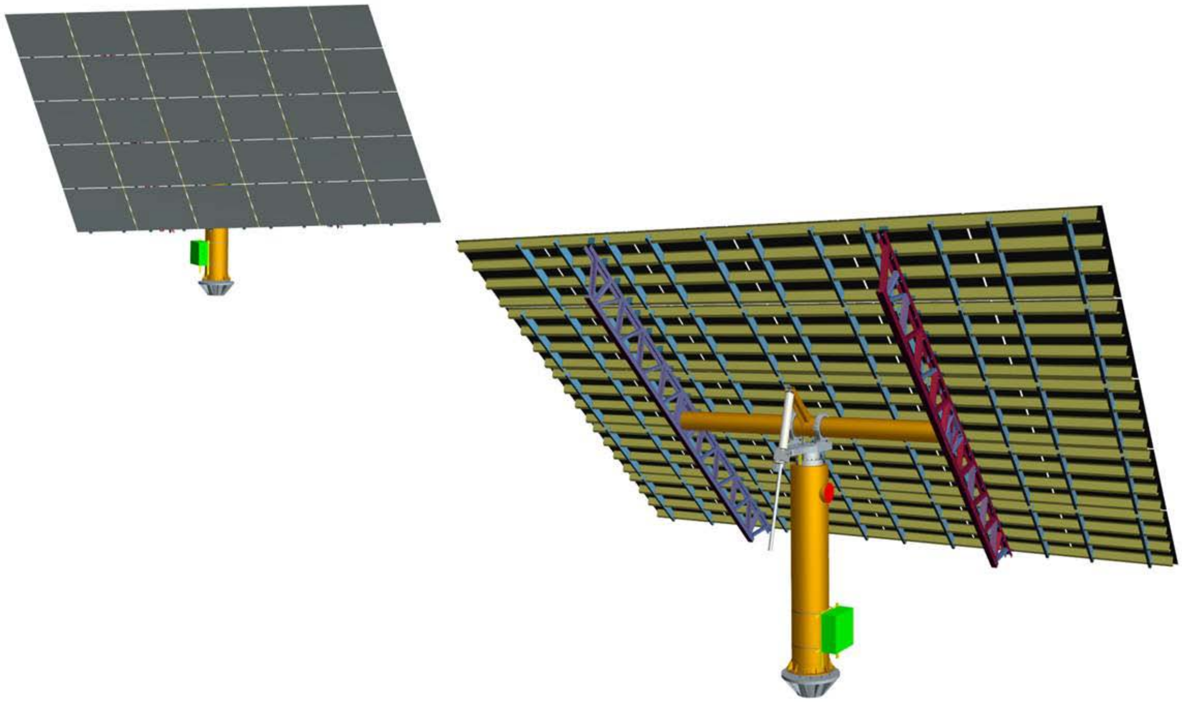


Figure 2-3 Heliostat

Power Block

The power block would include, in part, a steam turbine generator, multiple feedwater heaters, steam superheaters and reheaters, lubricating oil system, hydraulic control system, valving, piping, and feedwater pumps. Steam would be generated at a temperature up to 1,050°F and a pressure of approximately 1,685 absolute pounds per square inch before entering the high-pressure section of the turbine. Steam exiting the high-pressure section of the turbine (referred to as "HP Turbine" on Figure 2-1) would be reheated to increase its temperature before entering the immediate-/low-pressure section of the turbine (referred to as "IP/LP Turbine" on Figure 2-1). Exhaust steam from the turbine would be directed to the cooling system.

The turbine would drive a generator, which would deliver electrical power via a main generator step-up transformer from the onsite substation to the utility grid. Extraction steam from the steam turbine would be used to preheat the feedwater and for de-aerating the feedwater.

This high-efficiency turbine would be designed for reliable operation under conditions of daily start-up and shutdown over the life of the plant. The solar field would be started each morning after sunrise and insolation (heat) build-up, although the power generation equipment may be started at anytime in the morning based on the demand for electricity. The solar field would be shut down in the evening as the sun sets, although the integral thermal energy storage system would allow the steam turbine to continue operating.

The primary components of the power block are depicted on Figure 2-4 and are described below.

Steam Generator

The steam generator is the core of the steam-supply system for the power block. The steam generator system includes a preheater, evaporator, superheater, reheater, and steam drum. High pressure feedwater enters the steam generator from the feedwater heaters and preheater and leaves as saturated steam that subsequently flows to the superheaters. The major components of the steam generator system are described below.

- **Preheater –** The preheater would have a shell and tube design. High-pressure feedwater would enter the preheater from the low-pressure and high-pressure feedwater heaters and would leave as high-temperature feedwater.

- **Evaporator –** The evaporator would receive heated, high-pressure feedwater from the preheater and would evaporate the water into saturated steam. The evaporator would have a shell and tube design.

- **Superheaters/Reheaters –** The saturated steam would flow to shell and tube superheaters to reach the desired steam-turbine temperature- and pressure-operating conditions. The reheaters would receive “cold” outlet steam from the high-pressure turbine stage and reheat the steam before being reintroduced into the intermediate-pressure stage of the turbine.

- **Steam Turbine –** Once the pressurized steam has reached the optimum temperature in the superheaters, it would flow to the steam turbine, which would extract thermal energy from the steam.

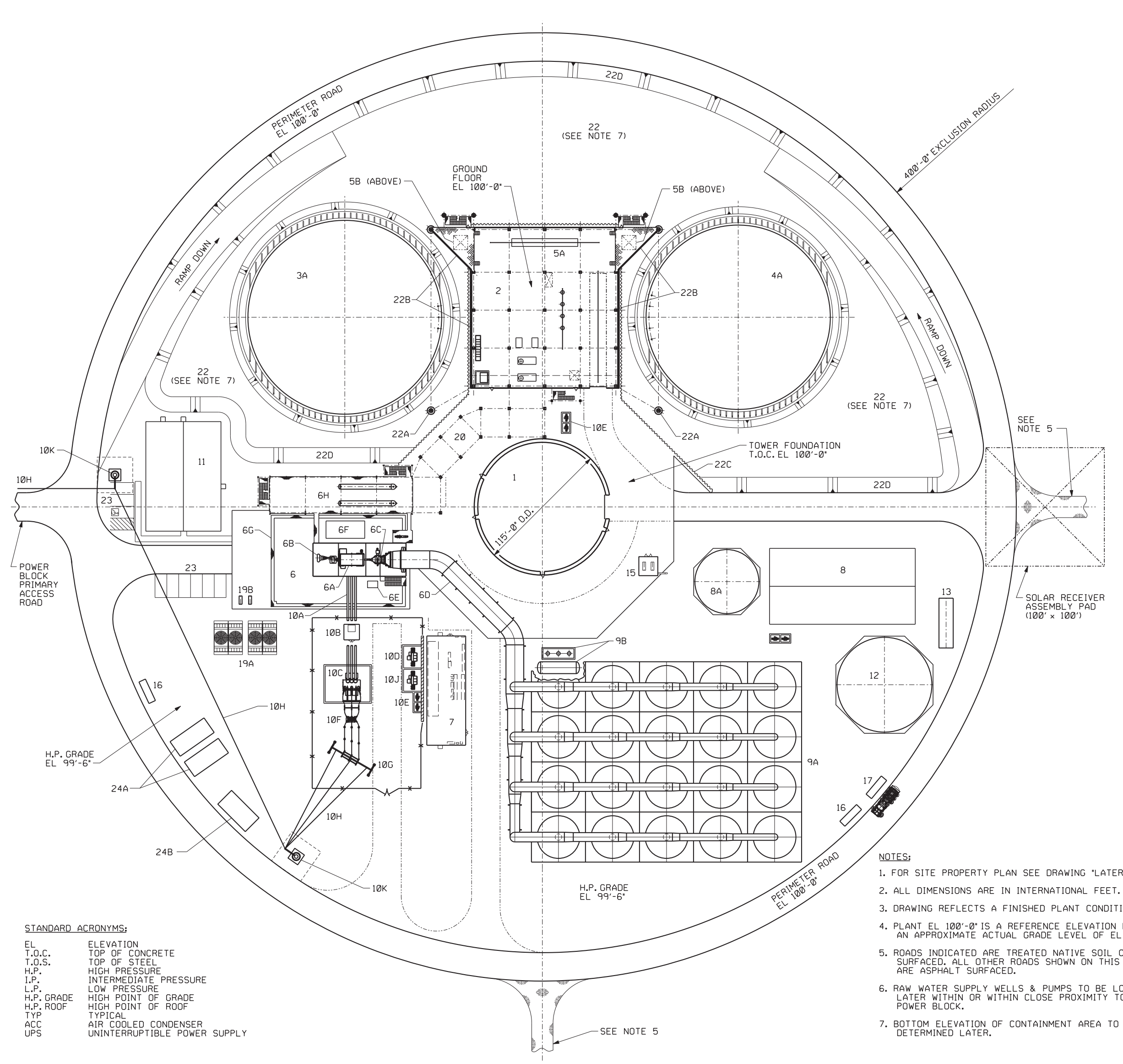
- **Feedwater Heaters –** The feedwater would be heated to the required conditions using conventional turbine extraction steam in low- and high-pressure feedwater heaters.

- **Deaerator –** A direct-contact steam deaerator would be included to eliminate dissolved oxygen in the condensate and feedwater.

Cooling System

Under the Applicant’s Proposed Project, a dry-cooling system would be employed at the site. The cooling system consists of an air-cooled condenser, condensate tank, and condensate pumps. The dry-cooled system receives exhaust steam from the steam turbine, where it is piped through a transfer duct to a finned-tube air-cooled condenser. The air-cooled condenser blows ambient air across a heat transfer surface area, which cools and condenses steam.

The finned tubes are usually arranged in the form of an A-frame or “delta” structure over forced draft fans to reduce land area requirements. The condensed steam is gathered in a condensate tank and provided to the feedwater circuit by condensate pumps. A typical air-cooled condenser can condense steam within 30° to 50°F of the ambient dry-bulb temperature.



