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Chapter 4.0 Environmental Consequences

4.1 Introduction

This chapter describes the environmental consequences that would result from the adoption of this *Proposed Toquop Land Disposal Amendment to the Caliente MFP and FEIS for the Toquop Energy Project*; exchanging either of the Toquop parcels for the Pah Rah parcel; and the construction, operation, and maintenance of the Toquop Energy Project. Effects of implementing the No Action Alternative also are described. The impact analysis focuses on potential direct, indirect, total, and cumulative impacts on the project area resources that were described in *Chapter 3, Affected Environment*. Mitigation measures are identified that would avoid, reduce, rectify, or compensate for certain adverse impacts. The final sections of this chapter describe unavoidable adverse impacts, short-term uses of the environment and long-term productivity, the irreversible and irretrievable commitments of resources, and energy requirements and conservation potential.

4.1.1 Assumptions and Assessment Guidelines

Assumptions and assessment guidelines for specific resource areas are summarized in the appropriate resource topics in this chapter. Common assumptions that were followed during the preparation of this *Proposed Toquop Land Disposal Amendment to the Caliente MFP and FEIS for the Toquop Energy Project* are the following:

- Project features were designed only to the feasibility level, which represents reasonable approximations for assessing potential project impacts and recommending appropriate mitigation measures.
- The expected life of the project is approximately 42 years (26-month construction period and 40-year operation period).
- The design of the Tule Desert wellfield and associated pipelines would only have sufficient capacity to supply the Toquop Energy Project.
- Environmental resource data have been developed and analyzed to the level of detail necessary to understand potential impacts and to distinguish project effects (both beneficial and adverse) among the Proposed Action and alternatives.
- Ground water data developed for this study are the best available representation of current and predicted conditions.
- Construction workers would be hired primarily from the local labor force in the Clark/Lincoln County area and most of those would commute from Las Vegas.
- Measures described in *Appendix A, Measures for Protecting Desert Tortoises and Their Habitat, Appendix B, Standard Construction and Operation Procedures, and Appendix C, Cultural Resources Programmatic Agreement,* are an integral part of the Proposed Action and Alternatives 1, 2, and 3.

- Mitigation measures would be implemented concurrent with the construction of project features.

- A Plan of Development (POD) will be finalized that details the construction of the power plant, access road, and ancillary facilities, and that incorporates site-specific stipulations, terms, and conditions associated with lands administered by the Ely and Las Vegas Field Offices of the BLM where project features would be located.

- Cumulative impacts consist of the potential impacts of the Proposed Action, Alternative 1, Alternative 2, or Alternative 3 for the Toquop Energy Project plus the potential impacts of the past, present, and reasonably foreseeable projects identified in *Chapter 1, Section 1.8, Interrelated Projects.* Only those projects that meet the criteria listed in *Section 1.8* and discussed in *Section 4.18, Cumulative Impacts*, are assessed for potential cumulative impacts.

4.1.2 Incomplete and/or Unavailable Information

The Code of Federal Regulations at 43 CFR 1502.22 mandates that agencies evaluating reasonably foreseeable significant adverse effects on the human environment in an EIS must identify potentially incomplete or unavailable information.

During the preparation of this *Proposed Toquop Land Disposal Amendment to the Caliente MFP and FEIS for the Toquop Energy Project*, information was incomplete and/or unavailable in three principal areas associated with the assessment of environmental consequences to ground water resources:

- The amount and movement of ground water in the basin-fill deposits within the Tule Desert.

- The amount and movement of ground water in the fractured-rock aquifer underlying both the Tule Desert and the Virgin River Valley hydrographic areas.

- The location(s) and amount(s) of ground water recharge and discharge from the fractured-rock aquifer underlying the Tule Desert.

Incomplete or unavailable information is discussed in detail in Section 4.4.1, *Groundwater Resources—Incomplete and/or Unavailable Information.*

4.1.3 Option for BLM to Issue ROWs

Under the Proposed Action, Alternative 1, Alternative 2, or Alternative 3, BLM could, in lieu of or in advance of the land disposal for the Toquop parcel, issue a ROW for the power plant site. The only additional effects on project area resources that would result from implementation of the Toquop Energy Project through a series of ROWs rather than a land disposal (that is, lower tax receipts) are described in *Section 4.16.5, Socioeconomics.*

4.2 Soils and Geology

This analysis addresses the potential soil constraints during project construction in the Toquop area. Because no impacts on soils are expected during project operation, that issue is not addressed further. This analysis also addresses the potential geologic constraints during

construction in the Toquop area. Because no impacts on geology are expected during project operation, that issue is not addressed further.

4.2.1 Soils

4.2.1.1 Proposed Action

4.2.1.1.1 Impacts

Toquop Area. An estimated 449 acres of soils would be disturbed and/or included in construction rights-of-way under the Proposed Action. Of this total, 267 acres would be reclaimed and 182 acres used for project features. Biological soil crusts present at the power plant site and along the proposed water pipeline corridor would be disturbed and some would be lost. However, the project has been designed to minimize the acreage of soils disturbed, and disturbed areas will be reclaimed. Soils disturbed during project construction activities may result in a temporary increase in erosion and wind-blown dust until construction is completed. After the BMPs and SOPs are implemented, no impact would result. Also, paving the access road may increase the potential for localized runoff and erosion. Improved access to the area via this road may result in greater off-highway vehicle (OHV) use and resultant impacts to soils.

Pah Rah Parcel. No construction activities would be associated with the proposed land exchange. The proposed land exchange in Washoe County (Pah Rah parcel) would not alter existing onsite soils and would not result in impacts to those soils.

4.2.1.1.2 Mitigation. No mitigation is required.

4.2.1.2 Alternative 1

4.2.1.2.1 Impacts. Impacts associated with Alternative 1 would be similar to those described for the Proposed Action. An estimated 451 acres of soils, including some biological soil crusts, would be disturbed under this alternative. Of this, 269 acres would be reclaimed and 182 acres used for project features.

4.2.1.2.2 Mitigation. No mitigation is required.

4.2.1.3 Alternative 2

4.2.1.3.1 Impacts. Impacts associated with Alternative 2 would be similar to those described for the Proposed Action. An estimated 581 acres of soils, including some biological soil crusts, would be disturbed under this alternative. Of this, 344 acres would be reclaimed and 237 acres used for project features.

4.2.1.3.2 Mitigation. No mitigation is required.

4.2.1.4 Alternative 3

4.2.1.4.1 Impacts. Impacts associated with Alternative 3 would be similar to those described for the Proposed Action. An estimated 417 acres of soils, including some biological soil crusts, would be disturbed under this alternative. Of this, 267 acres would be reclaimed and 150 acres used for project features.

4.2.1.4.2 Mitigation. No mitigation is required.

4.2.1.5 No Action Alternative

Implementation of the No Action Alternative would result in no change to

the Toquop area and Pah Rah parcel. Trends and future conditions in the Toquop area and Pah Rah parcel under the No Action Alternative are expected to be the same as existing conditions described in Chapter 3. Therefore, no soils impacts in the Toquop area and on the Pah Rah parcel would be expected.

4.2.2 Geology

4.2.2.1 Proposed Action

4.2.2.1.1 Impacts

Toquop Area. No geologic features or resources within the project area would be affected by the Proposed Action.

The presence of firmly cemented conglomerate rocks and caliche in the near-surface soils at the plant site under the Proposed Action could pose difficulties for excavation activities during construction.

The risk of adverse ground acceleration (shaking) as a result of seismic events is perceived to be very low throughout the project area. In addition, because of the following three principal reasons, the risk of liquefaction of the soils at the Proposed Action plant site is low: 1) the presence of the cemented conglomerate and caliche in the subsurface; 2) predominance of coarse-grained sediments in the near-surface soils; and 3) deep water table on the order of hundreds of feet (see *Section 3.4, Ground Water Resources*).

Pah Rah Parcel. No construction or operation activities would be associated with the proposed land exchange, and no geological impacts would occur on the Pah Rah parcel.

4.2.2.1.2 Mitigation. No mitigation is required.

4.2.2.2 Alternative 1

4.2.2.2.1 Impacts. No impacts would be associated with Alternative 1, the same as described for the Proposed Action.

4.2.2.2.2 Mitigation. No mitigation is required.

4.2.2.3 Alternative 2

4.2.2.3.1 Impacts. No impacts would be associated with Alternative 2, the same as described for the Proposed Action.

4.2.2.3.2 Mitigation. No mitigation is required.

4.2.2.4 Alternative 3

4.2.2.4.1 Impacts. No impacts would be associated with Alternative 3, the same as described for the Proposed Action.

4.2.2.4.2 Mitigation. No mitigation is required.

4.2.2.5 No Action Alternative

Implementation of the No Action Alternative would result in no change to the Toquop area and Pah Rah parcel. Trends and future conditions in the Toquop and Pah Rah areas under the No Action Alternative would be the same as existing conditions. Therefore, no impacts on geologic features or resources in the Toquop area and Pah Rah parcel would occur.

4.3 Surface Water Hydrology

The following text discusses potential impacts and mitigation associated with surface water in the Toquop area.

4.3.1 Proposed Action

4.3.1.1 Potential to Cause Flooding

4.3.1.1.1 Impacts

Toquop Area. Locally high-intensity rainfall events could cause the local washes in the Toquop project area to carry high volumes of runoff for short periods of time. Some of the features of the Proposed Action are located within a Zone D flood area (undetermined flood hazards) as designated by FEMA.

The flooding potential, however, results mainly from flows in the smaller local washes and not from flows in either the Toquop Wash or the South Fork Toquop Wash, the two principal surface water drainage features in the project area. This conclusion is based on the fact that each of these larger washes has cut deep canyons or arroyos within the project area that are anticipated to contain flows that correspond to a maximum 100-year return interval runoff events.

Plant Site. Six small, unnamed washes cross Section 36 where the power plant would be located under the Proposed Action. The specific disturbed area where the plant structures and facilities would be constructed directly straddles one of these washes. That particular wash, therefore, would be filled and its watercourse diverted to one or more adjacent washes. As a result, the amount and rate of flow in the wash(es) that receive(s) the diverted flows would increase when local rainfall events are great enough to generate runoff.

Construction of the power plant would create areas that are impervious (covered by impermeable surfaces such as roofs, roads, parking areas), which would increase the amount and rate of flow of runoff from local storms. The total area rendered impervious would be approximately 15 acres. Assuming that the maximum daily rainfall at the plant site is approximately 3 inches (NOAA, 1975), the corresponding stormwater runoff from the 15 acres of impervious surfaces would be approximately 3.75 acre-feet, or approximately 2 cubic feet per second (cfs) averaged over 24 hours.

Linear Facilities. During both construction and operation, the linear facilities associated with the Proposed Action (such as, access road, water pipeline, and electricity to the wellfield) would not affect the ephemeral washes they cross.

Under the Proposed Action, the utilities (water pipeline and electricity to the wellfield) would be routed across several washes, including the South Fork Toquop Wash, and through the Toquop Gap, which is the watercourse of the main Toquop Wash. Where the utilities cross the various washes, particularly the Toquop and the South Fork, the utilities would be buried sufficiently deep so as not to affect water flow or erosional processes (scouring) in the bottom of these washes.

The access road under the Proposed Action will utilize culverts to channel storm water under the road. These culverts will be sized appropriately according to local requirements. Therefore, the road would experience flooding only during extreme runoff events, and flooding would not constitute an environmental impact.

Wellfield. The wellhead structures associated with each well would occupy an area of 1 acre or less within the Tule Desert and would be located away from ephemeral washes and other low-lying areas susceptible to flooding. In addition, the impervious surface area around each well would be small (likely less than 300 square feet). No additional surface water runoff would be generated by these impervious areas. Therefore, construction and operation of the wellfield in the Tule Desert would not affect surface water hydrology.

Pah Rah Parcel. No construction or operation activities would be associated with the proposed land exchange, and no surface water impacts would occur on the Pah Rah parcel.

4.3.1.1.2 Mitigation. To effectively mitigate the effects of additional runoff at the plant site resulting from impervious surfaces, the Proposed Action would include a stormwater retention basin with sufficient dimensions to accommodate the runoff generated by the local maximum daily rainfall event of 3 inches or less. All runoff from the impervious surfaces would be directed to this retention basin prior to being released to the natural drainage system at flow rates equivalent to pre-development conditions.