LEGEND

1	SOLAR RECEIVER TOWER
2	STEAM GENERATION BUILDING
3	HOT SALT STORAGE TANK AREA
3A	HOT SALT STORAGE TANK
4	COLD SALT STORAGE TANK AREA
4A	COLD SALT STORAGE TANK
5	PUMP SUPPORT & MAINTENANCE AREA
5A	PUMP MAINTENANCE AREA
5B	PUMP REMOVAL HATCH
6	STEAM TURBINE/GENERATOR AREA
6A	GENERATOR
6B	H.P. TURBINE
6C	I.P./L.P. TURBINE
6D	TURBINE EXHAUST DUCT
6E	HYDRAULIC OIL UNIT
6F	LUBE OIL UNIT
6G	FLOOR TRENCH
6H	HEATER BAY
6J	BOILER FEEDWATER PUMPS (NOT SHOWN)
6K	DEAERATOR (NOT SHOWN)
7	ELECTRICAL BUILDING/PDC
8	WATER TREATMENT AREA/BUILDING
8A	DEMINERALIZED WATER TANK
8B	DEMINERALIZED WATER PUMPS (NOT SHOWN)
8C	SERVICE WAER PUMPS (NOT SHOWN)
9	AIR COOLED CONDENSER AREA
9A	AIR COOLED CONDENSER
9B	CONDENSATE DRAIN TANK & PUMPS (UNDER ACC)
10	ELECTRICAL TRANSMISSION AREA
10A	SEGREGATED PHASE BUS DUCT
10B	GENERATOR CIRCUIT BREAKER SWITCHGEAR
10C	GENERATOR STEP-UP TRANSFORMER
10D	UNIT AUXILIARY TRANSFORMER
10E	STATION SERVICE TRANSFORMER
10F	STEP-UP CIRCUIT BREAKER
10G	TRANSMISSION TOWER
10H	OVERHEAD POWER LINES
10J	BACKFEED UTILITY TRANSFORMER
10K	TUBULAR STEEL POLE
11	CONTROL & OPERATIONS BUILDING
12	SERVICE/FIRE WATER STORAGE TANK
13	FIRE WATER PUMP HOUSE
14	NOT USED
15	FIRE WATER BOOSTER PUMPS
16	ABOVE GROUND DIESEL FUEL STORAGE TANK
17	HELIOSTAT WASH TRUCK FILL AREA
18	OIL/WATER SEPARATOR - LATER
19	AUXILIARY COOLING SYSTEM
19A	WET SURFACE AIR COOLER (WSAC)
19B	CLOSED COOLING WATER PUMPS
20	HIGH ENERGY PIPE BRIDGE
21	NOT USED
22	MOLTEN SALT CONTAINMENT AREA
22A	CAISSON FOUNDATION
22B	DIVERSION WALL
22C	RETAINING WALL
22D	2:1 SLOPED SOIL
23	DESIGNATED PARKING AREA
24	HELIOSTAT UPS AREA
24A	EMERGENCY GENERATOR
24B	HELIOSTAT DISTRIBUTION SWITCHGEAR
25	RAW WATER SUPPLY WELLS & PUMPS (SEE NOTE 6)

REFERENCES:

1. LATER

Figure 2-4
Power Block Plan

STANDARD ACRONYMS:

EL	ELEVATION
T.O.C.	TOP OF CONCRETE
T.O.S.	TOP OF STEEL
H.P.	HIGH PRESSURE
I.P.	INTERMEDIATE PRESSURE
L.P.	LOW PRESSURE
H.P. GRADE	HIGH POINT OF GRADE
H.P. ROOF	HIGH POINT OF ROOF
TYP	TYPICAL
ACC	AIR COOLED CONDENSER
UPS	UNINTERRUPTIBLE POWER SUPPLY

NOTES:

1. FOR SITE PROPERTY PLAN SEE DRAWING "LATER".
2. ALL DIMENSIONS ARE IN INTERNATIONAL FEET.
3. DRAWING REFLECTS A FINISHED PLANT CONDITION.
4. PLANT EL 100'-0" IS A REFERENCE ELEVATION EQUAL TO AN APPROXIMATE ACTUAL GRADE LEVEL OF EL "LATER".
5. ROADS INDICATED ARE TREATED NATIVE SOIL OR GRAVEL SURFACED. ALL OTHER ROADS SHOWN ON THIS PLAN ARE ASPHALT SURFACED.
6. RAW WATER SUPPLY WELLS & PUMPS TO BE LOCATED LATER WITHIN OR WITHIN CLOSE PROXIMITY TO THE POWER BLOCK.
7. BOTTOM ELEVATION OF CONTAINMENT AREA TO BE DETERMINED LATER.

40 0 40 80 120

REV	DATE	DESCRIPTION				
B	04/05/11	ISSUED FOR REVIEW AND COMMENT	AP	BA	MW	BA BA
A		IN PROGRESS				

PRELIMINARY STATUS — DATE — REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.

APPROVED STATUS — DATE — REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL — PROFESSIONAL ENGINEER'S SEAL

DRAWN BY: A. PRATT
CHECKED BY:
LEAD DESIGNER:
ENGINEER/TECH SPECIALIST:
PROJECT ENGINEERING MANAGER: B. ANDERS
PROJECT MANAGER: B. ANDERS

Zero Harm — Leadership, No Incidents, Safe Behavior

WorleyParsons resources & energy

SolarReserve

CLIENT/PROJECT TITLE
QUARTZSITE SOLAR ENERGY PROJECT
QUARTZSITE SOLAR ENERGY, LLC

GENERAL ARRANGEMENT
SOLAR POWER PLANT
POWER BLOCK PLAN

SCALE: 1" = 40'-0"
DRAWING SIZE: ARCH D (36" x 24")
WORLEYPARSONS DWG. NO.: SRQZ-1-SK-111-002-002
REV: B

Thermal Storage System

The thermal storage system contains two storage tanks—one "cold" tank storing liquid salt at approximately 550°F and one "hot" tank storing liquid salt at approximately 1,050°F. As the sun rises, cold liquid salt (or HTF) would be pumped from the cold liquid salt tank through the tubes on the receiver. After absorbing energy from the concentrated sunlight, the temperature of the HTF would be increased to the design outlet temperature of 1,050°F. Part of the heated HTF is then pumped to a hot liquid salt tank for storage and the other part to a steam generating system that produces superheated steam for use in the conventional Rankine cycle turbine/generator system. After exiting the steam generator, the HTF would be returned to the cold tank, where it is stored and eventually reheated in the receiver. The cold salt storage tank would be approximately 42 feet tall at the perimeter (including insulation), 63.5 feet tall at the center, 159 feet in diameter, and have a capacity of approximately 5.6 million gallons. The hot salt storage tank would be approximately 42 feet tall at the perimeter (including insulation), 64.5 feet tall at the center, 167 feet in diameter, and have a capacity of approximately 6.3 million gallons.

The HTF consists of a mixture of sodium nitrate and potassium nitrate designed to remain liquid or molten over a wide temperature range. The HTF mixture has a melting point of 460°F and must be preheated and maintained above this minimum temperature in order to be pumped through the system. This arrangement allows for excess heat to be stored for power generation outside of the direct solar-heating period of the day. The system also includes piping, valves, pumps, expansion tanks, and heaters.

2.4.2.2 **Onsite Major Electrical Systems and Equipment, Lighting, and Communication Systems**

Electrical – Electrical power from the proposed solar energy facility would enter the electrical transmission grid via an interconnection with Western's existing power transmission system. During operation, a small amount of electric power would be used to power station auxiliary loads such as pumps and fans, control systems, and general facility loads including lighting, heating and air conditioning, heliostat movement, and other uses. The electrical system for Project facilities, buildings, and communication systems would be installed onsite, inside conduit in underground trenches or overhead in cable tray as per applicable code requirements. Some of the electric power would be used for heat tracing that would provide energy to maintain the salt in fluid state during protracted maintenance outages. Additionally, QSE proposes to obtain backup power from an existing 69-kV overhead transmission line that parallels SR 95. The 69-kV transmission line is owned and operated by Arizona Public Service.

Lighting – The Project's lighting system would provide operation and maintenance personnel with light for both normal and emergency conditions. Project lighting would be designed to minimize light pollution through the use of sensor-operated lights and directional lighting in cases where this would not compromise safety or security.

Aviation lighting would be installed on the solar collecting tower according to the recommendations of U.S. Department of Transportation FAA's Advisory Circular, AC 70/7460-1K, Obstruction Marking and Lighting. Lighting would not be provided for the solar field; however, for the remainder of the facility aside from the tower, lighting would be expected to be provided in the following areas:

- Building interior equipment, office, control, maintenance, and warehouse
- Solar collecting tower
- Building exterior entrances
- Outdoor equipment within the power block and tank area
- Power transformers
- Power block roadway and parking areas
- Entrance gate
- Water treatment area

Onsite Communications – The major communication system onsite would include hardware and software, field instrumentation, meteorological stations, and communications devices designed for site monitoring and control of the solar power plant. All data collected from the field would be transmitted to an onsite control room via a fiber or copper communications infrastructure. The network of cables for the communications system would be buried in the same trenches or run in overhead cable tray as the electrical system cables, maintaining appropriate levels of separation according to code requirements.

2.4.2.3 **Access Roads**

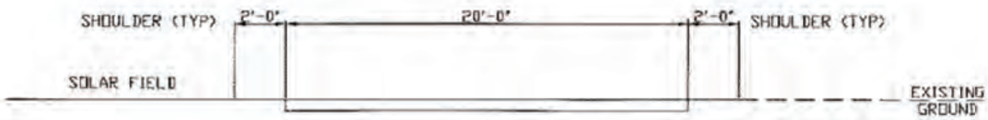
A paved access road would be constructed from SR 95 to the Project area, a distance of approximately 0.5 mile. Other paved and unpaved roads would be developed within the Project area to provide access to the power block and other ancillary facilities. Deceleration and/or acceleration lanes would be constructed, as required, to meet the ADOT and La Paz County requirements where the Project access road would connect to SR 95. The Project access road would be a two-lane road, constructed for two directions of travel, with a minimum width of 24 feet and 2-foot-wide shoulders on each side of the road. Additionally, paved roads meeting this same general description may be constructed from the power block to the east and south edges of the solar field. Alternate surfacing for these road segments would be rock. A perimeter road would be constructed around the perimeter of the solar field and would be surfaced with rock. Permanent access roads as discussed above are anticipated to occupy 2.3 acres. A typical section of this road is shown on Figure 2-5.