To minimize the exposure of personnel and equipment to potential flood hazards, construction activities in the washes would be scheduled to occur when the probability for flash flooding is minimal. These measures are included in *Appendix B, Standard Construction and Operation Procedures*.

4.3.1.2 Potential for Surface Water Quality Degradation

4.3.1.2.1 Impacts

Toquop Area. Both project construction and operation in the Toquop area provide opportunity to potentially affect the surface water quality of the local washes and, in turn, the Virgin River. Water quality in the washes could be degraded by the addition of both suspended solids (sediment) and dissolved constituents (substances commonly found in stormwater runoff from parking lots and industrial areas).

During construction, earthmoving activities could increase the potential for erosion from precipitation, which, in turn, would contribute additional suspended solids (sediment load) to the runoff in the local washes. During operation, diverted runoff from the wash filled in to accommodate construction of the power plant could increase the potential for erosion, and, therefore, result in increased sediment loads in the receiving wash(es).

In addition, runoff from parking surfaces and possibly areas where plant equipment could come in contact with precipitation could add low concentrations of dissolved petroleum hydrocarbons, metals, and possibly other substances to the runoff in the local washes. Runoff from the access road could also contribute low concentrations of similar dissolved substances to the flows in the local washes.

With the implementation of commitments in *Appendix B*, no impacts to surface water quality are anticipated from the utilities that link the wellfield to the plant site, or from the development and operation of the wellfield.

Pah Rah Parcel. No construction or operation activities would be associated with the proposed land exchange, and no surface water impacts would occur on the Pah Rah parcel.

4.3.1.2.2 Mitigation. No additional mitigation is required other than a retention basin to contain stormwater runoff.

4.3.2 Alternative 1

4.3.2.1 Impacts

Existing conditions and potential impacts to surface water hydrology in the Alternative 1 project area are similar to those for the Proposed Action. The only substantive difference is that Alternative 1 does not involve crossing the South Fork Toquop Wash by the utilities. Both alternatives, however, do involve crossing the Toquop Wash, and the impacts would be the same because only the location of the crossing would differ.

4.3.2.2 Mitigation

The mitigation measures described for the Proposed Action (retention basin to contain stormwater runoff) would also be taken under Alternative 1.

4.3.3 Alternative 2

4.3.3.1 Impacts

Existing conditions and potential impacts to surface water hydrology in the Alternative 2 project area are largely similar to those for the Proposed Action. The principal exception is that the power plant site under Alternative 2 (the northern site) does not contain any washes that would have to be diverted.

4.3.3.2 Mitigation

The mitigation measures described for the Proposed Action (retention basin to contain stormwater runoff) would also be taken under Alternative 2.

4.3.4 Alternative 3

4.3.4.1 Impacts

Existing conditions and potential impacts to surface water hydrology in the Alternative 3 project area are the same as those for the Proposed Action.

4.3.4.2 Mitigation

The mitigation measures described for the Proposed Action (retention basin to contain stormwater runoff) would also be taken under Alternative 3.

4.3.5 No Action Alternative

No changes to the existing surface water hydrologic conditions would occur under the No Action Alternative; therefore, no impacts to surface water hydrology would occur.

4.4 Ground Water Resources

This section evaluates the potential impacts associated with pumping ground water from the Tule Desert to supply up to 7,000 acre-feet of water per year (afy) for 42 years to the proposed project. These impacts not only include the potential project-induced effects on ground water resources, but also the potential project-induced effects on other water resources (springs and surface water bodies).

4.4.1 Ground Water Resources—Incomplete and/or Unavailable Information

During the preparation of this *Proposed Toquop Land Disposal Amendment to the Caliente MFP and FEIS for the Toquop Energy Project*, information was incomplete and/or unavailable in three principal areas associated with the assessment of environmental consequences to ground water resources:

- The amount and movement of ground water in the basin-fill deposits within the Tule Desert.
- The amount and movement of ground water in the fractured-rock aquifer underlying both the Tule Desert and the Virgin River Valley hydrographic areas.
- The location(s) and amount(s) of ground water recharge and discharge from the fractured-rock aquifer underlying the Tule Desert.

It is recognized that the lack of complete information in these areas may lead to differences of professional scientific opinion on the degree of potential environmental consequences both to ground water resources and to flows in the Virgin River within the lower Virgin River Valley, as a result of the Proposed Action or the Alternatives 1 and 2.

In addition, inasmuch as the ground water resources of the Tule Desert have not been developed to date, the potential ground water level declines and possible changes in water quality resulting from the Proposed Action, or the action alternatives, can only be estimated. Moreover, the combination of incomplete information, coupled with different available approaches in making these estimates, may lead to differences of opinion as to what the potential water level declines are likely to be.

A discussion of the relevance of incomplete information on these areas is presented below with respect to the assessment of environmental impacts to ground water resources, and to the relationship between withdrawing ground water in the Tule Desert and flows in the Virgin River.

4.4.1.1 Basin-Fill Deposits in the Tule Desert

Information to characterize the basin-fill deposits in the Tule Desert is incomplete and/or unavailable in specific areas. The most important of these areas with respect to the analysis of potential impacts include:

- The physical properties of the saturated basin-fill deposits.
- The source and amount of ground water recharge specifically to these deposits.
- The direction and rate of ground water flow and ground water discharge or outflow from these deposits.

The incomplete and/or unavailable information in these areas is primarily relevant to the assessment of the potential for decline in ground water levels and the depletion of ground water resources in the basin-fill deposits, but it also has relevancy to the issue of potential ground water discharge to the Virgin River.

4.4.1.1.1 Physical Properties. Data to quantify the transmissive and storage characteristics of the basin-fill deposits are very limited. Neither aquifer nor in-situ

hydraulic conductivity testing have been performed on wells that exclusively tap ground water in the Tule Desert basin-fill deposits, nor is this type of testing currently feasible without installing wells specifically for this purpose.

With respect to transmissive properties of the basin-fill deposits, the only known data are from a single measurement event at the Tule Desert Well reported in Hydrosystems (2002). This well, which is located in the south central portion of the Tule Desert (Figure 3-5), is 605 feet deep. The driller's log, which is on file with the Nevada State Engineer, indicates that the local stratigraphy at this well is composed of sand and gravel from zero to 435 feet, gravel between 435 and 461 feet, and red clay between 461 and 605 feet. The results of recent water-level measurements by Hydrosystems, reported in *Section 4.1.2.3* of CH2M HILL (2002b), indicate that when this well was pumped at a rate of 8 gallons per minute (gpm), the water level in the well declined immediately by approximately 100 feet. In addition, this level of drawdown remained constant with continued pumping over a 3-day period at the same rate. Based on the method presented in Walton (1962), this water level response corresponds to a value of transmissivity of approximately 1,000 gallons/day/foot of saturated thickness (gpd/ft). This value is considered very low (i.e., the saturated basin-fill deposits are not very transmissive in the vicinity of the Tule Desert Well).

Specific yield (the ratio of the volume of water that a given mass of saturated soil will yield by gravity to the volume of soil) represents the storage properties of the basin-fill deposits. The value of specific yield presented in this *Proposed Toquop Land Disposal Amendment to the Caliente MFP and FEIS for the Toquop Energy Project* is estimated from the technical literature (CH2M HILL, 2002b). There are no field data available to determine the storage properties of the basin-fill deposits directly.

These physical properties are important to the impact analysis because they are key input parameters to the estimation of potential water level decline as a result of the Proposed Action or the action-based alternatives. Because specific information on the physical properties of the basin-fill deposits is incomplete and/or unavailable, the impacts analysis in the EIS conservatively assumes that the values are the same as for the underlying fractured-rock aquifer for which data are available from aquifer testing. The assumption (i.e., that the properties are the same) is conservative because the resulting calculated water level declines in the basin-fill deposits are overestimated in the analysis (CH2M HILL, 2002b).

4.4.1.1.2 Basin-Fill Ground Water Recharge, Flow Direction(s), and Discharge

Ground Water Recharge. The amount of ground water recharge directly into the basin-fill deposits in the Tule Desert is unknown. As discussed below in *Section 4.4.1.2.2, Fractured-Rock Aquifer Recharge and Ground Water Sources*, estimates of the amount of recharge in the Tule Desert, via precipitation, ranges from 2,102 afy (Glancy and Van Denburgh, 1969) to 8,968 afy (Katzer et al., 2002). In addition to the uncertainty over a representative value of annual recharge, there is considerable uncertainty as to how much of this recharge, if any, continues through the basin-fill deposits and flows into the underlying fractured-rock aquifer. This latter point is important in the

understanding of the overall water balance of the basin-fill deposits in the Tule Desert, and the comprehension of the occurrence and movement of ground water in these deposits.

As discussed below in *Section 4.4.1.2.2, Fractured-Rock Aquifer Recharge and Ground Water Source*, the data are limited concerning the degree of hydraulic interconnection between the basin-fill deposits and the underlying fractured-rock aquifer. From ground water level data at the MW-2 well cluster, the vertical hydraulic gradient is downward (implying that the tendency is for ground water to flow from the basin-fill deposits into the underlying fractured rock) in this portion of the Tule Desert. The available water chemistry data, however, do not support the conclusion that ground water in the fractured rock is recharged from the overlying sediments to any measurable degree (i.e., ground water in the fractured rock is not chemically linked to local recharge). Therefore, the currently available information suggests that most of the precipitation derived recharge remains in the basin-fill deposits until it discharges from the basin, but that there is the potential for some recharge to flow into the underlying fractured rock in some portions of the Tule Desert.

Ground Water Flow Directions. Reliable ground water level data that are representative of conditions in the basin-fill deposits in the Tule Desert are available only from the Tule Desert Well, MW-2 (shallow), and MW-5. However, based on the much higher water levels consistently recorded in the Tule Desert Well, together with the thick sequence of clay observed at that location, the water levels measured in the Tule Desert Well suggest that the ground water is perched at that location. This implies that the water levels in the Tule Desert Well are not representative of a continuous aquifer unit within the basin-fill deposits (CH2M HILL, 2002b). This conclusion is also consistent with the lack of physical basis for the elevation of ground water to be locally high in the vicinity of the Tule Desert Well. As a result, only the available water level data from MW-2 (shallow) and MW-5 are considered to be representative of a potentially continuous aquifer unit in the basin-fill deposits. Because data from three locations are required to define the water table mathematically, the current information is insufficient to establish scientifically the direction of ground water flow in the basin-fill deposits within the Tule Desert.

However, the assumption is made in this *Proposed Toquop Land Disposal Amendment to the Caliente MFP and FEIS for the Toquop Energy Project* that ground water in the basin-fill deposits generally mimics the topographic surface of the Tule Desert and therefore flows from areas of higher elevations (in the northern areas at the base of the Clover Mountains) to areas of lower elevations (toward the south and toward Toquop Gap). This is a common assumption for ground water systems that are not confined under pressure.

Basin-Fill Ground Water Discharge. As discussed above, there is considerable uncertainty with respect to the direction and rate of ground water flow in the Tule Desert basin-fill deposits. As a result of the historic and current absence of ground water pumping (that is, no change in the amount of ground water in storage in the basin fill) the amount of ground water inflow should balance the amount of ground water discharge. The Toquop Gap is the only one place where the basin-fill deposits of the two adjacent hydrographic units (Tule Desert and Virgin River

Valley) merge. Toquop Gap is also the topographic low point in the Tule Desert. Accordingly, it initially is a logical point to consider ground water to flow from the Tule Desert into the Virgin River Valley. However, while some ground water may flow through the gap, it is doubtful that the saturated cross sectional area is large enough to accommodate all of the recharge to Tule Desert basin-fill identified above [that is, estimates range up to 8,968 acre-feet per year (afy)]. Inasmuch as there are no monitoring wells in the vicinity of Toquop Gap, it is not possible to confirm the foregoing hypothesis, or calculate directly how much ground water, if any, flows through the Toquop Gap.

In Section 3.4.2.1.1, the *Proposed Toquop Land Disposal Amendment to the Caliente MFP and FEIS for the Toquop Energy Project* assumes that much of the ground water in the basin-fill deposits discharges into the shallow fractured-rock around the downgradient perimeter of the Tule Desert (i.e., flows through fractures and faults in the rocks that comprise the Tule Springs Hills and the East Mormon Mountains that abut the saturated basin-fill deposits). Although specific information is unavailable to confirm this ground water discharge hypothesis, the conclusions in the *Proposed Toquop Land Disposal Amendment to the Caliente MFP and FEIS for the Toquop Energy Project* are consistent with other reports that touch upon this issue (Glancy and Van Denburgh, 1969; Dixon and Katzer, 2002; and Katzer et al., 2002).

4.4.1.2 Fractured-Rock Aquifer Underlying the Tule Desert

Information to support the characterization of the fractured-rock aquifer underlying the Tule Desert is incomplete and/or unavailable in some fundamental aspects. The most important of these aspects with respect to the analysis of potential impacts include:

- The spatial variation in the values of the physical properties.
- The source and amount of ground water recharge specific to this aquifer both within the Tule Desert and regionally.
- The amount of reasonably accessible ground water in storage in this aquifer both within the Tule Desert and regionally.

4.4.1.2.1 Spatial Variation in Physical Properties of the Fractured-Rock Aquifer. All of the available data that support the quantification of the physical properties of the fractured-rock aquifer come from the aquifer testing on PW-1. While these data are directly relevant and critical to the assessment of potential impacts, they are known only to be representative of the aquifer conditions in the vicinity of PW-1. Because of the observed geologic complexity in the adjacent Tule Springs Hills, and the reported geologic complexity of the underlying fractured-rock, it is highly probable that aquifer testing in other portions of the Tule Desert would yield different values of the transmissive and storage properties of the fractured-rock aquifer.

In *Section 4.4.1.1* of the *Proposed Toquop Land Disposal Amendment to the Caliente MFP and FEIS for the Toquop Energy Project*, the aquifer test results are used in the impacts analysis as the basis for selecting parameter values for the calculation of potential water level

declines. To address the uncertainty in the spatial representativeness of the available data, the values of the physical properties were selected to produce the greatest water level decline (i.e., tend toward overestimation of the resulting decline) (CH2M HILL, 2002b). In that way, the results of the impact analysis are conservative.

4.4.1.2.2 Fractured-Rock Aquifer Recharge and Ground Water Source.

Three reports [(Glancy and Van Denburgh (1969); Katzer et al. (2002); and Walker and Associates (2002)] have quantified ground water recharge, via precipitation, to the Tule Desert. The results range from 2,102 afy (Glancy and Van Denburgh, 1969) to 8,968 afy (Katzer et al., 2002). These values, however, represent total recharge via precipitation, and do not take into account the additional amount of ground water that flows into the aquifer from upgradient locations. There are, therefore, two principal uncertainties with respect to the source of water to the Tule Desert fractured-rock aquifer:

- The portion of the precipitation-derived recharge, identified above, that actually reaches the fractured rock aquifer.
- The amount and origin of the ground water that flows into the Tule Desert fractured-rock aquifer from upgradient locations.

The available water quality data indicate that ground water in the basin-fill deposits is isotopically and chemically different than the ground water in the underlying fractured-rock aquifer (CH2M HILL, 2002a). However, the water level response during the aquifer testing, together with data from the MW-2 well that indicate a downward vertical gradient between the basin-fill and the underlying fractured rock, support the conclusion that the two aquifers are hydraulically connected. Accordingly, some portion of the precipitation derived recharge likely flows into the underlying fractured-rock.

The available water chemistry and isotopic data also indicate that the ground water from PW-1 has a uniquely similar chemical signature to carbonate springs located approximately 30 miles north of the northern edge of the Tule Desert (CH2M HILL, 2002a, CH2M HILL, 2002b). The implication is that ground water from PW-1 is representative of the regional carbonate rock province described in *Section 3.4.1.2.2*. Accordingly, the ground water that would supply the Proposed Action and the action alternatives, is considered to be derived from a vast regional ground water system, and is not limited locally to the Tule Desert. Although the most reliable data from the Tule Desert that support this conclusion are limited to the area around PW-1, there is clearly chemical similarity between ground water from PW-1 and the upgradient carbonate springs.

The origin of the ground water from PW-1 is also important from the perspective of potential impacts to existing ground water users in the Virgin River Valley. Katzer et al. (2002) state that the ground water from PW-1 in the Tule Desert is chemically similar to wells operated by the Virgin Valley Water District (VVWD), the implication being that pumping from PW-1 would directly affect the source of water to VVWD wells. However, the VVWD wells in question are on the Nevada-Arizona state line and, based on water-level trends developed by Katzer et al. (2002), these wells are not hydraulically downgradient of the Tule Desert. No wells that are hydraulically downgradient of the Tule

Desert, to the extent that water level information is available to make such a conclusion, have the same chemical signature as the wells currently in the Tule Desert.

4.4.1.3 Ground Water Discharge from the Tule Desert Fractured-Rock Aquifer

Information to support the direction and characteristics of ground water flow within the fractured-rock aquifer downgradient of the Tule Desert hydrographic area is incomplete and/or unavailable. As a result, it is not possible to state with certainty where ground water in the Tule Desert fractured-rock aquifer discharges. In the absence of such information, the *Proposed Toquop Land Disposal Amendment to the Caliente MFP and FEIS for the Toquop Energy Project* assumes that ground water continues to flow in a similar direction as determined from the water level data in the Tule Desert (i.e., it flows toward the south). This is consistent with the conclusion that ground water in the Tule Desert fractured-rock aquifer is part of the vast regional carbonate rock province, where previous investigators have identified the direction of groundwater flow as generally being toward the south.

4.4.1.4 Analysis of Water Level Decline in the Fractured-Rock Aquifer

The potential water level decline in the fractured-rock aquifer is presented in *Section 4.4.1.1.1* of the *Proposed Toquop Land Disposal Amendment to the Caliente MFP and FEIS for the Toquop Energy Project* based on the results of an analysis reported in CH2M HILL (2002b). As discussed in this document, the approach taken in the impacts analysis was to employ a numerical ground water model to simulate the anticipated water level declines that might be induced by withdrawals of up to 7,000 afy. This approach was taken largely because of the relatively steep hydraulic gradient observed in the Tule Desert fractured-rock aquifer. A pronounced hydraulic gradient has the effect of limiting the lateral extent of the capture zone of a pumping well. The presence of a hydraulic gradient also necessarily implies that the aquifer is being recharged by flow from upgradient sources, as observed in the Tule Desert, and discussed above.

Katzer et al. (2002) also performed an analysis of the potential water level declines induced by withdrawals of up to 7,000 afy. However, their analysis does not take into account any hydraulic gradient, nor does it take into account ground water flow from upgradient locations. Consequently, the conclusions of Katzer et al. (2002) consist of significantly greater potential water level declines than concluded in this *Proposed Toquop Land Disposal Amendment to the Caliente MFP and FEIS for the Toquop Energy Project*.

4.4.1.5 Conclusion

Although the currently available information is not complete in all areas, the information that is currently available is adequate to support the conclusions regarding adverse environmental impacts and to make a reasoned choice among alternatives. The availability of additional data is not expected to alter the conclusions with regard to ground water presented below.

4.4.2 Proposed Action

4.4.2.1 Potential for Decline in Ground Water Levels and Depletion of Ground Water Resources

4.4.2.1.1 Impacts

Toquop Area. Pumping water from the fractured-rock aquifer in the Tule Desert in the amount and rates necessary to serve the proposed project would not result in a substantial decline in ground water levels or a substantial depletion of ground water resources. Water levels within the Tule Desert would be lowered as a result of project pumping, but not to the extent that a substantial depletion of ground water resources would occur.

Outside the Tule Desert, specifically in the Virgin River Valley hydrographic area, ground water levels, as well as the availability of the ground water resources, would remain unchanged as a result of pumping in the Tule Desert.

Specifically, based on the results of an analysis of potential water level decline (drawdown) presented in CH2M HILL (2002), ground water levels will be lowered within the Tule Desert a minimum of approximately 45 feet within a radius of approximately 1,000 feet from a representative production well (pumping at a rate of 1,100 gallons per minute [gpm]) under the conditions determined from the local aquifer testing (see *Section 3.4.2.1.2, Ground Water in the Fractured Rock*). The maximum drawdown would remain above the top of the fractured-rock aquifer and no de-watering of the aquifer would occur.

The same representative well would drawdown the water level 0.5 foot at a distance of roughly 1.5 miles from the well. Beyond 1.5 miles from a representative well, the drawdown would be less than 0.5 foot. Accordingly, project pumping would not result in a substantial water-level decline outside of the Tule Desert because the wellfield would be designed such that the wells would be: 1) spaced to minimize additive effects on drawdown; and 2) located at least 1.5 miles from the edge of the Virgin River Valley hydrographic area.

These results occur largely because of the steep lateral hydraulic gradient in the Tule Desert fractured-rock aquifer (discussed in *Section 3.4.2.1.2, Ground Water in the Fractured Rock*. The steep gradient is indicative of the relatively poor ability of the Tule Desert fractured-rock aquifer to transmit ground water (low tranmissivity), which acts to limit the lateral extent of water level decline around a pumping well (that is, the lower the transmissivity, the smaller the radius of influence around a well). In addition, the steep gradient means that most of the water entering the project wells would do so from the upgradient direction (from the north in the Tule Desert), causing water level declines to be less over a similar distance south of the production wells toward the downgradient Virgin River Valley.

Although the water levels will be lowered in the vicinity of each production well, there would be no major dewatering of the fractured rock aquifer or depletion of the ground water resource within the Tule Desert. The amount of annual ground water flow through a 4-mile wide portion of the basin within the fractured-rock aquifer has been estimated to be slightly less (6,500 afy) than the amount of water required for the project (up to 7,000 afy). Additional ground water also flows within the Tule Desert outside this 4-mile width

and at depths greater than investigated to date (see *Section 3.4.2.1.2, Ground Water in the Fractured Rock*).

As long as the fractured-rock aquifer is not de-watered (that is, the water level does not decline below the top of the fractured rock), the lower water levels correspond to a localized decrease in the pressure exerted by the water in the fractures, and do not represent a major loss of water from storage. This occurs because the aquifer is confined under pressure, and would continue to be confined during project pumping as long as the fractured rock remains fully saturated.

In the Tule Desert basin-fill deposits, the actual extent of the water level decline that would be caused by project pumping is unknown because of the aquifer complexity and the limited available data. However, the amount of ground water level decline in the basin-fill would be no greater than that anticipated for the fractured rock, and most likely considerably less based on the understanding that the ability of the basin-fill deposits to transmit water (aquifer transmissivity) is very low and because ground water in the basin fill is assumed to be unconfined (see *Section 3.4.2.1.1, Ground Water in the Basin Fill* and CH2M HILL, 2002). For the purpose of this impacts assessment, the water level decline is conservatively assumed to be the same in the basin fill as it is in the fractured rock. Accordingly, there would not be a substantial water-level decline in the basin fill material outside of the Tule Desert.

The only known current water well that taps basin-fill ground water in the Tule Desert is the Tule Well, which is capable of pumping approximately 8 gpm on demand. Given the distance of this well from the area where the project wells are likely to be located (that is, it is located more than 1.5 miles from where a project well would be located), together with the small well yield and water demand associated with this well, it is unlikely that this well would be adversely affected by project pumping.

There are no current users of ground water from the fractured-rock aquifer in the Tule Desert. Consequently, no existing wells would be affected by the water level decline that would occur in the fractured-rock aquifer within the Tule Desert.

Because ground water in Virgin River Valley is a vital source of water to municipalities and agriculture in the region, the potential impacts of project pumping on this resource must be assessed thoroughly. Therefore, in addition to the drawdown analysis, presented above, which indicates that water level declines will be restricted to roughly 1.5 miles from the pumping wells, the conclusion that project pumping would not result in either substantial ground water level declines or a substantial loss of the ground water resource within the Virgin River Valley is further supported by the following factors:

- As presented in *Section 3.4.2.2.3, Aquifer Characteristics*, the available perennial yield in the lower Virgin River Valley is estimated by Dixon and Katzer (2002) to be approximately 40,000 afy, even after the current local pumping in the Virgin River Valley, reported to be about 12,000 afy, is taken into account. This estimate implies that even if the entire project demand were to be pumped directly from the lower Virgin River Valley, there would still be 33,000 afy of perennial yield available within the Virgin River Valley.