2.4.2.4 **Buildings, Enclosures, and Fencing**

The following buildings and enclosures are planned as part of the Project, and their locations are described below:

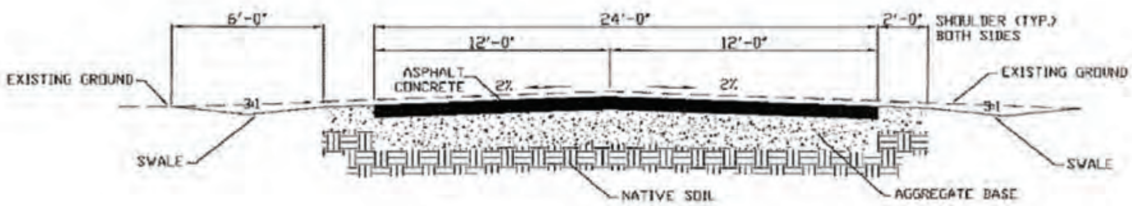
- **Steam Generator Building** (0.7 acre). This structure would be located between the HTF storage tanks within the power block. The building would provide structural support and protection for the equipment associated with the heat exchange process.

- **Steam Turbine Area/Enclosure** (not considered a building). This structure would support the Steam Turbine Generator and associated equipment, and would be located within the power block. The Steam Turbine Generator may be enclosed in a building for protection, or it may be located outdoors.



1 PERIMETER ROAD- AGGREGATE SURFACE DETAIL

NOT TO SCALE



2 ACCESS ROAD SECTION (TYP.)

NOT TO SCALE

DRAWN BY: C. MAHER

Figure 2-5 Road Sections

Quartzsite Solar Energy Project

Source: Solar Reserve

- **Electrical Building** (0.05 acre). This structure would be located within the power block area and would house the switchgear, motor control centers, battery power supply, and other primary plant electrical components.

- **Administration/Maintenance Building** (0.23 acre). This building would serve as the center for support staff for the Project during operations. This facility may be located outside the heliostat field, near the access road, or within the power block area.

- **Heliostat Assembly Building** (1.8 acres). This building would be used as a protected environment for the assembly/construction of heliostats during construction of the plant. It may be converted to other uses upon completion of Project construction, or may be removed entirely, following completion of the heliostat assembly.

- **Permanent Warehouse** (0.14 acre). This building would provide permanent warehouse space for the facility and would be located near main access road to facilitate delivery of equipment without transiting the heliostat field.

- **Control Room Building** (0.14 acre). This building would be located within the power block and would provide the control room functions for the Project.

- **Building Sanitation Facilities**. The administrative/maintenance building and the control building may each be served by a permanent septic system (tank and leach field).

- **Water Treatment Building** (0.28 acre). The building would house the water treatment facilities.

Site Security and Fencing – Chain link security fencing would be installed around the Project area perimeter, substation, ponds, and other areas requiring controlled access prior to beginning construction. The Project area perimeter fence would be 8 feet high and have an overall height of no more than 10 feet from the bottom of the chain link to the top barbed wire, or per requirements mandated by the North American Electric Reliability Corporation and the U.S. Department of Homeland Security for facilities of this type. The fence may have a top rail, bottom tension wire, and three strands of barbed wire mounted on 45 degree extension arms. Posts would be set in concrete, based on Federal security assessments (to be completed prior to start of construction).

Controlled access gates would be located at the entrances to the facility. Project area gates would be swing or rolling type access gates. Access through the main gate would require an electronic swipe card (or other acceptable means), preventing unaccompanied visitors from accessing the facility. All visitors would be logged in and out of the facility during normal business hours. Visitors and non-employees would be allowed entry only with approval from a staff member at the facility. Visitors would be issued passes to be worn during their visit and returned at the main office when leaving.

Personnel would staff the facility 24 hours per day/7 days per week. Even when the solar power plant is not operating, personnel would be present, as necessary, for maintenance; to prepare the plant for startup, and/or for Project area security. It is anticipated that 30 to 35 personnel would be present onsite during normal working hours and three to five personnel during any other shift (i.e., overnight or weekends).

2.4.2.5 **Water Supply, Storage, and Treatment Systems**

Water Requirements during Construction – During construction of the Project, there would be a need for water for soil moisture conditioning, dust control, and other construction activities. The construction water source likely would come from onsite water wells, or if not available during construction, would be sourced from an offsite location.

Based on the expected soil conditions (existing moisture content and the optimal moisture of the soil necessary to achieve proper compaction), it is estimated that a total of approximately 1,000 acre-feet of water would be needed the first year of construction, while the major earthwork is ongoing. Approximately 150 acre-feet of water would be needed per year of construction, after the initial earthmoving operations are complete, for ongoing dust control and moisture conditioning of soils for ongoing backfilling operations.

Water Requirements during Operations – Water needs during plant operation, estimated at 200 acre-feet per year, include three primary uses:

- Steam cycle makeup water – estimated at 100 acre-feet per year
- Mirror wash water – estimated at 70 acre-feet per year
- Other uses including a wet-surface air cooler for auxiliary equipment, service water, and quench water, estimated at up to 30 acre-feet per year

Although the steam cycle is a "closed system," operational steam blowdown requires the addition of makeup water throughout the operating time frame. Additionally, the heliostat mirrors' reflectivity would decrease in efficiency as the mirrors collect dust and other particles. Thus, water would also be required to support a mirror wash program to be implemented that would clean the mirrors on a continual basis. This program may run up to 7 days/nights per week.

Operational water would be obtained from onsite wells; an offsite pipeline would not be required. The location, number, depth, and design of any new groundwater wells that would be used to supply the Project would be determined based on a groundwater investigation; however, up to three wells would be required for redundancy.

Water Storage – The onsite water storage system would include one demineralized water storage tank to store demineralized water for use as mirror wash water and for steam cycle makeup. One fire water/service water tank also would be constructed onsite to store water for fire protection, service water needs, and raw water storage prior to treatment.

Water Treatment System – Raw water would be treated through an onsite RO water treatment facility and converted to demineralized water for use in the steam cycle and for mirror washing. The need for additional pre-treatment such as water softening or ion exchange, if any, would be determined based on analytical data obtained during the groundwater investigation.

Evaporation Ponds – Two types of wastewater would be generated from the Project: industrial and domestic. In the industrial process, wastewater is generated from the water treatment operation (from the RO system pre-treatment of groundwater) and the steam cycle blowdown. A dry-cooled Project would require three 4-acre, double-lined evaporation ponds to manage the industrial wastewaters generated by the power block. Each brine pond would have an average design depth of at least 6 feet to allow for 1 foot of sludge buildup, 3 feet of operational depth, and 2 feet of freeboard. The ponds would be constructed and lined as follows:

- a base layer consisting of either a geo-synthetic clay liner or 2 feet of onsite material with a hydraulic conductivity of less than 1 x 10.6 centimeters/second
- a secondary high density polyethylene liner (minimum of 40 mils)
- a leak detection and removal system comprising a geonet and collection sump
- a primary 60-mil high density polyethylene liner at the surface of the ponds

The wastewater to be discharged into the evaporation ponds is anticipated to be nonhazardous; however, it would contain pollutants that could exceed water quality objectives or affect the beneficial uses of groundwater, if released. Therefore, the wastewater would be classified as a "designated waste" and would be regulated by ADEQ.

Wastewater from industrial processes would be piped to the evaporation ponds for disposal. Three ponds were selected for reliability. The plant would operate using all three ponds; however, the ponds would be designed and sized so that one pond can be taken out of service for up to one year for maintenance/service. If a pond requires maintenance or solids removal, the plant still could operate with the other two ponds for up to one year. Solids removed from the evaporation ponds would be disposed of at a permitted hazardous waste landfill.

To limit the amount of wastewater discharged to the ponds, waste streams from within the plant, such as steam cycle blowdown, can be used as makeup water for the heat exchanger, to cool auxiliary plant loads called a wet surface air cooler. The wet surface air cooler evaporates water to remove heat from the internal plant cooling system used for small cycle heat loads, such as the main electrical generator's cooling system. By evaporating various plant waste water streams, the amount of water discharged to the ponds is reduced, allowing the majority of the water to evaporate quickly in the ponds, and preventing an excess of standing water that would attract wildlife and waterfowl in this arid environment. Also, by discharging the remaining wastewater to multiple ponds simultaneously, the water would also evaporate quickly during most days of the year, helping to preclude an excess of standing water in the ponds.

In the domestic process, all wastewater generated from toilets, showers, kitchens, and sinks would be directed into an onsite sanitary septic system and onsite leach field.

2.4.2.6 **Emergency Diesel Generator**

The primary function of the emergency generators would be to provide relatively instantaneous backup power needed to redirect the heliostat field flux off the solar receiver during loss of liquid salt flow emergencies. The emergency generators are approximately 4,000 brake-horsepower each and would be test-run at least monthly to meet supplier guarantee, the National Fire Protection Association (NFPA), and insurance carrier requirements on maintenance and testing.

2.4.2.7 **Fire Protection**

A Construction Fire Protection and Prevention Plan would be developed and followed throughout all phases of construction. The permanent facility fire protection system would be put into use during construction as soon as is practicable. Prior to the availability of this system, fire extinguishers and other portable fire-fighting equipment would be available onsite. Locations of portable firefighting equipment may include portable office spaces, welding areas, flammable chemical areas, and vehicles and other mobile equipment. All equipment would be NFPA and Occupational Safety and Health Administration (OSHA) compliant.

The facilities operating fire protection water system would be supplied from a dedicated portion of the service/fire water storage tank located on the plant site. One electric and one diesel-fueled backup firewater pump would deliver water to the fire protection water-piping network. A smaller electric motor-driven jockey pump would maintain pressure in the piping network. If the jockey pump is unable to maintain a set operating pressure in the piping network, the motor-operated fire pump starts automatically. If there is a loss of power to the motor-driven fire pump, and the system pressure falls to a preset pressure, the diesel fire pump starts automatically.