- The volume of ground water in storage in the uppermost 100 feet of saturated sediments in the Virgin River Valley is estimated to be close to 3 million acre-feet. This volume is more than 10 times the entire 42-year water demand of the project. A vast amount of ground water is, therefore, stored within the Virgin River Valley. Even in the absence of available perennial yield, this much water in storage effectively mitigates the extent of water level decline caused by local pumping. Consequently, even if the entire project demand were pumped directly from the Virgin River Valley, and not from the proposed location in the Tule Desert, the resulting water level decline in the Virgin River Valley could be controlled through the wellfield design such that no existing wells would be adversely affected. In other words, through optimizing the spacing of the wells, the water level decline associated with pumping up to 7,000 afy could be kept at levels that would not affect the water levels in existing production wells within the Virgin River Valley).

  This conclusion is further supported by the results of two different analyses, the first being the results of the Tule Desert drawdown analysis discussed above. The Muddy Creek Formation is understood to be no more transmissive than the fractured-rock aquifer of the Tule Desert. Accordingly, a similar limited area of influence of a given pumping well in the Tule Desert should also occur in the Muddy Creek Formation (that is, drawdowns of no more than approximately half a foot at distances of roughly 1.5 miles from the pumping well).

  Second, the results of a study of spatially concentrated pumping 10,000 afy from the Muddy Creek Formation in the vicinity of Halfway Wash indicates that drawdowns on the order of 5 feet extend no more than 6 miles from the pumping center after 50 years (Las Valley Water District, 1992).

- Based on the generally southern direction of the hydraulic gradient of ground water in the Tule Desert fractured-rock, ground water inflow from the wellfield portion of Tule Desert into the Virgin River Valley occurs primarily west of Toquop Wash and downgradient of the current municipal production wells that serve the towns of Mesquite and Bunkerville. This implies that ground water intercepted by the project wells in the Tule Desert would not flow, in the absence of project pumping, toward existing Virgin River Valley wells. Project pumping, therefore, would not affect ground water flowing to existing Virgin River Valley wells, and water levels in these wells would similarly not be affected by the proposed project.

- A comparison of the C-14 data from the fractured-rock aquifer in the Tule Desert (PW-1) with the available data from municipal wells in the Virgin River Valley (Bunkerville 1 and 2, and Virgin Valley 5 and 25) clearly indicates that age of the ground water is significantly different between these two areas—implying a different source for each water type. Pumping in the Tule Desert, therefore, would not affect the existing municipal wells in the Virgin River Valley because they have independent sources.

Specifically, the value of C-14 at PW-1 (0.9 percent modern carbon) approaches the maximum age for using C-14 for dating purposes (approximately 40,000 to 50,000 years old; see *Section 3.4.2.1.2, Ground Water in the Fractured Rock*).

Carbon-14 data from the municipal production wells in the Virgin River Valley reveal the following two related occurrences: 1) the ground water from the Virgin River Valley wells is younger than the ground water from PW-1 in the Tule Desert; and 2) the age of the ground water from the Virgin River Valley wells increases from east to west (that is, in a downstream direction along the Virgin River). Both of these observations support the occurrence of independent ground water flow paths between the proposed wellfield area in the Tule Desert and the existing municipal wells in the Virgin River Valley. Specifically, they reinforce the conclusions made above that ground water that currently flows beneath the Tule Desert enters the Virgin River Valley downstream of the Virgin Valley municipal wells.

With respect to the regional carbonate-aquifer system, the rate of ground water extraction for this project would be only a small fraction of the total capacity of the aquifer. Within the Colorado River Basin, the flow has been estimated to be approximately 200,000 afy (see *Section 3.4.1.2.2, Carbonate Rock Province*). The project demand of approximately 7,000 afy is 3.5 percent of that amount. The Nevada State Engineer has approved 2,100 acre-feet of water per year of the Vidler Water Company—Lincoln County water right applications. Vidler Water Company—Lincoln County have an application for additional water adequate to operate the power plant. The application is being held aside pending results of additional hydrologic studies.

Pah Rah Parcel. No construction or operation activities would be associated with the proposed land exchange, and no ground water impacts would occur on the Pah Rah parcel.

4.4.2.1.2 Mitigation. No mitigation is required.

4.4.2.2 Spring Discharge

4.4.2.2.1 Impacts

Toquop Area. Pumping water from the fractured-rock aquifer in the Tule Desert in the amount and rates necessary to serve the proposed project would not result in a change in the flows of the springs in the hills and mountains that rim the Tule Desert.

As discussed in *Section 3.4.2.1.3, Springs*, the source of water to the springs in the project area is local recharge (that is, precipitation that infiltrates near to these springs and subsequently travels a relatively short distance before being discharged at a spring). In addition, the elevations of all of the local springs are several hundred feet above the local and regional ground water levels, further indicating the springs are not connected to the ground water systems of the Tule Desert. The rate of discharge of the springs is therefore independent of ground water in both the fractured-rock and the basin-fill aquifers, and pumping from the fractured-rock aquifer within the Tule Desert would not affect the discharge of any spring.

In addition, pumping from the fractured-rock aquifer in the Tule Desert would not affect any of the regionally significant springs in the vicinity of the project area, including the Littlefield Springs, Muddy Springs and the springs adjacent to the shore of Lake Mead. Although some of these springs are related to the regional carbonate aquifer, the ground water that discharges from these springs is not related to ground water in the Tule Desert (i.e., ground water in the Tule Desert is not the source of any of these springs; they all can be traced to different sources) (*Section 3.4.2.1.3, Springs*).

Pah Rah Parcel. No construction or operation activities would be associated with the proposed land exchange, and no impacts on springs would occur on the Pah Rah parcel.

4.4.2.2.2 Mitigation. No mitigation is required.

4.4.2.3 Ground Water Quality

4.4.2.3.1 Impacts

Toquop Area. Ground water quality would not be degraded as a result of the proposed project. The pumping of ground water and the resulting localized water level declines would not alter the water quality of the aquifer systems in the Tule Desert.

The quality of the ground water in the fractured-rock aquifer of the Tule Desert is likely to be highly variable across the basin because of the different compositions of the rock (for example, limestone, volcanic rocks, siltstone with possible gypsum layers) (see *Section 3.4.2.1.2, Ground Water in the Fractured Rock*). As a result, the quality of the ground water pumped in the Tule Desert could change over time as ground water flows from different rock types to the wells and the influence of specific fractures that contribute ground water to the wells changes. These potential changes in the quality of the water pumped, however, would not imply a degradation in water quality of the aquifer.

The temporary handling and storage of potential chemical substances and waste products have a slight potential to affect ground water quality adversely at the locations of the plant sites should there be a release of these substances to the environment. The potential for ground water-quality degradation is minimal, however, because the climate is arid, which reduces the potential for infiltration into the ground, and the depths to ground water are considerable (on the order of several hundred feet).

Pah Rah Parcel. No construction or operation activities would be associated with the proposed land exchange, and no ground water impacts would occur on the Pah Rah parcel.

4.4.2.3.2 Mitigation. No mitigation is required.

4.4.2.4 Flow in the Virgin River

4.4.2.4.1 Impacts. The flow in the Virgin River would not be affected by pumping in the Tule Desert for the Proposed Action. As discussed in *Section 3.4.2.2.4, Virgin River/Ground Water Interaction*, multiple lines of evidence indicate that the Virgin River is not recharged by regional ground water systems as it flows from Littlefield, Arizona, to Lake Mead. In fact, it has been demonstrated that the river naturally loses flow through infiltration, evaporation, and diversion for irrigation along this area.

In addition, a comparison of water-chemistry data from the river and the ground water in the Tule Desert indicates that there is no connection between the two waters (see *Section 3.4.2.2.4, Virgin River/Ground Water Interaction*). Furthermore, an analysis of the chemical data from the Virgin River reveals that the origin of the flows in the river downstream of Littlefield are from Beaver Dam Wash and upstream Virgin River flows (that is, all of the flow in the river can be accounted for through these sources, none of which can be attributed to ground water).

4.4.2.4.2 Mitigation. No mitigation is required.

4.4.2.5 Land Subsidence

4.4.2.5.1 Impacts

Toquop Area. Based on detailed analysis of the soil conditions in the Tule Desert basin-fill deposits, and the potential drawdown that could occur in these deposits as a result of project pumping, the potential for land subsidence is minimal and the corresponding loss of storage negligible.

Specifically, the maximum amount of settlement ranges between 0.3 inches and 0.6 inches in the vicinity of PW-1 and MW-4, and between 2.5 inches (for the clayey sand) and up to 13 inches (for the silty sand) in the vicinity of MW-2 (CH2M HILL, 2002; *Appendix F*). The maximum corresponding percent reduction in porosity is less than 1 percent.

Pah Rah Parcel. No construction or operation activities would be associated with the proposed land exchange, and no land subsidence would occur on the Pah Rah parcel.

4.4.2.5.2 Mitigation. No mitigation is required.

4.4.3 Alternative 1

4.4.3.1 Impacts

The impacts for Alternative 1 would be the same as those for the Proposed Action.

4.4.3.2 Mitigation

No mitigation is required

4.4.4 Alternative 2

4.4.4.1 Impacts

The impacts for Alternative 2 would be the same as those for the Proposed Action.

4.4.4.2 Mitigation

No mitigation is required.

4.4.5 Alternative 3

4.4.5.1 Impacts

Under Alternative 3, the demand for ground water would be 170 afy, which is considerably less than under the Proposed Action or either Alternative 1 or Alternative 2, both of which require up to 7,000 afy. The effects associated with using 7,000 afy of ground water from the Tule Desert are evaluated in *Section 4.4.2.1.1, Impacts,* and have been determined to be minimal.

The water demand of 170 afy under Alternative 3 would require the construction and operation of fewer wells and reduced pumping rates relative to the Proposed Action and Alternatives 1 and 2. Specifically, Alternative 3 would require

only two production wells (one principal well with a second one to provide back-up supply during maintenance periods), and the maximum pumping rate would be on the order of 250 gpm or less. The total area of disturbed land would be reduced under Alternative 3 to 2 acres for the production wells (an additional acre of disturbed land would still be required for a monitoring well for a total disturbed area of 3 acres).

Changes in both the total water level decline and the radius of influence resulting from the pumping would be considerably less under Alternative 3 than under the Proposed Action or either Alternative 1 or Alternative 2 because of the substantially reduced annual water demand under Alternative 3. Water level declines under Alternative 3 would similarly be less than under the Proposed Action and Alternatives 1 and 2 because the maximum pumping rates are approximately 30 times less under this alternative.

With respect to potential impacts to spring discharge, the impacts analysis in *Section 4.4.1.3.1* concludes that the impacts of the Proposed Action are unlikely primarily because of the lack of interconnection between the source of water to the springs and the ground water in the Tule Desert. Accordingly, the impacts to spring discharge from Alternative 3 should similarly be less than significant. Likewise, the analysis of potential impacts to the Virgin River under the Proposed Action determined that these impacts would be unlikely because there is no evidence of a direct connection between fractured-rock ground water in the Tule Desert and flows in the Virgin River (*Section 4.4.2.4, Flow in the Virgin River*). Accordingly, the impacts to flows in the Virgin River under Alternative 3 are also considered unlikely.

Regarding the analysis of potential impacts to ground water quality and land subsidence, both of these areas of potential impact are related to the potential water level declines. Inasmuch as the water level declines under Alternative 3 are considered to be small, the impacts to ground water quality and land subsidence under Alternative 3 are similarly considered to be minimal.

4.4.5.2 Mitigation

No mitigation is required.

4.4.6 No Action Alternative

There would be no changes to the existing ground water conditions under the No Action Alternative; therefore, there would be no impacts.

4.5 Biological Resources

4.5.1 Threatened, Endangered, and Sensitive Species

4.5.1.1 Proposed Action

4.5.1.1.1 Impacts

Toquop Area. Direct impacts (effects) on threatened, endangered, and sensitive species can result from ground disturbance caused by construction-related activities and project operation and maintenance. Indirect impacts can result from increased public access and project maintenance. Ground disturbance impacts vegetation by habitat destruction and degradation resulting from soil compaction and vegetation removal, and by erosion when vegetation is lost. The loss of vegetative

cover can adversely affect sensitive wildlife species dependent on vegetation for food or cover. Impacts can occur as a result of construction, operation, and maintenance of the power plant and associated facilities.

Ground disturbance can also have a more permanent impact because of the take of wildlife species. Wildlife can be adversely impacted by increased human activity that causes wildlife harassment, legal and non-legal take of wildlife species, take from vehicles on roads or increased off-road use, and general disturbance of wildlife. Long-term impacts can occur from loss of vegetation and wildlife habitat resulting from the slow process of revegetation in disturbed areas, because of erosion, or continued disturbance from maintenance.

Desert Tortoise. Table 4-1 lists acres of desert tortoise designated critical habitat and desert tortoise habitat not designated as critical that would be temporarily or permanently disturbed under the Proposed Action and Alternatives 1, 2, and 3. Direct impacts on desert tortoise habitat would result from ground disturbing construction activities. Project features and construction rights-of-way associated with the Proposed Action would be located on approximately 449 acres of desert tortoise habitat, 222 acres of which have been designated as critical habitat. Assuming an average density of approximately 11 desert tortoises per square mile (640 acres) in the general area (see affected environment discussions in *Section 3.5.1, Threatened, Endangered, and Sensitive Species*), 449 acres would provide habitat for 8 desert tortoises. The net new long-term disturbance of 182 acres, following reclamation of disturbed sites (see Table 4-1), would provide habitat for three desert tortoises. The resultant short-term and long-term loss of vegetation would reduce the amount of forage available to tortoises. Activities associated with project construction could potentially injure or kill tortoises. Vehicles and heavy construction equipment pose the greatest hazard to tortoises and their burrows. Fencing meeting the requirements for tortoise exclusion would be used around the power plant. Tortoise fencing installed along the access road under the Proposed Action would minimize or eliminate the potential for highway-related mortality (see below and *Appendix A, Measures for Protecting Desert Tortoises and Their Habitat*, for a discussion of this and other desert tortoise mitigation measures). This access road would pass through the Mormon Mesa ACEC and desert tortoise critical habitat.

Indirect impacts on tortoises could result from increases in human activity during construction, operation, and maintenance. Impacts from increased human activity could include further habitat disturbance from recreational OHV activity, direct mortality from off-road vehicles crushing tortoises, increased illegal collecting of tortoises, and mortality from vandalism (for example, shooting). Protective measures, particularly fencing requirements, would be effective in reducing potential impacts from traffic on the access road to the plant site. With tortoise undercrossings provided at intervals of not greater than 1 mile on the access road, habitat fragmentation resulting from road improvements would not be a concern. Potential impacts from maintenance of the water pipeline would be greatly reduced through worker education measures.

TABLE 4-1
Desert Tortoise Habitat Disturbed under the Proposed Action and Action Alternatives

	Proposed Action	Alternative 1	Alternative 2	Alternative 3
Desert Tortoise Designated Critical Habitat				
Acres temporarily disturbed and/or in construction rights-of-way	222	222	266	222
Acres permanently disturbed	61	61	73	61
Desert Tortoise Habitat Not Designated Critical				
Acres temporarily disturbed and/or in construction rights-of-way	227	229	315	195
Acres permanently disturbed	121	123	164	89
Total Desert Tortoise Habitat				
Acres temporarily disturbed and/or in construction rights-of-way	449	451	581	417
Acres permanently disturbed	182	182	237	150

Southwestern Willow Flycatcher, Yuma Clapper Rail, Woundfin, and Virgin River Chub. Implementing the Proposed Action would have no direct or indirect impact on riparian or aquatic habitats of the Virgin River on which these species depend.

Species of Concern and Other Sensitive Species. The Gila monster and chuckwalla likely occur in the project area, particularly in areas with rocky outcrops. Both species would be subjected to the same impacts described for desert tortoises. Impacts on migratory birds identified in *Section 3.5.1,Threatened, Endangered, and Sensitive Species,* including the FWS candidate species, the yellow-billed cuckoo, would be avoided as long as nests are not disturbed during the breeding season. No significant bat roosts are known to occur within or adjacent to the construction zones and, therefore, no impacts are anticipated. Also, plant species of concern were not present in area surveys and, therefore, no impacts are anticipated.

Pah Rah Parcel. No direct or indirect impacts to sensitive species, including sage grouse, are anticipated as a result of the land transfer. No new ground disturbing activities on the Pah Rah parcel are part of this aspect of the Proposed Action. Acquisition of the Pah Rah parcel would bring important wildlife habitat under BLM management, particularly for sage grouse.

4.5.1.1.2 Mitigation. Beyond the measures already identified, no mitigation is required. The project includes measures to protect desert tortoise and their habitat (see *Appendix A*). Measures have been established in the *Approved Caliente Management Framework Plan Amendment (APA)* and *Record of Decision (ROD) for the Management of Desert Tortoise Habitat* (BLM, 2000) and are applicable to this proposed project. These measures include the Terms and Conditions to implement the Reasonable and Prudent Measures in the FWS's Biological Opinion (BO) for the APA (FWS, 2000).

Of the eight Reasonable and Prudent Measures implemented to reduce the take of desert tortoises and their habitat, Numbers 5, 6, and 7 are applicable to this project. Also included are the Standard Operating Procedures (SOP) that were issued by BLM to aid in the recovery of the desert tortoise. These measures are consistent with those developed for the *Clark County Multiple Species HCP and EIS* (Clark County, 2000). For the Toquop Energy Project, permanent tortoise-proof fencing will be required for the access road from I-15 to the plant because the road is within an ACEC. *Appendix A* also includes stipulations to protect desert tortoise in the event that blasting is required. Measures to protect desert tortoise, in addition to those commitments contained in *Appendix A*, may be further developed during formal consultation with the FWS under Section 7 of the ESA and stipulated in the BO for this project.

Appendix B, Standard Construction and Operation Procedures, contains measures to prevent or minimize the potential for impacts on other special status species. Examples include consideration of bird breeding seasons, burrowing owls, bat roosts (if encountered), Gila monsters, and chuckwallas.

4.5.1.2 Alternative 1

4.5.1.2.1 Impacts. Because the project features, their operation, and associated actions under Alternative 1 would be the same or nearly the same as described for the Proposed Action, the impacts would also be similar. Because the water pipeline (eastern alignment) would only be 0.1 mile longer in this alternative, the area of ground disturbance and project rights-of-way would be 451 acres (182 acres of net new long-term disturbance following reclamation)—nearly the same as the amount of desert tortoise habitat affected under the Proposed Action (see Table 4-1). However, because the eastern water pipeline would run next to an existing road for 85 percent of its length, impacts from increased human activity during construction and maintenance would be relatively less than for the Proposed Action.

4.5.1.2.2 Mitigation. Protective measures would be the same as those described for the Proposed Action.

4.5.1.3 Alternative 2

4.5.1.3.1 Impacts. Because the project features, their operation, and associated actions for the power plant and wellfield for Alternative 2 would be the same or similar to those for the Proposed Action, the impacts would also be similar to those described for the Proposed Action. The location of the power plant adjacent to the wellfield in the Tule Desert under Alternative 2 would not increase the relative direct impacts from power plant construction. Eliminating the need for constructing a long water pipeline would greatly reduce direct and indirect impacts from construction and maintenance of this feature. However, construction of the 12.0-mile natural gas pipeline and electrical transmission line and the adjacent access road would greatly increase both direct and indirect impacts through increased ground disturbance and human activities from construction, operation, and maintenance of the project relative to the Proposed Action. The area of ground disturbance and project-related rights-of-way would total 581 acres of desert tortoise habitat under Alternative 2, including 44 acres of desert tortoise critical habitat in Lincoln County outside the Mormon Mesa ACEC construction

disturbance of 222 acres of desert tortoise critical habitat (see Table 4-1). This 581 acres would provide habitat for 10 desert tortoises. The net new long-term disturbance of 237 acres, following reclamation of disturbed sites (see Table 4-1), would provide habitat for four desert tortoises. The potential for increased predation by ravens on the desert tortoise as a result of new electrical transmission line would be much greater under Alternative 2 than the Proposed Action or Alternative 1. The new transmission line would provide new nesting and roosting sites for ravens in an area where few are currently available.

4.5.1.3.2 Mitigation. Protective measures would be the same as those described for the Proposed Action, but would need to be applied to the specific project features associated with Alternative 2.

4.5.1.4 Alternative 3

4.5.1.4.1 Impacts. Because the project features, their operation, and associated actions under Alternative 3 would be the same or nearly the same as described for the Proposed Action, the impacts would also be similar. Because of the smaller land requirement for the power plant site (80 acres) and ground water wells (up to 3 acres) under this alternative, the area of ground disturbance and project rights-of-way would be 417 acres (see Table 4-1). This would provide habitat for seven desert tortoises. The net new long-term disturbance of 150 acres (see Table 4-1), following reclamation of disturbed sites, would provide habitat for three desert tortoises.

4.5.1.4.2 Mitigation. Protective measures would be the same as those described for the Proposed Action.

4.5.1.5 No Action Alternative

Under the No Action Alternative, none of the direct or indirect impacts on threatened, endangered, or sensitive species described for the Proposed Action or alternatives would occur.

4.5.2 Vegetation and Noxious Weeds

4.5.2.1 Proposed Action

4.5.2.1.1 Impacts

Toquop Area. Direct impacts on vegetation would result from construction-related activities, and some indirect impacts would result from increased public access and project maintenance. Impacts on vegetation would result from direct removal, degradation caused by soil compaction, and increased erosion. Increased human activity associated with power plant construction, new road construction, and other project features would also impact vegetation by hindering revegetation in continually disturbed areas.

The Proposed Action would result in the disturbance or loss of 449 acres and associated vegetation. Following reclamation, the net new long-term disturbance would be 182 acres. Plants would be crushed during land-disturbing activities such as blading, grading, vehicular traffic, and trenching. Numerous species of cactus and yuccas are protected by state laws and occur throughout the project area. Several high-density areas of cactus and Joshua trees would be traversed by the water pipeline alignment between the proposed wellfield and the Toquop Gap, and between the Toquop Gap and the power plant site. Improved access to the

area may encourage greater OHV use and related impacts on vegetation.

The Proposed Action would increase the potential for the introduction and spread of noxious weeds on the project site. Noxious weeds identified in the project area include Russian thistle and, in the Toquop Gap, tamarisk. Because the isolated tamarisk stands in the Toquop Gap do not provide special wildlife habitat, they will be treated as any other species of noxious weed. Noxious weeds could spread via vehicles and soil disturbance activities during project development. However, the measures described in *Appendix B, Standard Construction and Operation Procedures*, include reclamation and BLM's standard weed control measures that would be effective in reducing the potential for spread of noxious weeds and their establishment in reclaimed areas. Through implementation of the Proposed Action, the Toquop parcel would no longer be under noxious weed management of the BLM and would fall under State of Nevada regulations. All other rights-of-way would remain under BLM weed management. All rights-of-way will be managed according to a BLM-approved integrated management plan.

Pah Rah Parcel. Native vegetation would benefit from BLM management practices if the land exchange were to occur. Long-term monitoring, regulated livestock grazing, and fire suppression are common BLM management practices that would enhance the condition of vegetation. Vegetation would be given added protection under BLM management. No other effects would be expected to occur on the Pah Rah parcel because land use would not change. No records of noxious weeds are associated with the Pah Rah parcel. The Proposed Action would not impact the potential for the introduction or spread of noxious weeds on the Pah Rah parcel.

4.5.2.1.2 Mitigation

Toquop Area. A temporary fencing plan for the pipeline right-of-way would be prepared and temporary fencing installed to protect restoration efforts as part of Measure 16 for protecting desert tortoise and their habitat (see *Appendix A*)

Pah Rah Parcel. No mitigation measures are proposed for the Pah Rah parcel.