The fire protection system piping network would be configured in a loop so that a piping failure can be isolated with shutoff valves without interrupting the supply of water to a majority of the loop. The piping network would supply fire hydrants located at intervals throughout the power plant site, at the Steam Turbine Generator lube oil equipment, and at other equipment as required. Sprinkler systems would also be installed in the administration control warehouse, maintenance buildings, and fire pump enclosure as required by the NFPA and local fire protection codes. Handheld fire extinguishers of the appropriate size and rating (NFPA 10) would be located throughout the facility.

2.4.3 Action Alternative 1 – Hybrid Cooling

Alternative 1, the hybrid wet- and dry-cooled option, would incorporate similar construction, operation, decommissioning, and reclamation components as the Applicant’s Proposed Project, but would use an alternative cooling technology. To avoid redundancy, the description of the construction, operation, decommissioning, and reclamation aspects of the hybrid alternative is described under the Applicant’s Proposed Project. Key differences between the two options are described in Table 2-1.

A hybrid cooling system typically includes two cooling towers (one dry-cooled and one wet-cooled) and an air-cooled condenser designed to operate in parallel as one system. The cooling towers would only operate at peak temperature conditions to provide for the most economic operation of the plant. Equipment sizes vary, depending on specific conditions for a given site; but typically, each unit (the air-cooled condenser and cooling towers) would be designed to provide less than 100 percent of the cooling demand. However, together these units provide 100 percent of plant cooling requirements at full load and at the design temperature.

Hybrid systems would operate between a wet-cooled and a dry-cooled system in all aspects. Hybrid systems use less water than a wet-cooled system, but more than an air-cooled one. Turbine efficiency would be between that of a wet-cooled and a dry-cooled system. The cost of a hybrid system is typically higher than that of either an air-cooled or a wet-cooled system, because it requires capital investment for both technologies.

Operational water requirements for Alternative 1 would be up to 600 acre-feet per year and would require up to 18 acres of evaporation pond surface area to process wastewater disposal. Water use would depend largely on site conditions, water quality, and the efficiency of the air-cooled condenser and the cooling tower.

2.4.4 Western's Switchyard and Telecommunication System

The Project would interconnect to Western's transmission system through Western's existing Bouse-Kofa 161-kV transmission line, located to the east of and parallel to SR 95. The interconnection would require an onsite substation (owned and operated by QSE), located within the power block area, to transform the voltage of the power generated by the solar facility, making it compatible for transmission on the proposed 1.5-mile 161/230-kV transmission line to the interconnection point. The interconnection point would be at a new switchyard, which would be owned and operated by Western, where power would be interconnected to the existing system. The 1.5-mile long, 161/230-kV transmission line would be designed as a single-circuit overhead line on monopole or lattice structures; the structures would be 85 to 115 feet tall, with spans of up to 500 feet between structures. The final locations of transmission line tower structures would depend on the type of structure selected, the type of terrain encountered, and geotechnical conditions.

Independent of this Project, Western has a long-term plan to rebuild the existing 161-kV lines at 230 kV to provide for a more standard and reliable infrastructure. Western's existing Bouse-Kofa 161-kV transmission line is anticipated to be rebuilt as a part of this long-term plan. All facilities that are added to existing systems in this area, such as the proposed transmission line for the Project, are required to be built to 230-kV standards in anticipation of the future transmission line conversion to 230 kV. Therefore, the transmission lines would be constructed to 230-kV standards. If in the future, Western's 161-kV system is modified to operate at 230 kV, it is anticipated that QSE's onsite substation would be modified to step-up the voltage to 230 kV. This Draft EIS and Proposed YFO RMP Amendment is not intended to analyze a future upgrade of the Bouse-Kofa 161-kV transmission line by Western.

At this time, all the transmission system studies associated with the proposed interconnection have not been completed. Details, requirements, and environmental impacts for other system improvements are unknown at this time, as they would be dictated by the ongoing transmission system studies. These studies may identify additional system upgrades needed to accommodate the proposed interconnection; upgrades also may be required to some of Western's existing substations. If improvements are identified after the EIS is completed, additional NEPA analysis for these necessary improvements to the electrical system would be completed.

2.4.4.1 Western's Switchyard

Western's switchyard would occupy approximately 4.6 acres of BLM-administered land adjacent to the Bouse-Kofa 161-kV transmission line. The final switchyard location would be based on a number of different factors that include proximity to the transmission line, drainage, security, and access. The switchyard must be located as close to the existing transmission line as possible to allow for entry and exit of the existing conductor into the switchyard. The most direct route for the 161-kV (high voltage) conductor into the switchyard is preferred to minimize realignment of the existing line. Once the switchyard is complete, the existing conductors would be cut and rerouted into the new switchyard for service.

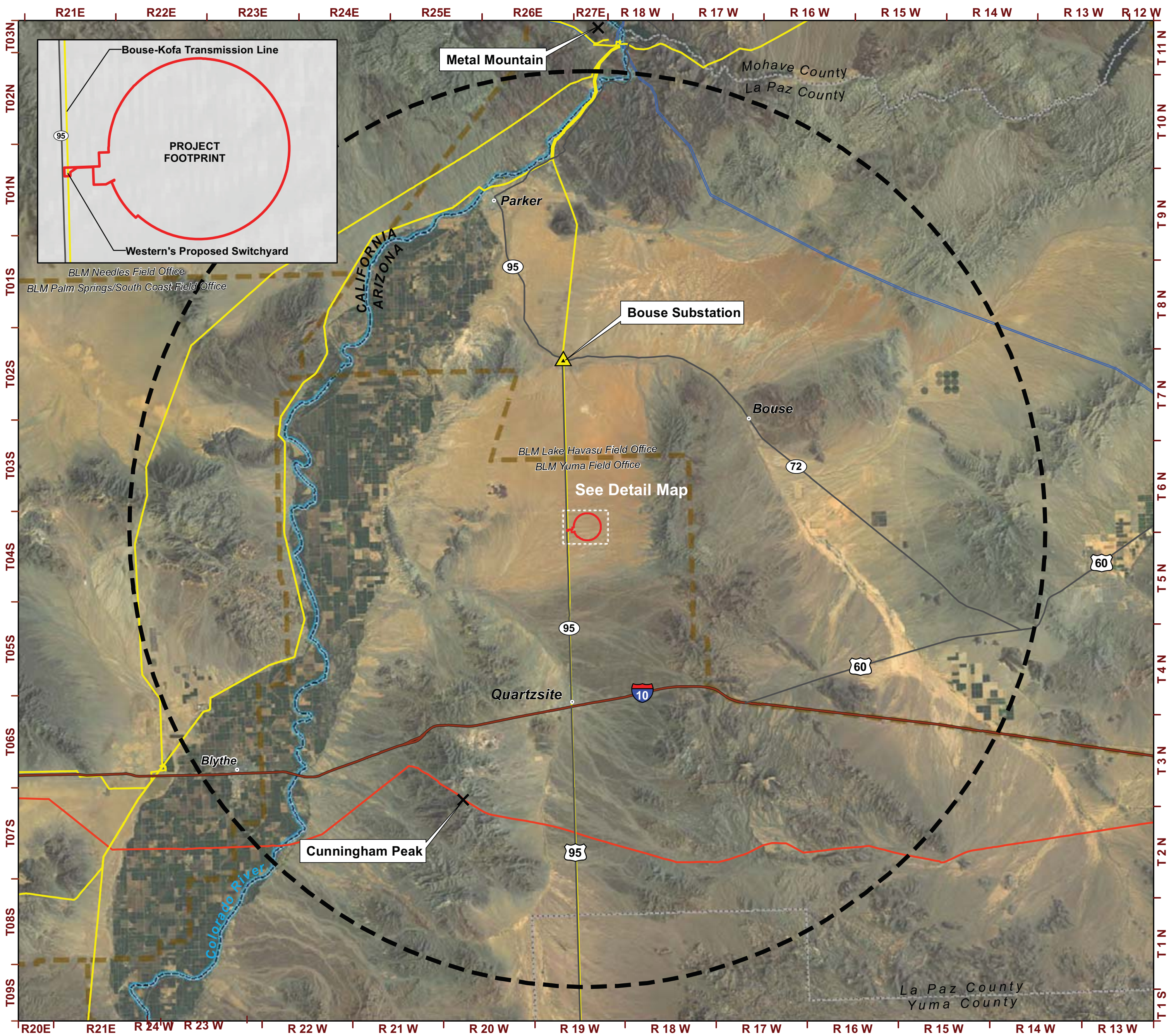
Locating the facility next to a paved road improves access for personnel, equipment, and machinery for required maintenance and replacement of critical equipment as needed (Figure 2-6). An 8-foot block wall or chain link fence topped with razor wire (or similar) would provide security for the switchyard. Adequate space would be provided inside the fence to maneuver construction and maintenance vehicles.

2.4.4.2 **Western's Communication Facilities**

The Project would require improvements to Western's communication system to provide redundant communication paths. Redundant paths are required to provide reliability within the electrical transmission system. Two different types of communication (microwave and fiber) are preferred for redundancy. From Western's interconnection switchyard east of SR 95, telecommunications would be established by: (1) installing a new fiber optic line on Western's existing Bouse-Kofa 161-kV transmission line from the switchyard to the Bouse Substation, a distance of approximately 12 miles; or (2) microwave (radio-frequency) transmission from (a) a new microwave dish mounted within the new Western switchyard to Metal Mountain, or (b) a new microwave dish mounted within the Project solar field to Metal Mountain, or (c) a new microwave dish mounted within the Project solar field to the Bouse Substation. The location of the Bouse Substation and the communication sites at Metal Mountain and Cunningham Peak are shown on Figure 2-6.

Fiber Optic Line Option

- ***Fiber from the new Western Switchyard to the existing Bouse Substation***. Under this option, a new fiber optic line would be installed on Western's existing 161-kV transmission line for approximately 12 miles to the north into the Bouse Substation (Figure 2-6). From Bouse, the signal would be on an existing microwave path to Cunningham Peak. Construction equipment used to replace one of two existing overhead groundwires would include a manlift truck (multi-axle, rough terrain vehicle with an articulating-boom and man-bucket), a truck-mounted tensioner, and a reel truck and trailer. Approximately 96 structures exist on the 12-mile transmission line section. Vehicles would use the existing maintenance road for all access along the transmission line.