4.5.2.2 Alternative 1

4.5.2.2.1 Impacts. Because the project features, their operation, and associated actions under Alternative 1 would be the same or nearly the same as described for the Proposed Action, the impacts would be similar. Because the water pipeline (eastern alignment) would only be 0.1 mile longer in this alternative, the area of ground disturbance and project rights-of way resulting in habitat loss would total 451 acres (net new long-term disturbance of 182 acres)—nearly the same as the Proposed Action. However, because the water pipeline would run next to an existing road for 85 percent of its length, the quality of the vegetation impacted would be relatively less than for the Proposed Action. This alternative pipeline route supports a lower density of cacti species and Joshua trees overall compared to the Proposed Action. Higher-density pockets of cacti and Joshua trees occur in some areas, such as the Summit Spring area. However, newly disturbed areas adjacent to existing roads are more susceptible to noxious weeds.

4.5.2.2.2 Mitigation. Mitigation measures would be the same as those described for the Proposed Action.

4.5.2.3 Alternative 2

4.5.2.3.1 Impacts. Because the project features, their operation, and associated actions for the power plant and wellfield would be the same or similar to those for the Proposed Action, the impacts on vegetation would also be similar to those described for the Proposed Action. The location of the power plant adjacent to the wellfield in the Tule Desert would not increase the relative direct impacts from power plant construction. Eliminating the need for constructing a long water pipeline would greatly reduce direct and indirect impacts from construction and maintenance of this feature. However, construction of the 12.0-mile natural gas pipeline and electrical transmission line and the adjacent access road to the power plant site would greatly increase ground disturbance and the subsequent loss of vegetation. The area of ground disturbance and project-related rights-of-way would total 581 acres under Alternative 2. Following reclamation, the net new long-term disturbance would be 237 acres.

4.5.2.3.2 Mitigation. A temporary fencing plan for the gas pipeline right-of-way would be prepared and temporary fencing installed to protect restoration efforts as part of Measure 16 for protecting desert tortoise and their habitat.

4.5.2.4 Alternative 3

4.5.2.4.1 Impacts. Because the project features, their operation, and associated actions under Alternative 3 would be the same or nearly the same as described for the Proposed Action, the impacts would be similar. Because of the smaller land requirement for the power plant site (80 acres) and ground water wells (up to 3 acres) under this alternative, the area of ground disturbance and project rights-of-way resulting in habitat loss would total 417 acres. Following reclamation, the net new long-term disturbance would be 150 acres.

4.5.2.4.2 Mitigation. Mitigation measures would be the same as those described for the Proposed Action.

4.5.2.5 No Action Alternative

Under the No Action Alternative, new impacts on vegetation would not occur. There would be less potential for noxious weeds being introduced to the project area.

4.5.3 Wild Horses and Burros

4.5.3.1 Proposed Action

4.5.3.1.1 Impacts

Toquop Area. No impacts on wild horses and burros would occur in the Toquop area as a result of the Proposed Action.

Pah Rah Parcel. The Pah Rah parcel would be managed by BLM as a “horse free” area in the existing Herd Area for wild horses and burros. No effects would be expected to occur because the current land use would not change.

4.5.3.1.2 Mitigation. No mitigation is required.

4.5.3.2 Alternative 1

Impacts on wild horses and burros for this alternative would be the same as those described for the Proposed Action. No impacts would be expected.

4.5.3.3 Alternative 2

Impacts on wild horses and burros for this alternative would be the same as those described for the Proposed Action. Fencing that will enclose the power plant and associated facilities on the northern Toquop parcel will prevent access by wild horses. No impacts would be expected.

4.5.3.4 Alternative 3

Impacts on wild horses and burros for this alternative would be the same as those described for the Proposed Action. No impacts would be expected.

4.5.3.5 No Action Alternative

No impacts on wild horses or burros would occur under the No Action Alternative.

4.5.4 Wildlife and Fisheries Resources

4.5.4.1 Proposed Action

4.5.4.1.1 Impacts

Toquop Area. Direct and indirect impacts on wildlife and wildlife habitat would result from implementing the Proposed Action. Direct impacts would result from ground disturbance during construction-related activities and project operation and maintenance that would total 449 acres. Following reclamation, the net new long-term disturbance would be 182 acres. Direct impacts would also occur from vehicle-wildlife conflicts during construction and operation. Desert bighorn sheep may be impacted by increased traffic on that portion of the access road between the proposed plant site and I-15 where it passes through a portion of the East Mormon foothills. Indirect impacts would result from increased public access and project maintenance. Habitat loss through the loss of vegetative cover would have an adverse effect on wildlife species dependent on vegetation for food or cover. In general, impacts on wildlife and wildlife habitat would be the same as those previously described in *Section 4.5.1* for threatened, endangered, and sensitive species of plants and wildlife.

Impacts on reptiles and small mammals would occur as a result of the ground disturbance associated with project construction, operation, and maintenance. Direct impacts to reptiles and small mammal species would include mortalites from construction activity and vehicular traffic. Reptile habitat would be destroyed as a result of earth moving activities, and direct mortalities may result from reptiles being crushed underground or run over by earth moving equipment. Some wildlife species would be temporarily displaced during construction activities.

During construction, dust and other construction-related disturbances may affect plants and wildlife. Construction may possibly fragment existing habitat use patterns, leading to a reduction in quality of habitat adjacent to new construction.

No direct or indirect impacts on aquatic habitat and fisheries of the Virgin River would result from ground water pumping for the Proposed Action. No short-term, adverse impacts from ground water pumping on the availability of water to wildlife are anticipated.

The evaporation pond for the Toquop power plant would be located in an area with few water sources. Especially because of this isolation, it may attract waterfowl, shorebirds, and other water

birds, thereby creating possible exposures of birds to highly saline water at the power plant. The ions in the pond water (for example, Na+, K+, Cl-, and SO_4-) are generally non-toxic and are not considered problematic to wildlife at normal environmental levels. However, concentrations of sodium (147,963 ppm) expected in the evaporation pond far exceed those associated with adverse effects in waterfowl; therefore, risk of mortality in waterfowl utilizing the pond is likely.

High levels of salinity, especially when coupled with low ambient temperatures (less than 4 degrees C), can result in salt encrustation on the feathers of waterfowl and other water birds. This encrustation of salt on the feathers results in the inability of the birds to fly to freshwater sources or continue migration, which may result in their death (possibly by drowning). Salt encrustation on waterfowl feathers and mortality were observed in several field studies (*Appendix E Salinity Effects on Birds*) and in another hypersaline wetland with electrical conductivity lower than that estimated for the evaporation pond. *Appendix E, Salinity Effects on Birds,* provides additional detail on the expected chemical make-up of water in the evaporation pond and possible effects on birds.

Pah Rah Parcel. No negative impacts on wildlife resources on the Pah Rah parcel, including pronghorn antelope and sage grouse, are anticipated from the land transfer. Acquisition of the Pah Rah parcel would bring important wildlife habitat under BLM management and would foster enhanced management by the BLM for sensitive wildlife species.

4.5.4.1.2 Mitigation. The evaporation pond will be monitored for water quality. Prior to when critical levels that could have adverse impacts on avian fauna are reached, active mitigation will be initiated. A number of mitigation techniques have been identified to keep water fowl and shore birds from entering the evaporation pond. Possible mitigation techniques that would be considered include electronic sound devices that mimic predatory bird calls, visual scare tactics, and propane noise cannons. These techniques have all been found to be successful under various conditions. Habituation can be a problem with some of these techniques. However, because the majority of water fowl and shore birds in the area will be present only during migratory flights, it is likely that the mitigation measures identified above will be effective. Once active mitigation is initiated, the effectiveness of the techniques used will be monitored. In the event the techniques listed above are not adequate to prevent most avian mortality, more advanced techniques, such as netting, may be employed.

4.5.4.2 Alternative 1

4.5.4.2.1 Impacts. Because the project features, their operation, and associated actions under Alternative 1 would be the same or nearly the same as those described for the Proposed Action, the impacts would be similar. A total of 451 acres would be disturbed during construction of project features. Net new long-term disturbance following reclamation would be 182 acres. The water pipeline (eastern alignment) would be 0.1 mile longer in this alternative than the Proposed Action. However, because the water pipeline would run next to an existing road for 85 percent of the line, relative impacts from increased human activity associated with construction and maintenance would be relatively less than for the Proposed Action.

4.5.4.2.2 Mitigation. Mitigation for Alternative 1 would be the same as for the Proposed Action.

4.5.4.3 Alternative 2

4.5.4.3.1 Impacts. Because the project features, their operation, and associated actions for the power plant and wellfield would be the same or similar to those for the Proposed Action, the impacts on wildlife also would be similar to those described for the Proposed Action. The location of the power plant adjacent to the wellfield in the Tule Desert would not increase the relative direct impacts from power plant construction. Eliminating the need for a long water pipeline would greatly reduce direct and indirect impacts from construction and maintenance of this feature. However, construction of the 12.0-mile natural gas pipeline and electrical transmission line and the adjacent access road would greatly increase direct and indirect impacts because of increased ground disturbance and human activities associated with construction, operation, and maintenance. The area that would be disturbed and/or included in construction-related rights-of-way would total 581 acres under Alternative 2. Following reclamation, the net new long-term disturbance would be 237 acres.

4.5.4.3.2 Mitigation. Mitigation for Alternative 2 would be the same as for the Proposed Action.

4.5.4.4 Alternative 3

4.5.4.4.1 Impacts. Because the project features, their operation, and associated actions under Alternative 3 would be the same or nearly the same as those described for the Proposed Action, the impacts on wildlife would be similar. The evaporation pond for Alternative 3 would be approximately 5 acres. A total of 417 acres would be disturbed during construction of project features. Net new long-term disturbance following reclamation would be 150 acres.

4.5.4.4.2 Mitigation. Mitigation for Alternative 3 would be the same as for the Proposed Action.

4.5.4.5 No Action Alternative

Under the No Action Alternative, impacts on wildlife resources would not occur.

4.5.5 Wetlands/Riparian Zones, Floodplains, and Waters of the United States

4.5.5.1 Proposed Action

4.5.5.1.1 Impacts

Toquop Area. The Proposed Action would not affect wetlands or riparian zones present at springs because these resources do not occur at the proposed sites of project features. Locations of springs in relation to project feature sites were discussed in *Section 4.4, Ground Water Resources*. The Proposed Action would affect a number of named and unnamed ephemeral washes. Named ephemeral washes that would be affected by the Proposed Action include Halfway Wash, Toquop Wash, South Fork Toquop Wash, and Sam's Camp Wash.

Jurisdictional delineations of waters of the United States were reviewed by Grady McNure of the USACE during a site visit/consultation on November 14, 2002. Table 1, *Appendix F*, presents a summary of the waters of the United States within

the Proposed Action and an estimate of impacts for the Proposed Action. Figures 4-1, 4-2, and 4-3 present the approximate relative location of the larger washes within the Proposed Action. Because of the scale of the map and the small size of most of the ephemeral washes, many of the washes cannot be depicted on the figure.

The proposed access road would cross approximately 38 ephemeral washes, including Halfway Wash, that either intersect or parallel the proposed roadway. Construction in the bed or banks of the ephemeral washes would potentially cause minor, temporary increases in erosion, hydrologic changes, or vegetation removal that would reduce the ecological and functional values of the ephemeral wash. Waters of the United States affected by the roadway improvements are designated R-# within Table 1, *Appendix F*. As indicated in Table 1, *Appendix F*, the area affected at each of the 38 crossings of the waters of the United States is less than 0.5 acre.

Two small ephemeral washes are located within or immediately adjacent to the footprint of the proposed plant site. These washes are approximately 8 feet wide and flow into Toquop Wash. As shown in Table 1, *Appendix F*, the area of the waters of the United States affected by the proposed plant would total approximately 0.3 acre.

The proposed water pipeline (western alignment) would affect ten ephemeral washes, including Toquop Wash, South Fork Toquop Wash, and Sam's Camp Wash. The proposed water pipeline would be located within and parallel to the streambed of the Toquop Wash within the Toquop Gap. The proposed pipeline would parallel the Toquop Wash for an estimated 2,000 feet. The pipeline alignment within Toquop Gap will be refined during the final engineering design phase to specifically minimize impacts to areas of riparian vegetation within the Gap. Impacts to waters of the United States associated with installation of the water pipeline would be temporary impacts, because the ground surface would be returned to pre-existing contours following completion of construction activities.

Floodplains are not expected to be affected by the Proposed Action because the area is mapped as "Zone D," which is defined as "areas of undetermined, but possible, flood hazards."

Based on a preliminary estimate of impacts to waters of the United States (See Appendix F, Tables 1, 2, and 3), the Nationwide Permit Program (NWP) probably cannot be utilized for the Proposed Action because the cumulative permanent impacts associated with the roadway improvements and the plant site would exceed the acreage loss of waters of the United States authorized by the individual NWPs for these activities (NWP 14—Linear Transportation Projects and NWP 39—Residential, Commercial and Institutional Developments).

The Nevada Letter of Permission (LOP) procedures would be the applicable permit instrument for the Proposed Action. The Sacramento District of the USACE issues LOPs to authorize certain fill activities pursuant to Section 404 of the Clean Water Act that have overall minor impact to the aquatic ecosystem. Activities that qualify for processing through LOP procedures are fill activities that do not qualify for existing nationwide permit(s) or other general permit. These fill

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activities have minor impacts; and, therefore, do not warrant more detailed processing. The LOP is used only for those projects where the applicant performs a thorough pre-application coordination among the regulatory and resource agencies.

As requested by the USACE, a summary of the Proposed Action impacts evaluated according to the Section 404(b)1 Guidelines is presented in *Appendix F, Section 404(b)1 Guidelines for the Toquop Energy Facility,* of this *Proposed Toquop Land Disposal Amendment to the Caliente MFP and FEIS for the Toquop Energy Project*.

With the implementation of best management practices (BMPs) during construction, and other measures described in *Appendix B, Standard Construction and Operation Procedures,* and summarized below, impacts on waters of the United States, including ephemeral washes, would be minor.

Pah Rah Parcel. No perennial water bodies, waters of the United States, wetlands, other aquatic areas, or riparian vegetation are present within the Pah Rah parcel and, therefore, would not be affected by the Proposed Action.

4.5.5.1.2 Mitigation. No mitigation is required.

4.5.5.2 Alternative 1

4.5.5.2.1 Impacts. Alternative 1 would not affect wetlands or riparian zones present at springs. These resources do not occur at the immediate site of project features, although a number of springs are within approximately 100 yards of the eastern water pipeline alignment (see *Section 4.3, Surface Water Hydrology,* for discussion of spring locations). Alternative 1 would affect a number of named and unnamed ephemeral washes. Named ephemeral washes that would be affected include Halfway Wash, Toquop Wash, and Sam's Camp Wash.

As with the Proposed Action, the proposed access road would impact approximately 38 ephemeral washes, including Halfway Wash, that either intersect or parallel the proposed roadway. Two small ephemeral washes are located within the southern plant site. These washes are approximately 8 feet wide and flow into Toquop Wash.

The proposed water pipeline (eastern alignment) would affect approximately 54 ephemeral washes, including Toquop Wash and Sam's Camp Wash. The proposed pipeline would cross Toquop Wash below the confluence of Toquop Wash and South Fork Toquop Wash. Several drainages are present in the vicinity of the proposed crossing of the Toquop Wash.

Table 2, *Appendix F*, presents a summary of the Waters of the United States and an estimate of impacts associated with Alternative 1.

With the implementation of BMPs during construction and mitigation measures (see *Appendix B*), impacts on waters of the United States would be minor.

4.5.5.2.2 Mitigation. No mitigation is required.

4.5.5.3 Alternative 2

4.5.5.3.1 Impacts. Alternative 2 would not affect wetlands or riparian zones present at springs, although the utility corridor would pass near a number of springs, as described for the water pipeline

corridor in Alternative 1. Alternative 2 would affect a number of named and unnamed ephemeral washes. Named ephemeral washes that would be affected include Halfway Wash, Toquop Wash, and Sam's Camp Wash.

The proposed access road, which would extend from I-15 to the northern plant site, would impact approximately 92 ephemeral washes—including Halfway Wash, Toquop Wash, and Sam's Camp Wash—that either intersect or parallel the proposed roadway. Fifty-four of these ephemeral washes are the same as those that would be affected by the proposed water line and 38 are the same ephemeral washes that would be affected by the proposed road improvements described for the Proposed Action and Alternative 1. Based on a review of the USGS topographic maps, no ephemeral washes are present within the proposed plant site.

Table 3, *Appendix F*, presents a summary of the Waters of the United States and an estimate of impacts associated with Alternative 2.

The proposed utility alignment would affect approximately 54 ephemeral washes, including Toquop Wash and Sam's Camp Wash. These washes also would be affected by portions of the proposed access road. The proposed utility alignment would cross the Toquop Wash below the confluence of the Toquop Wash and the South Fork Toquop Wash. Several drainages are present in the vicinity of the proposed crossing of the Toquop Wash.

With the implementation of BMPs during construction and mitigation measures (see *Appendix B*), impacts on waters of the United States would be minor.

4.5.5.3.2 Mitigation. No mitigation is required.

4.5.5.4 Alternative 3

4.5.5.4.1 Impacts. Impacts of Alternative 3 would be the same as those described for the Proposed Action.

4.5.5.4.2 Mitigation. No mitigation is required.

4.5.5.5 No Action Alternative

Under the No Action Alternative, no impacts on wetlands or riparian zones, ephemeral washes, or floodplains would occur.

4.6 Air Quality and Noise

4.6.1 Air Quality

4.6.1.1 Proposed Action

4.6.1.1.1 Toquop Area

Overview

Construction. The Proposed Action would involve two distinct construction phases that have potential for impacts on air quality. The first is the construction of the pipeline that would supply water to the facility. The second is the construction of the power plant, including associated facilities such as the access road and substation. During construction, temporary and localized increases in ambient concentrations of NOx, CO, SO_2, VOCs, and PM10 would result from exhaust emissions of worker vehicles, heavy construction equipment, diesel generators, and other machinery and tools. In addition, fugitive dust emissions would result from excavation and earthwork.

For the duration of construction activities, actively disturbed areas would be stabilized through the use of wet suppression. Surfactants may be used to aid in wet suppression, thereby reducing the volume of water required to effectively treat the site. Disturbed areas of the site, including storage piles not being actively used for a period of 1 week or longer, would be stabilized as appropriate to minimize dust emissions. Active stabilization may not be required if soil moisture or natural crusting is sufficient to limit ambient impacts.

Bulk material stored onsite would be actively wetted during unloading as needed to minimize ambient impacts. It is anticipated that the majority of the material would be used onsite upon arrival. Should bulk materials require onsite storage for an extended period of time, the application of active wet suppression or the installation of a porous wind fence would be used as necessary to minimize fugitive dust generation.

Traffic passing from unpaved surfaces to paved roadways would create both mud and dirt deposits on the road and blowing dust from passing vehicles. Onsite equipment tire washing, for equipment that would leave the site and travel on paved roads, would be implemented as necessary to mitigate this potential source of fugitive dust.

Particulate emissions occur whenever a vehicle travels across an unpaved surface. Many of the heavily traveled unpaved surfaces, such as onsite access roads, would be covered with gravel and watered as necessary to minimize dust generation.

Onsite fugitive dust emissions would be limited by reducing vehicle speeds and a combination of active and passive dust suppression measures. Additional mitigation practices could include the following:

- Where practical, onsite employee parking, construction offices, and equipment and material laydown areas would be located near the main entrance to minimize onsite vehicle traffic.
- Onsite access roads, parking lots, and laydown areas would be maintained with a gravel cover to the maximum extent practical.
- Traffic off maintained onsite access roads would be restricted and a posted speed limit of 15 miles per hour would be enforced to minimize emissions from unpaved road segments.
- Unpaved road segments would be watered at least once daily when precipitation has not occurred. Additional watering of unpaved surfaces may be undertaken whenever it is necessary to prevent ambient impacts.
- Gaseous emissions from mobile sources would be minimized by proper maintenance and tune-up of equipment and by limitation of the equipment used to newer equipment, which meet air emission standards for emissions of gaseous pollutants.

For this study, a very conservative emission estimate was prepared using the emission factor for generalized construction activities from the California Air Resources Board (CARB) *Emission Inventory Procedural Manual* (CARB, 1997). This estimation methodology was accepted by NDEP BAQ. Controlled emissions based on this factor are 0.11 ton

per active acre per month of PM10 based on 8 hours per day of construction activities. This factor was scaled up to account for up to 9 hours per day of construction activity at the Toquop parcel.

The proposed power plant, switchyard, equalization and evaporation ponds, associated facilities, and a lay-down area would involve disturbance of approximately 100 acres. The access road and staging area would involve the disturbance of approximate 236 acres. Well, storage tank, and pipeline construction together with staging areas would add an additional 113 acres. Collectively, the total construction area to be disturbed is estimated to be 449 acres.

Based on an analysis of specific construction plans, it was estimated that a maximum of 35 percent of the plant area would be disturbed by activities on any given day. Additionally, it was estimated that the access road construction would cause soil disturbance in 1.5-mile sections (only 1.5 miles of the dirt access road would be disturbed at any one time before paving), that only one water well would be completed at any one time, and excavation and soil disturbance for the water pipeline would occur in 2-mile sections. The resultant maximum short-term PM10 emissions considering these factors would be 44.6 pounds per hour (lb/hr) from the power plant and evaporation pond area, 27.5 lb/hr from the wellfield and associated pipeline, and 10.4 lb/hr from the access road.

In addition to the fugitive dust emissions, during construction on-road and off-road vehicles would generate gaseous exhaust emissions. Mobile emissions are a function of hours of operation, vehicle speed, vehicle type, and fuel burned. Tables 4-2 and 4-3 summarize the total mobile emissions of CO, NOx, PM10, and SO_2 that would be generated during the construction phase.

Emission factors were obtained from CARB Emission Inventory for Off-Road Large Compression-Ignited (CI) Engines (greater than 25 horsepower), *Appendix D—Emission Factors for Off-Road Equipment*. January 2000 and EPA document AP-42, Volume II, Emission Factors for mobile Sources (EPA 1995, 5th edition and updates). This estimation methodology was accepted by NDEP BAQ.

TABLE 4-2
Emissions During the Construction Phase—Short-Term Rates
Proposed Action

	Particulate (PM10) (lb/hr)	Carbon Monoxide (lb/hr)	Sulfur Dioxide (lb/hr)	Nitrogen Oxides (lb/hr)
Power plant	45.72	7.39	5.90	39.23
Access road	11.78	9.87	9.07	13.91
Water pipeline	14.98	3.28	2.72	3.97
Wells	1.6	2.54	2.34	2.27

TABLE 4-3
Emissions During the Construction Phase—Total
Proposed Action

Phase of Construction	Carbon Monoxide (tons)	Nitrogen Oxides (tons)	Sulfur Dioxide (tons)	Particulate (PM10) (tons)
Power plant	16.7	73.0	10.6	303.5
Access road	3.5	19.0	3.2	61.3
Water pipeline	0.9	4.3	0.7	33.1
Wells	3.6	19.3	3.3	1.3
Project Totals	**24.7**	**115.7**	**17.8**	**399.3**

Operations

Air Emission Sources. The Proposed Action would include construction of a combined cycle, natural gas-fired water-cooled power plant. The plant would consume natural gas for the production of up to 1,100 MW of electricity.

The majority of the natural gas consumed by the plant would be fired in combustion turbines, which are similar to large jet engines. The hot exhaust gases would provide the energy to drive the turbine, which in turn would drive generators to produce electricity. Each combustion turbine/generator pair is referred to as a combustion turbine generator.

The waste heat in the turbine exhaust gas would be directed to a heat recovery steam generator to produce steam for the production of additional electricity. The heat recovery steam generator functions by passing the hot exhaust across a bank of metal tubes. Water inside of the tubes is thus heated by the exhaust to produce steam, which in turn drives another turbine, which in turn drives another generator to produce electricity. This turbine/generator pair is referred to as a steam turbine generator.