Quartzsite Solar Energy Project

Telecommunication Options

Figure 2-6

LEGEND

Project Features
- Project Footprint
- 30-Mile Buffer

Existing Utilities
- 500kV Transmission Line
- 230kV Transmission Line
- <230kV Transmission Line

Reference Features
- BLM Field Office Boundary
- State Boundary
- County Boundary
- City/Town
- Interstate
- Highway
- Major River

Project Location

0 5 10 20 Miles

May 2011

Sources: USGS, 2010; BLM, 2010; ALRIS, 2009; Worley-Parsons, 2010; Geocommunicator, 2010; Platts, 2009; EPG, 2009;

Microwave Options

- ***Microwave from the new Western Switchyard to Metal Mountain***. Under this option, an 80-foot monopole and microwave dish would be installed within the new Western switchyard. The microwave would have a direct path to the existing Metal Mountain facility located approximately 32 miles north of the Project area. A new microwave dish would be mounted on an existing pole/structure at Metal Mountain using ropes and pulleys. A single pick-up truck would be used to transport the dish to Metal Mountain using existing access roads.

- ***Microwave from the Project Solar Field to Metal Mountain***. Under this option, a new fiber optic line would be installed on the generation tie-line between the solar field and Western's switchyard. The generation tie-line may be up to 1.5 miles long. A microwave dish would be mounted at approximately 40 feet on a Project facility component that would provide a microwave path to Metal Mountain, where a new microwave dish would be installed on an existing pole or structure using ropes and pulleys. A single pick-up truck would be used to transport the dish to Metal Mountain using existing access roads.

- ***Microwave from the Project Solar Field to the existing Bouse Substation***. Under this option, a fiber optic line would be installed on the generation tie-line between the solar field and Western's switchyard. The generation tie-line may be up to 1.5 miles long. A microwave dish would be mounted at approximately 350 feet on the Project's central receiver tower to provide a microwave path to the Bouse Substation. Under this option, a new microwave dish would be installed on an existing structure or new monopole at the Bouse Substation. If the microwave dish is installed on an existing structure, it would be installed using ropes and pulleys and delivered using a single pick-up truck along existing access roads. Should a new monopole need to be erected, an auger drill rig, medium-duty crane, and concrete truck would be used during construction.

At this time, Western has not selected a communication option.

2.5 PROJECT CONSTRUCTION

The construction of the Project would begin once all applicable approvals and permits have been obtained. Project construction, from site preparation and grading to commercial operation, would be expected to take approximately 30 months. Table 2-2 provides a conceptual Project schedule with activities representative of construction of a thermal solar power plant and associated infrastructure, including Western's switchyard and communication facilities.

Typically, construction would be scheduled to occur between 5 a.m. and 7 p.m. on Monday – Saturday (approximately 14 hours per day, 6 days per week). However, construction could occur outside of these hours to make up schedule deficiencies, to work around extreme mid-day heat or other weather events, or to complete critical construction activities such as when pouring concrete. During some construction periods and during the start-up phase of the Project, some activities would continue 24 hours per day/7 days per week. The items of work that may occur 24 hours per day would include, but are not limited to, placing and finishing concrete (because of cooler nighttime temperatures), welding on critical pipe systems (these may be critical path items and need to be expedited), radiographic testing of the welds on certain pipes (completed when staff are vacated from the area), electrical terminations, distributed control system wiring and programming, heliostat assembly (if this seems to be falling behind schedule), and preparation for start-up testing. Because this is a solar plant, testing of the facility requires adequate energy supply (i.e., the sun). Therefore, preparations may take place overnight to ready the facility for start-up tests the following day, when the sun would provide the energy to power the start-up testing.

Table 2-2 Conceptual Project Schedule

Activity	Time Frame
Start construction	Month 1
Begin mobilization	Month 1
Delineate and mark the boundaries of the construction zone	Month 1
Stabilize construction entrance/exit and roadway; install tire wash	Months 2 and 3
Establish parking and staging areas for vehicle and equipment storage and maintenance	Month 2
Establish lay down area(s) for materials storage and staging	Month 3 and 4
Establish concrete washout area	Month 3
Clear and grub, strip topsoil	Months 1 to 4
Install certified weed-free fiber rolls or silt fence at the base of slopes adjacent to delineated sensitive areas, if any	Months 1 and 2
Construct stormwater infiltration/evaporation area	Months 3 to 6
Assemble and erect heliostats	Months 10 to 22
Power block construction	Months 3 to 18
Construction of Western’s switchyard	Months 10 to 16
Construction of Western’s telecommunications	Month 16
Construct reinforced concrete foundations	Months 3 to 18
Construction administrative/warehouse building	Months 20 to 22
Final stabilization of site	Month 29
Commission and testing	Months 22 to 30

2.5.1 Construction Work Force

Separate construction crews are expected to build the solar generating facility, the generation tie-line, and Western’s switchyard and communication facilities. QSE-managed construction crews would be responsible for completing the solar facility and generation tie-line to connect the solar facility to Western’s switchyard. Western-managed construction crews would be responsible for the construction of Western’s new switchyard and associated elements, as well as the communication facilities.

The construction work force would consist of approximately 400 to 500 personnel at peak for construction, including supervisors and management personnel, with an average of approximately 250 crewmembers onsite at any given time. Project construction would require additional support staff, including construction inspectors, surveyors, Project managers, and environmental inspectors.

2.5.2 Temporary Construction/Laydown Areas

The Project construction contractor would mobilize and develop temporary construction facilities and laydown areas adjacent to the power block and outside the heliostat field (see Section 2.5.9 for details about Western's switchyard). Once a final design has been established, the contractor would prepare site maps showing the construction activities in detail. Temporary construction facilities would include:

- Approximately 19 single-wide full-length trailer offices or equivalent complete with electrical, telephone, and internet service
- Guard shack
- Chemical toilets
- Employee parking area for approximately 500 vehicles
- Approximately 15 tool sheds/containers
- Equipment parking for approximately 20 pieces of construction equipment
- Construction material laydown area
- Solar field equipment laydown area
- Onsite dumpsters for domestic and construction waste
- Portable concrete batch plant (to be located within the temporary laydown area outside the heliostat circle or near the power block)
- Construction access and material/equipment delivery area
- Diesel storage tank (up to 10,000 gallons) with appropriate containment

Construction laydown and storage would occur throughout the permanently disturbed areas. The power block and the heliostat field immediately adjacent to the power block would be used for laydown and storage of the power block components. Equipment would be stored within the power block, and would include cranes, loaders, forklifts, generators, boom trucks, and water trucks. The earthmoving equipment would be stored in a central location each night near the area where the work is being undertaken, or near the western side of the heliostat field, where all the equipment can be most easily fueled. All these locations would be within the perimeter of the permanent Project facilities.

A temporary concrete batch plant consisting of three portable units would be set up near the perimeter of the site to supply the necessary ready-mix concrete for the plant. Concrete requirements include foundations for the solar collecting tower, the storage tanks, several building/structures, and all the heliostats. Concrete would also be required for the tower structure itself. For monolithic concrete mass such as the foundation of the solar collecting tower and the tower structure, continuous supply and pouring of concrete would be necessary. Consequently, it is conservatively assumed that the batching units would be operated up to 24 hours per day/7 days per week during the construction of the tower. The concrete batch units would be individually powered by portable diesel generators. It is anticipated that one or two batching units would be removed from the Project area as soon as the production demand rate subsides.

The heliostat assembly building may be constructed permanently to be used during the life of the Project, or may be a temporary facility removed after construction. Areas along the transmission line corridor and near the substation (less than 5 acres) may be used for storage of power poles during construction. These areas would remain within the area identified for temporary disturbance.

2.5.3 Aggregate Processing Plant

An onsite aggregate processing plant may be deployed relatively early in order to support the Project’s need for aggregates (e.g., road compaction, dust minimization, material for batch plant). Alternatively, aggregates may be procured from a commercial source. Activities at the plant (onsite or offsite) would consist of quarrying, crushing, and screening for aggregates, pea gravel, and coarse rock and sand. Equipment and emission sources associated with the aggregate processing plant would generally consist of:

- A 350-ton per hour primary crusher, a primary screening system, and a baghouse controlling both pieces of equipment
- A 200-ton per hour secondary crusher and a secondary screening system

A tertiary screener would provide additional processing for the primary screened material. Operation of the aggregate plant would occupy approximately 9 months of the 30-month overall schedule. A conservative estimate of maximum hourly throughput may be based on a 3-month time window and on a 10-hour day/5-day per week schedule: 350,000 tons / (10 x 90) = 388 tons/hour (approximately 410 tons per hour [maximum] for permitting purpose).

Should an aggregate processing plant be established on public land under BLM jurisdiction, additional permitting and environmental analysis would be required.

2.5.4 Site Preparation

Site preparation activities would be completed with traditional earthmoving equipment, including but not limited to bulldozers, scrapers, motor graders, excavators, water trucks, water wagons, loaders, and compactors. Only areas of excavation for foundations would require complete removal of all vegetation (Table 2-3).

The root system of existing vegetation would remain intact to the extent possible to limit fugitive dust and soil erosion, and to allow native vegetation to regrow. Impacts to native plants, including salvage, would be consistent with Arizona’s Native Plant Law. Subsequent removal of plant material would be done with heavy equipment and may include the use of a bulldozer equipped with a brush rake.

Table 2-3 Areas of Vegetation Clearance	
Facility	**Acres of Vegetation Clearance**
Power Block	12
Access Road	5
Ponds	20
Laydown Area	20
Construction Parking	10
Drainage Ditch outside Fence	35
Administration Building/Warehouse	3
Heliostat Assembly	5
Switchyard	5
TOTAL	**115**

Waste vegetation would be chipped and incorporated into the topsoil, or chipped and spread on disturbed areas that are not part of the Project. All cut vegetation would be managed onsite to limit waste.

Topsoil would be stockpiled from the Project area for use in revegetation areas. The topsoil excavated would be segregated, kept intact, and protected, under conditions shown to sustain seed bank viability. The upper 1 inch of topsoil that contains the seed bank would be scraped and stockpiled for use as the top-dressing for the revegetation area. An additional 6 to 8 inches of soil below the top 1 inch of soil would also be scraped and separately stockpiled for use in revegetation areas. Topsoil would be replaced in its original vertical orientation following ground disturbance, ensuring the integrity of the top 1 inch in particular.

The majority of the efforts to grade the Project area would be completed within the first year of construction activities. Early grading would be completed in the area of the roads and parking areas (to provide access), the laydown area (to provide an early location for storage), and in the power block (to provide an early start to the power block construction activities). Detailed information regarding the location within the solar field of the laydown and parking areas would be developed once the Project engineering is finalized. Completion of the earthwork within the solar field would follow immediately after or during the early grading activities, in order to allow construction of the solar field heliostats.

Minor grading would be ongoing in the form of excavation and backfill for foundations, pipelines, conduits, and other miscellaneous facilities for the duration of construction. Some re-grading for maintenance most likely would be required within the access roads due to soil erosion and regular use.

A temporary fence would be installed around the construction laydown and parking area, with a permanent fence being installed as soon as doing so would not disrupt construction of the Project.

Dust control measures would be implemented throughout the construction phase and during operations. These measures would include, but would not be limited to, frequent application of a BLM-approved dust suppressant, restriction of construction vehicle speed on unpaved roadways (i.e., less than 15 miles per hour [mph]), restriction or cessation of construction activities during high wind events, and covering or otherwise shielding stockpiles of soil or similar construction materials.

2.5.5 Solar Array Assembly and Construction

The heliostats consist of glass mirror modules, structural support components, motor drives, a heliostat controller, and a foundation. There would be a total of approximately 17,500 heliostats. The support structure consists of a steel frame backing to support the mirror modules and a steel tubular post (pedestal) for supporting the heliostat in the ground. The heliostat assemblies would be mounted on steel or concrete foundations. The geotechnical information and the potential pile test program would provide the information necessary to determine the most cost-effective foundation. The most likely foundation would be a reinforced concrete pier foundation that would be cast in a drilled hole. Alternate foundations could be traditional concrete mat foundations, concrete piles, or steel piles. Solar field equipment and material laydown areas would be rotated through the site as construction progresses.

The individual heliostats are located within the solar field in order to maximize the reflected solar energy to the receiver. The precise location of each heliostat and its associated foundation can vary within a few feet of the designated coordinates in order to avoid sensitive areas within the field such as washes, flora, or subsurface irregularities (i.e., geologic anomalies). This is because the control system is able to compensate for the variation in location of each heliostat in the field, providing some (limited) flexibility in the precise location of each unit, so long as the units do not physically interfere with each other’s full range of motion and proper operation.

2.5.6 Power Block Construction

Concrete, mechanical, and electrical work would be performed over a period of months, with the aid of graders, rollers, front loaders, dump trucks, trenching machines, concrete mixer and pump trucks, cranes, and pick-ups. Approximately 90,000 cubic yards of concrete would be used to construct the power block and heliostat fields. Miscellaneous, non-vehicle, motorized equipment would also be used over the length of the job, such as welding machines and compressors.

The first phase of power block construction would consist of foundation work and underground mechanical work. Foundation construction would involve excavation, form, and rebar work preceding a number of concrete pours. The specific equipment in use would be more variable as the individual foundations and components are erected. The solar collecting tower would be constructed of reinforced concrete using a slip-form process. Underground pipe work would require trenching, onsite welding, backfill, and compaction. When the foundations have cured adequately, major equipment and aboveground piping could be installed. During this phase of construction the steam turbine generator, water treatment system, cooling tower and/or air-cooled condenser (depending on the alternative), generator step-up transformer, unit auxiliary transformers, and other ancillary equipment would be set on their corresponding foundations. Major equipment components would then be installed, and pump, turbine, and fan alignments would be performed.

With the equipment set on their foundations, aboveground piping and electrical activities can be completed. Piping and electrical cable would be terminated at equipment interfaces. High-voltage bus duct would be installed between the steam turbine generator and generator step-up transformer. The final construction activities would include site paving, installation of final surfacing of power block areas (such as crushed stone), completion of final landscaping, and any remaining restoration of temporarily disturbed areas. Once systems are installed and complete, commissioning would begin.

2.5.7 HTF Material Process

The HTF material (salt) would be delivered to the Project area at an indoor storage and staging location. The material would be delivered in 1.2-metric ton "super sacks," some or all of which would be stored onsite until melted for use in the plant process. The remainder of the salt would be delivered to the site and incorporated into the salt melting operation over a period of approximately 10 months at a rate of approximately 150 super sacks per day until the entire quantity has been received. A standard multi-axle highway transport truck can carry approximately 30 super sacks at one time. The salt must be heated until liquefied for use in the system, and would be stored within a secured laydown area within the Project area until it is heated, liquefied, and pumped into the storage tanks.

The HTF system hot and cold storage tanks would first be preheated to help prevent against thermal shock to the tank and foundation. It is expected to take approximately 2 to 3 months to melt and load the complete volume of salt. The salt is not consumed and is expected to remain in an effective and usable form throughout the operating plant life.

2.5.8 Transmission Line

The 1.5-mile long 161/230-kV transmission line between the solar field and Western's switchyard would be constructed as a single-circuit overhead line, on steel monopoles or lattice structures. Foundation holes for the transmission towers would be excavated, forms constructed, reinforcing bars installed, and concrete poured. The structures would be assembled in sections at a staging area and then transported to each tower location by truck, placed by crane, and bolted to the foundations. The design of the transmission line would be in accordance with industry codes and standards.

Before conductor installation begins, temporary guard structures would be installed at road crossings and other locations where the new conductors may inadvertently come into contact with electric or communications facilities and/or vehicular traffic during installation. These guard structures consist of one or two poles on either side of the feature crossed with a "V"-shaped cargo net tensioned between the guard structures.

The actual conductor-stringing operation begins with the installation of rollers attached to the cross arm of the transmission structure. The rollers allow the individual conductors to be pulled through each structure until the conductor is ready to be pulled up to the final tension position. When the pull and tension equipment is set in place, a sock line (a small cable used to pull in the conductor) would be pulled from tower to tower using ground equipment. After the sock line is installed, the conductor would be attached to the sock line and pulled in, or strung, using the tension-stringing method. This involves pulling the conductor through each tower under a controlled tension to keep the conductor elevated above crossing structures, roads, and other facilities. After the conductor is pulled into place, tension would be adjusted to a pre-calculated level. The conductor is then clamped to the end of each insulator as the rollers are removed. The final step of the conductor installation would be to install vibration dampers and other accessories.

2.5.9 Western's Switchyard

Western's proposed 161/230-kV interconnection switchyard would be constructed on BLM-administered land adjacent to the existing right-of-way of Western's Bouse-Kofa 161-kV transmission line. Primary construction and maintenance access to the switchyard site would be off of SR 95 and the new access road between SR 95 and the solar facility.

The switchyard is expected to be approximately 400-feet wide by 500-feet long (approximately 5 acres). The switchyard would contain power circuit breakers, disconnect switches, steel busses, steel poles, cables, metering equipment communication equipment, DC batteries, and other equipment. The switchyard facilities would be constructed, owned, and operated by Western through a land use agreement with the BLM.

The 161/230-kV switchyard would temporarily require approximately 7 acres during construction. Construction vehicles and equipment that would be needed for the construction of the switchyard include large cranes, heavy backhoes and earthmovers, large forklifts, and various power tools. Construction of the switchyard and interconnection facilities would involve several stages of work including access road construction and/or improvement; grading of the switchyard area; construction of foundations for transformers, steel work, breakers, control houses; and other outdoor equipment.

A temporary staging area would be developed on approximately two acres adjacent to the switchyard site. The staging area would be used for construction safety meetings, to host office trailers, temporary sanitation stations, parking for equipment, vehicle parking for equipment operators and construction workers, and staging for limited project components. The staging area would be prepared by clearing and grading as needed. The area would then be covered with four to six inches of gravel to provide a level ground surface.

To interconnect the new switchyard with the existing Bouse-Kofa 161-kV transmission line, two existing H-frame transmission structures (one north and one south of the new switchyard), would be replaced with two dead-end type structures. These poles would resemble the existing H-frame structure, but would be more robust in construction. The new structures would be located in the existing structure locations and would require an area of 4,000 square feet to install.

Switchyard start-up would follow a detailed plan for testing and energizing the step-up substation, tie-line, and interconnection switchyard in a defined sequence, with lock and tags on breakers to ensure safety and allow for fault detection prior to energizing any component of the system. Switchyard start-up would not require any heavy machinery to complete.

During operation of the new switchyard, authorized Western personnel would conduct periodic inspections and service equipment as needed. Properly trained maintenance personnel would monitor and manage the use, storage, and replacement of gas-filled breakers to minimize any releases to the environment. During inspections, equipment would be monitored for detection of leaks and repairs would be made as appropriate. The switchyard would be designed to operate from a remote location, and no permanent employees would be required.

2.5.10 Post-Construction

QSE would restore all temporarily disturbed areas, to the extent practicable, to their preconstruction conditions, as required by Western and the BLM. These include temporary construction areas and access roads as well as offsite underground utility alignments. These areas would be regraded and revegetated to restore them to pre-existing conditions.

Site stabilization could include the use of soil binders, geo-grid, or aggregate surfacing to allow the movement of maintenance vehicles and mirror wash water trucks to travel within the solar array.

2.6 PROJECT OPERATION, MAINTENANCE, AND DECOMMISSIONING

The facility would be operated up to 7 days a week/10 or more hours per day. The facility would be staffed 24 hours per day, and would be operated in the following mode:

- The facility would be operated up to its maximum output as dictated by the available solar insolation and the available thermal storage, for as many hours per year as possible.
- The facility would be placed in standby mode every night when the solar insolation or thermal energy storage level drops to a point that results in the steam turbine generator output to be reduced from its maximum designed capacity.
- A full shutdown would occur if forced by equipment malfunction, transmission line disconnect, or scheduled maintenance.

Long-term operation of the facility would include periodic maintenance and overhaul of all balance-of-plant and solar facility equipment including, but not limited to, the steam turbine generator, pumps, and piping, in accordance with manufacturer-recommended schedules. Routine cleaning of the heliostats with demineralized water would be necessary to maintain the desired mirror reflectivity.

Regular inspections of the substation and electric transmission line would be conducted by certified site personnel as required by Federal, State, and local codes or as needed under emergency conditions. All non-destructive testing and in-process compliance inspections and certifications would be completed in accordance with the applicable Federal, State, and local codes for each given activity. Various inspection processes, including aerial inspection, ground inspection, and climbing, may be conducted. All of the onsite substation structures would be inspected from the ground on an annual basis for corrosion, misalignment, and foundation condition. Frequency of inspection may vary depending on factors such as the age of the system, structure type, and vegetation conditions.

2.6.1 Operations Workforce

Management, engineering, administrative staff, skilled workers, and operators would serve the solar plant. The Project would employ approximately 47 full-time employees during operation. It is planned that plant personnel would be onsite in two 12-hour shifts or three 8-hour shifts, 7 days a week, to ensure that the facility would be staffed at all times. The full-time staff required for operations and maintenance of the facility would be approximately 1 operator for every 12-hour rotating shift, 4 relief operators, 4 maintenance technicians, 4 mirror washers, 1 to 2 process/performance engineers, 1 maintenance manager, and 5 to 7 administrative staff members per day. An additional part-time staff of 5 to 15 subcontractor personnel would be onsite periodically to conduct occasional maintenance of the facility, including cleaning or repairing equipment; system testing; removing, repairing, and/or installing insulation before and after maintenance; scaffold installation and removal; and personnel facility-related activities.

2.6.2 Decommissioning

The lifespan of the Project is expected to be at least 30 years. At the end of the Project's useful lifespan, the facilities would be either repowered or decommissioned. Due to the excellent solar resource at the Project area, repowering is a viable option. This may involve retrofitting existing components with updated, more efficient components; thereby extending the useful lifespan of the Project.

The procedures described for decommissioning are designed to ensure public health and safety, environmental protection, and compliance with applicable regulations. It is assumed that decommissioning would begin 30 to 50 years after the commercial operation date of the solar plant.

The Project goals for site decommissioning are as follows:

- Remove above-ground structures, unless converted to other uses
- Restore the lines and grades in the disturbed area of the Project area to match the natural gradients of the site
- Re-establish native vegetation in the disturbed areas

Although various types of decommissioning and demolition equipment would be utilized to dismantle each type of structure or equipment, dismantling would proceed according to the following general staging process. The first stage consists of the dismantling and demolition of above-ground structures. 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 consists of the excavation and removal of soils and final site contouring to return the originally disturbed area of the Project area to near original conditions while disturbing as little of the other Project area portions, as is practical.

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 a central recycling/staging area where the debris would be processed for transport to an offsite recycler.

The below-ground facilities to be removed would 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 Project-related piping and utilities—including water lines—below ground electric, control, and communication 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.

The need for, depth of, and extent of contaminated soil excavation would 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 used during decommissioning. At this time, removal of contaminated soil is assumed not to be needed. 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 would be 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.

Recontouring of the Project area 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. 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.

After recontouring, the Project area would be revegetated using native plants and seeds, where appropriate.

If approved, the ROW authorization for the proposed Project would include a required Performance and Reclamation bond to ensure compliance with the terms and conditions of the

ROW authorization, consistent with the requirements of 43 CFR 2805.12(g). The "Performance and Reclamation" bond would consist of three components. The first component would be hazardous materials; the second component would be the decommissioning and removal of improvements and facilities; and the third component would address reclamation, revegetation, restoration, and soil stabilization.

2.7 BEST MANAGEMENT PRACTICES AND BUILT-IN MITIGATION

The Project would use standard construction procedures pursuant to the BLM IM-2011-003 that advises developers to refer to the Solar Energy Development Programmatic EIS (currently in draft format), which provides "potential BMPs that could mitigate or reduce adverse impacts from solar energy development on the public lands." In addition, construction of the Project would be subject to agency-required mitigation measures that are intended to guide construction activities and development of facilities to minimize environmental and operational impacts. BMPs include standards associated with overall Project management, surface disturbance, facilities design, erosion control and revegetation, hazardous materials, Project monitoring, and responsibilities for environmental inspection. The switchyard would be constructed in conformance with Western's construction standards. An example of one of Western's standard construction guidelines, Construction Standard 13: Environmental Quality Protection, is provided in Appendix B.

2.7.1 Stormwater Drainage

The proposed Project area has an incline that slopes at less than 1 percent. The stormwater drainage system would be designed to separate the "offsite" stormwater flows from "onsite" stormwater flows. The offsite flows are considered the flows generated from rain that fall outside of the developed area of the solar generating facility. The onsite flows are considered the flows generated from rain that fall inside the developed area of the solar generating facility.

Offsite flows are sourced from an area east of the site, originating in the Plomosa Mountains. Two offsite drainage watersheds pass storm flows through the Project area. The drainage watersheds are 3,484 and 2,603 acres, respectively. The stormwater runoff from these watersheds sheet flows towards the Project area through desertscrub landscape and existing washes.

Due to the type of terrain, the minor slopes, and the offsite flows being isolated, the stormwater management would be achieved with limited sized ditches, swales, and berms. Based on site visits and a review of aerial photos, it appears that the offsite storm flows have not been redirected in the past. A collector ditch and dike system would divert offsite flows around the solar generating facility and discharge these flows to pre-existing locations downslope from the developed area and to the existing swale crossings on SR 95. These offsite flows would then follow the existing drainage patterns.

Onsite stormwater runoff within the heliostat field would be allowed to sheet flow along its current drainage pattern to the west end of the heliostat field. At this location, an expansive and shallow detention basin would be constructed to detain any increase in storm flows, and to allow a location for sediment control. The detention area shall attenuate the post-developed 100-year, 24-hour storm event runoff, and discharge at the pre-developed 100-year, 24-hour storm event flow rate. The detention facility, to be located in the western portion of the solar field, would be constructed in order to slow the water, allow it to infiltrate, and promote flow patterns into their existing drainage patterns.

The stormwater drainage system would be designed using the Soil Conservation Service method (TR-55) to determine the amount of rainfall during a specific rainfall event, and in accordance with requirements specified in the most current version of the La Paz County design requirements.

All surface water runoff during and after construction would be controlled in accordance with the requirements of the National Pollution Discharge Elimination System (NPDES) permits for Stormwater Discharges Associated with Construction Activity and Stormwater Discharges Associated with Industrial Activity, the requirements of La Paz County, and all other applicable laws, ordinances, regulations, and standards.

2.7.2 Erosion and Dust Control

Construction and industrial operations at the site would be subject to NPDES permits for Stormwater Discharges Associated with Construction Activity and Stormwater Discharges Associated with Industrial Activity. Compliance with these permits would require preparation and implementation of construction and operation SWPPPs that address the following requirements (among others):

- Identification of activities that may pollute stormwater
- Identification of BMPs to control stormwater pollution, including water erosion and wind erosion
- BMP inspection, maintenance, and repair
- Training
- Site inspection and monitoring

Erosion and sedimentation control BMPs would be designed and implemented to meet the requirements of the NPDES permits, as well as any requirements specified by Western and the BLM. In addition, grading and earthwork would follow the general requirements of La Paz County.

The area of soil disturbance for the Project would be kept to a minimum to limit wind and water erosion and enhance successful site rehabilitation/restoration. The areas of soil disturbance would be limited to perimeter ditch alignments, access roads, construction support areas, and the heliostat, power block, and operational support facilities.

Soil stabilization measures would be used to prevent soil being detached by stormwater runoff or wind erosion. QSE's construction contractors would employ temporary and permanent BMPs to protect the soil surface by covering or binding soil particles or preventing the concentration of runoff. The Project would incorporate erosion-control measures required by regulatory agency permits and contract documents, as well as other measures selected by the engineer. Site-specific

BMPs would be identified in the SWPPP, with final selection and design by the engineer, and associated figures to be included in the final active Project SWPPP.

Project design features and/or mitigation measures that would aid in the protection of soil resources could include, at a minimum, the following:

- Erosion and sedimentation control calculations performed to verify acceptable stormwater velocities, calculate BMP clean-out frequencies, and size rip rap.
- Construction and final drainage designed to promote sheet flow, avoid unnecessary concentration of runoff, and control runoff velocity.
- Stone filters and check dams strategically placed throughout the site to provide areas for sediment deposition and to promote the sheet flow of stormwater prior to leaving the site boundary. Where available, native materials (rock and gravel) would be used for the construction of the stone filter and check dams.
- Diversion berms, culverts, and water bars would be utilized to redirect stormwater.
- Diversion channels would be armored as required to prevent erosion and scouring.
- Flat detention/infiltration ponds and ditches would be used.
- Where possible, maintenance roads would be designed not to disrupt regional flow patterns.
- Silt fences would be utilized extensively during each phase of construction to minimize wind and water erosion. Silt fence locations have yet to be determined and would be provided in the Project SWPPP.
- In areas of temporary disturbance (e.g., transmission line alignment, temporary construction support areas), the surface would be recontoured to promote sheet flow and restore and match the original or surrounding drainage function. Native vegetation would be restored to promote rehabilitation of the landscape.
- Periodic maintenance conducted as required after major storm events and when the volume of material behind the check dams exceeds 50 percent of the original volume. Stone filters and check dams are not intended to alter drainage patterns, but are intended to minimize soil erosion and promote sheet flow.
- Erosion and Sedimentation control BMP design would be in accordance with applicable government codes and standards.

Dust control measures implemented to meet or exceed ADEQ requirements are expected to include, but would not be limited to:

- Frequent application of water to active earthmoving areas
- Restriction in construction vehicle speeds on unpaved roadways (i.e., less than 15 mph)

- Application of gravel or other surface palliatives to most-used unpaved areas and roadways
- Restriction or cessation of construction activities during "high wind" events
- Covering or otherwise shielding stock piles of soil or similar construction materials
- Installation of vehicle "track out" areas or wash down areas to prevent fine dust from being tracked onto adjacent paved roads

For the point sources involved in the construction phase, such as the optional concrete batch plants and aggregate plant, dust collectors would be used to control particulate matter emissions from the loading and unloading of silos. Additional controls would include water sprays, enclosures, hoods, curtains, shrouds, and chutes. The movement of heavy trucks over unpaved or dusty surfaces in and around these onsite plants would be controlled by good maintenance, wetting of the road surface with water, and/or the use of dust suppressants.

2.7.3 Vegetation Treatment and Weed Management

The developed portions of the Project area would be cleared of vegetation, grubbed, and graded level to the extent necessary. Prior to clearing, native plants would be assessed and salvaged per Arizona Department of Agriculture policies.

Key considerations for vegetation treatment of the Project area include:

- Soil disturbance in support of construction would increase likelihood of noxious weed introductions. Regular weed monitoring and management during construction would be required. Ongoing maintenance activities at the heliostat locations would also have the potential for ongoing introduction of weedy species through soil disturbance and equipment entrance. As a result, ongoing weed management would be implemented.

- Where temporary access is needed to install facilities or site leveling is not required for drainage or access, no dedicated removal of existing vegetation or grading would occur. Rather, trucks and equipment would drive over and crush existing desertscrub vegetation without direct removal or the vegetation would be cut to ground level, leaving the root system in place for soil stabilization.

- Revegetation with native species would be implemented to the extent feasible. Areas of temporary disturbance—such as temporary construction roads, temporary construction support, and staging and laydown areas—would be recontoured and revegetated.

- Topsoil would be stockpiled from the Project area for use in revegetation of the disturbed soils. The topsoil excavated would be segregated, kept intact, and protected, under conditions shown to sustain seed bank viability. The upper 1 inch of topsoil, which contains the seed bank, would be scraped and stockpiled for use as the top-dressing for the revegetation area. An additional 6 to 8 inches of soil below the top 1 inch of soil would also be scraped and separately stockpiled for use in revegetation areas. Topsoil would be replaced in its original vertical orientation following ground disturbance, ensuring the integrity of the top 1 inch in particular.

The Applicant would develop a Weed Management Plan that describes the non-native, noxious, or invasive weed species that occur or are likely to occur within the Project area, and prescribes management actions that may be taken to monitor for and eradicate specified species, including mechanical and chemical methods. The Weed Management Plan would also describe applicable regulations for the use of herbicides on federally managed land in Arizona, and provide the basis for proper management and use of herbicides at the site.

Typical operations and maintenance requirements for native landscapes are low, once established. The Weed Management Plan would include weeding, annual pruning, and soil monitoring if necessary. Weeding should occur frequently, typically weekly, during the initial growth period to ensure that invasive plants do not mature and set seed. Weeding activities would follow the approved Weed Management Plan. Once the native plant species are established, weeding frequency would drop to less frequent intervals.

2.7.4 Wildlife Resources

The following BMPs have been established to minimize the impacts to wildlife resources as a result of activities associated with construction and operation of the Project:

- In areas where sensitive biological resources have been identified, biological monitors would be assigned during construction operations. Responsibilities would include: (1) promoting avoidance, to the maximum extent possible, of impacts to sensitive species, wildlife habitat, or other unique resources; (2) as appropriate, flagging boundaries of areas to be excluded from construction activities to protect wildlife or sensitive species; (3) monitoring such restricted areas during construction.

- In order to comply with the MBTA, nest clearance surveys would be conducted by a qualified biologist prior to all surface-disturbing activities taking place during avian nesting season (February 15 to September 15) (Corman and Wise-Gervais 2005). All nests would either be protected in place until the chicks had fledged or relocated into suitable habitat, in compliance with any USFWS permit requirements.

- Caution signs, indicating the potential for wildlife crossing, would be posted periodically along each access route. Particular locations for these signs would be at the beginning and end of each access road and where roads intersect xeroriparian washes. If signs and speed limits are ineffective, speed bumps would be installed to further limit the speed of vehicles.

- All steep-walled excavations would be covered at the end of each day to prevent wildlife entrapment. A biological monitor would inspect all open excavations a minimum of twice a day and immediately prior to backfilling. Any animals found in excavations would be safely removed and relocated out of harm’s way.

2.7.5 Hazardous Materials and Waste Management

There would be a variety of chemicals and hazardous substances stored and used during construction and operation of the Project. The storage, handling, and use of all chemicals would be conducted in accordance with applicable laws, ordinances, and regulations. The following planning documents would specify procedures for the proper storage and management of these substances at the site.

Health and Safety Requirements – To comply with regulations set forth by OSHA and the Arizona Division of Occupational Safety and Health, health and safety programs would be established for construction and operations at the site that would document potential hazards and requirements for establishing and maintaining a safe working environment during construction and operation. The programs would include identification of all hazardous substances and chemicals used at the site, including Material Safety Data Sheets, a communication and training program, labeling, and identification of hazards and safe work practices. In addition, safety showers and eyewashes would be provided adjacent to, or in the vicinity of, chemical storage and use areas. Plant personnel would use approved personal protective equipment during chemical spill containment and cleanup activities. Personnel would be properly trained in the handling of these chemicals and instructed in the procedures to follow, in case of a chemical spill or accidental release. Supplies of absorbent material would be stored onsite for spill cleanup.

Construction and Operating Stormwater Pollution Prevention Plans – The Project would prepare and implement a SWPPP and file a Notice of Intent with the ADEQ to comply with the General Construction and General Industrial Stormwater NPDES permit. The plans would include procedures to be followed during construction to prevent erosion and sedimentation, non-stormwater discharges, and contact between stormwater and potentially polluting substances.

Hazardous Materials Business Plans – Hazardous Materials Business Plans would be filed with La Paz County for the construction and operation of the facility. The plans would inventory the hazardous materials and waste properties, quantities, storage containers and locations, and contingency planning and emergency response procedures.

Spill Prevention Control and Countermeasure Plans – SPCC Plans would be prepared for construction and operation of the Project. The plans would include spill prevention and countermeasures procedures to be implemented, including, but not limited to, a spill record (if applicable), analysis of potential spills, description of containment facilities, fill and overfill prevention facilities, spill response procedures, and personnel training.

The solar facility would require the use of a mixture of sodium and potassium nitrate salts. To ensure worker safety, the hot and cold HTF tank areas would be designed such that any release would be contained in a basin. The Construction SWPPP would specify procedures to prevent contact between HTF and stormwater during processing of this material prior to plant startup. In addition, the processing area would be cleaned to ensure residual HTF is removed from surface soil after processing.

Industrial wastewater would consist of a relatively small amount of blowdown from the steam system and RO treatment return flow. This wastewater would be disposed of in evaporation ponds at the site. A technical document would be submitted to the ADEQ to permit evaporation ponds for industrial wastewater disposal at the site. The technical document would include waste characterization, impoundment design, leak collection and detection, construction and operating parameters for the ponds, and closure requirements.

Domestic wastewater would be treated and disposed of at the site using a septic disposal system consisting of septic tanks and leach field permitted with the ADEQ and La Paz County. Up to two separate septic and leach field systems may be constructed: one located in the power block to service the Operations and Control Building, and the other located outside the heliostat field near the facility entrance to service the Administration Building.

Project operations would produce maintenance and plant wastes typical of a power generation plant. These wastes would be managed in accordance with a Waste Management Plan. Wastes may include oily rags, broken and rusted metal and machine parts, defective or broken solar mirrors and electrical materials, empty containers, and other miscellaneous solid wastes, including the typical refuse generated by workers. These materials would be collected by a local waste disposal company and disposed of at a landfill permitted to receive these wastes. Waste collection and disposal would be in accordance with applicable regulatory requirements to minimize health and safety effects, prevent leaks and spills, and prevent potential contact with stormwater.

Several methods would be used to properly manage and dispose of hazardous wastes generated by the Project. Waste lubricating oil would be recovered and recycled by a waste oil recycling contractor. Spent lubrication oil filters would be disposed of in a Class I landfill. Workers would be trained to handle hazardous wastes generated at the site.

Chemical cleaning wastes would consist of alkaline and acid cleaning solutions used during pre-operational chemical cleaning of heat exchangers piping systems after the units are put into service. These wastes, which can contain elevated metal concentrations, would be temporarily stored onsite in portable tanks, and disposed of offsite by a chemical cleaning contractor, in accordance with applicable regulatory requirements.

2.7.6 Health and Safety Program

A health and safety program would be established for construction and operation at the site. The program would include the following components:

- Policies and responsibilities
- Emergency response and contingency planning
- Hazard identification and job safety analysis
- Hazard communication
- Safe work practices
- Personal protective equipment
- Hazardous work permitting systems
- Special considerations for electrical safety, hazardous materials and wastes, fall protection, confined spaces, and mobile equipment safety
- Training requirements

- Incident reporting and investigation
- Record keeping requirements

The Project would also develop and implement a construction safety training program that would be adapted to serve as an operations safety training program as the Project transitions from construction into routine power generation facility operations. The elements of the safety training program would be essentially the same for operations as for construction, but specifics of the training would be adapted as needed to be suitable for the specific work activities associated with operations to the extent that the various activities differ between the two phases. Typical training courses and the employees who are required to receive the training are provided in Table 2-4.

Table 2-4 Training Program

Training Course	Target Employees
Injury and Illness Prevention Training	All employees
Emergency Action Plan Training	All employees
Personal Protective Equipment Training	All employees
Heavy Equipment Safety Training	Employees working on, near, or with heavy equipment
Forklift Operation Training	Employees working with forklifts
Excavation and Trenching Safety Training	Employees involved with trenching or excavation operations
Fall Protection Training	All employees
Scaffolding and Ladder Safety Training	Employees required to use or erect scaffolding and employees using ladders
Hoist and Rigging Program	Employees and supervisors responsible for conducting hoists and rigging operations
Crane Safety Training	Supervisors and crane operators
Fire Protection and Prevention Training	All employees
Blood Borne Pathogens Training	First responders
Hazard Communication Training	Employees working with or handling hazardous materials
Electrical Safety Training	Employees performing work with electrical systems, equipment, or electrical extension cords; additionally, employees working with lockout/tagout activities
Hand and Portable Power Tool Safety Training	All employees
Heat Stress and Cold Stress Safety Training	All employees
Hearing Conservation Training	All employees
Back Injury Prevention Training	All employees
Safe Driving Training	All employees

Table 2-4 Training Program	
Training Course	**Target Employees**
Pressure Vessel and Pipeline Safety Training	Employees supervising or working on pressurized vessel, pipes, or equipment
Respiratory Protection Training	All employees required to wear respiratory protection equipment
Hot Work Training	All employees working with welding, heating, or other equipment that generates ignition sources

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