Heat recovery steam generators are often equipped with "duct burners," which are burners that combust additional fuel, further raising the temperature of the combustion turbine exhaust. The hotter exhaust is used to produce additional steam, allowing the steam turbine generator to produce additional electricity.

The proposed Toqoup facility would include four General Electric Frame 7FA combustion turbine generators. Each combustion turbine generator would be paired with one heat recovery steam generator equipped with 300 MMBtu/hr duct burners. Two heat recovery steam generators would be paired with each of two steam turbine generators; thus the steam from the four heat recovery steam generators would be delivered to two steam turbine generators. This arrangement is referred to as a "2x2x1" configuration, where there are two power blocks each consisting of two combustion turbine generators and one steam turbine generator. The Toquop combustion turbine generators and duct burners would be fired exclusively with natural gas.

Another configuration would change the facility to a "4x1x1" arrangement. In this arrangement, there would be four steam turbine generators, each of which would

be paired with one of the combustion turbine generators. No changes to the magnitude, type, or impact of air emissions would result from this modification.

The facility would also include two auxiliary boilers, which would be used to provide steam to preheat portions of the heat recovery steam generator and steam turbine generator. This auxiliary steam allows a faster and more efficient plant startup, and allows the heat recovery steam generator to be kept hot during brief maintenance outages. The Toqoup auxiliary boilers would be fired exclusively with natural gas.

Other sources of air emissions would result from equipment used to support the power plant. Four fuel preheaters (one per combustion turbine generator) with a rated heat input of 5 MMBTU would be used to re-vaporize any liquids that condense in the natural gas after the gas is reduced from pipeline pressure to burner pressure. Two diesel fired emergency generators would be used to provide power to protect critical equipment during plant outages in the event that grid power is also lost. A diesel-fired pump would be used to provide water for fire protection. Two cooling towers of eight to ten cells each would be used to provide cooling water to the surface water condensers.

The combustion turbine generators, duct burners, auxiliary boilers, generators, and fire pump would all cause air emissions of the criteria air pollutants nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), small particulate matter (PM10), and volatile organic compounds (VOCs). Minor quantities of hazardous air pollutants (HAPs) such as formaldehyde and benzene would also be emitted. The cooling towers will cause emissions of PM10.

Air Emission Controls. The facility would utilize a selective catalytic reduction (SCR) system for the control of NO_x emissions from the combustion turbine generators and duct burners. SCR technology uses ammonia, in the presence of catalyst, to react NO_x to elemental nitrogen (N_2). The SCR systems of the Proposed Action would be designed to control the combustion turbine generator/duct burner NO_x to 2.5 parts per million by volume, on a dry basis, corrected to 15 percent oxygen (ppmvd @ 15% O_2).

A small stoichiometric excess of ammonia must be added in order to control the NO_x to the target control concentration; this excess ammonia is then exhausted with the combustion turbine generator/duct burner exhaust and is referred to as “ammonia slip.” When the SCR catalyst is new, ammonia slip is very small; ammonia slip from a new SCR system is typically less than 1 part per million by volume on a wet basis (ppmvw). After repeated use the catalyst loses reactivity, and additional stoichiometric excess of ammonia must be injected in order to meet the NO_x emission limits, resulting in additional ammonia slip. Eventually the catalyst is replaced, lowering ammonia slip to the original levels. For the Proposed Action, catalyst would be replaced when ammonia slip reaches 10 ppmvw.

The combustion turbine generators and other combustion sources would also use modern engineering and computer controls to minimize the emissions of other pollutants. After NO_x, CO is the other primary pollutant of concern from natural gas fired power plants; maximum CO emissions from Toquop combustion

turbine generators would be 10 ppmvd @ 15% O_2. The cooling towers would utilize highly efficient drift eliminators to minimize PM10 emissions.

Magnitude of Emissions. The emissions from the Toquop facility, and the use of air emission controls, would be regulated by various state and federal air pollution permits. In particular, the facility must apply for and obtain a permit under the Prevention of Significant Deterioration (PSD) program, which is required by the federal Clean Air Act but is administered in the State of Nevada by the Nevada Department of Environmental Protection.

The maximum emissions of criteria air pollutants from the facility, at the limits requested in the PSD permit application, are shown in Table 4-4. Emission data upon which these limits were based include turbine manufacturer's emission estimates, data from the USEPA "AP-42" document, and engineering experience from other plants. Toquop Energy Inc. would be required to verify compliance with these emission limits under the terms of the PSD air permit. Because federally enforceable limits on the emissions from the facility are being requested via the PSD permit, these rates also represent the potential to emit (PTE) of the facility.

Estimated maximum emissions of HAPs are shown in Table 4-5. These emissions were estimated based on source test data compiled in the CARB California Air Toxic Emission Factor (CATEF) database. The use of CATEF factors as a basis for estimating plant emissions was accepted by NDEP BAQ.

TABLE 4-4
Criteria Air Pollutant Potential Emissions for the Proposed Action, Alternative 1, Alternative 2, and Alternative 3

Pollutant	Single Combustion Turbine Generator/ Duct Burners On	Fuel Preheater (per unit)	Auxiliary Boiler (per unit)	Cooling Tower (per cell)[a]	Emergency Fire Pump	Total Facility[b]
NO_x (lb/hr) [c]	19.19	0.25	1.40	—	3.91	108.5
NO_x (TPY) [d]	84.05	1.10	2.8	—	0.98	355.91
CO (lb/hr)	54	0.46	2.92	—	0.17	230.33
CO (TPY)	236.52	2.01	5.84	—	0.04	967.48
SO_2 (lb/hr)	11.44	0.03	0.24	—	0.39	47.57
SO_2 (TPY)	50.11	0.13	0.48	—	0.10	202.23
PM10 (lb/hr))	24.00	0.10	0.20	0.17	0.04	100.54
PM10 (TPY)	105.12	0.44	0.40	0.73	0.01	434.97
VOC (lb/hr)	4.22	0.24	0.16	—	0.13	19.37
VOC (TPY)	18.47	1.05	0.32	—	0.03	79.04

[a] Cooling tower emissions would be eliminated for Alternative 3.
[b] Includes emissions from four single combustion turbine generators and insignificant activities.
[c] Pounds per hour.
[d] Tons per year.

TABLE 4-5
Hazardous Air Pollutant Potential Emissions for the Proposed Action, Alternative 1, Alternative 2, and Alternative 3

Pollutant	Potential to Emit (pounds/hour)*	Potential to Emit (tons/year)*
Benzene	0.61	2.62
Formaldehyde	0.80	3.47
1,3-Butadiene	0.0014	0.0036
Acetaldehyde	0.36	1.53
Acrolein	0.070	0.30
Ethylbenzene	0.061	0.27
Hexane	1.38	6.04
Naphthalene	0.0074	0.026
Propylene oxide	0.28	1.24
Toluene	0.38	1.63
Xylene (m,p)	0.27	1.18
Xylene (o)	0.14	0.59
Xylene (total)	0.13	0.53
Total Hazardous Air Pollutants	**4.50**	**19.4**

*Controlled emissions including insignificant/exempt activities.

Impacts

Construction. As discussed above, various control measures would be used to minimize impact of construction-related emissions. Because of these measures to prevent fugitive dust and the minimum vehicle emissions, the potential impacts resulting from construction activities at the proposed site would occur only over a limited geographic area and only for a limited time. After site preparation is complete, foundations have been constructed, and mitigation measures such as covering of traffic routes with gravel have been implemented, emissions would be very low. A Class II area impact analysis was completed, based on the emission rates described above and using the SCREEN3 dispersion model. This analysis demonstrates that federal and state ambient air quality standards would not be exceeded at any time during the construction phase. All predicted construction impacts are less than allowable standards. Modeled construction impacts for the power plant, access road, pipeline, and wellfield are presented and compared to ambient air quality standards in Tables 4-6 through 4-9. Pollutant concentrations in these tables and some subsequent tables are expressed as micrograms per cubic meter ($\mu g/m^3$).

TABLE 4-6
Estimated Reasonable but Conservative Impacts for Proposed Action Power Plant Construction

Pollutant	Maximum 1-Hour Predicted Impacts ($\mu g/m^3$)	Averaging Period	Scaling Factor	Maximum Predicted Impacts ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Nitrogen dioxide	274.9	Annual	0.1	27.5	100
Carbon dioxide	51.8	8-hour	0.7	36.2	NA
		1-hour	1.0	51.8	NA
Sulfur dioxide	41.3	Annual	0.1	4.1	80
		24-hour	0.4	16.5	365
		3-hour	0.9	37.2	1,300
PM10*	320.3	Annual	0.1	41.0	50
		24-hour	0.4	138.3	150

*Maximum predicted PM10 impacts include background of 9 $\mu g/m^3$ (annual average) and 10.2 $\mu g/m^3$ (24-hour average)

TABLE 4-7
Estimated Reasonable but Conservative Impacts for Proposed Action Access Road Construction

Pollutant	Maximum 1-Hour Predicted Impacts ($\mu g/m^3$)	Averaging Period	Scaling Factor	Maximum Predicted Impacts ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Nitrogen dioxide	144.3	Annual	0.1	14.4	100
Carbon dioxide	102.4	8-hour	0.7	71.7	NA
		1-hour	1.0	102.4	NA
Sulfur dioxide	94.1	Annual	0.1	9.4	80
		24-hour	0.4	37.6	365
		3-hour	0.9	84.7	1,300
PM10*	122.3	Annual	0.1	21.2	50
		24-hour	0.4	59.1	150

*Maximum predicted PM10 impacts include background of 9 $\mu g/m^3$ (annual average) and 10.2 $\mu g/m^3$ (24-hour average)

TABLE 4-8
Estimated Reasonable but Conservative Impacts for Proposed Action Water Pipeline Construction

Pollutant	Maximum 1-Hour Predicted Impacts ($\mu g/m^3$)	Averaging Period	Scaling Factor	Maximum Predicted Impacts ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Nitrogen dioxide	67.5	Annual	0.1	6.8	100
Carbon dioxide	55.9	8-hour	0.7	39.1	NA
		1-hour	1.0	55.9	NA
Sulfur dioxide	46.3	Annual	0.1	4.6	80
		24-hour	0.4	18.5	365
		3-hour	0.9	41.7	1,300
PM10*	255.1	Annual	0.1	34.5	50
		24-hour	0.4	112.2	150

*Maximum predicted PM_{10} impacts include background of 9 $\mu g/m^3$ (annual average) and 10.2 $\mu g/m^3$ (24-hour average)

TABLE 4-9
Estimated Reasonable but Conservative Impacts for Proposed Action Well Site Construction

Pollutant	Maximum 1-Hour Predicted Impacts ($\mu g/m^3$)	Averaging Period	Scaling Factor	Maximum Predicted Impact ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Nitrogen dioxide	207.8	Annual	0.1	20.8	100
Carbon dioxide	231.7	8-hour	0.7	162.2	NA
		1-hour	1.0	231.7	NA
Sulfur dioxide	214.1	Annual	0.1	21.4	80
		24-hour	0.4	85.6	365
		3-hour	0.9	192.7	1,300
PM10*	146.6	Annual	0.1	23.7	50
		24-hour	0.4	68.8	150

*Maximum predicted PM_{10} impacts include background of 9 $\mu g/m^3$ (annual average) and 10.2 $\mu g/m^3$ (24-hour average)

Operations

Dispersion Modeling Methodology. Dispersion modeling was performed using EPA-approved air quality dispersion models, which are mathematical descriptions of atmospheric diffusion and dispersion processes that can be used to predict pollutant impacts over a given area. The modeling was conducted in accordance with a dispersion modeling protocol that was submitted to and approved by the NDEP BAQ as part of the PSD process. *Appendix G, Air Quality Dispersion Modeling Methodology,* describes the air quality dispersion modeling methodology in detail.

Class II Area Dispersion Modeling Results. Dispersion modeling of the maximum allowable emissions from the Toquop facility was performed for NO_X, CO, PM10, and SO_2. No EPA-approved models exist for prediction of ozone impacts of a single facility.

Predicted impacts are compared to the "PSD Increment," which is the maximum allowable ambient air quality deterioration allowed under the PSD program. They are also compared to the national ambient air quality standards (NAAQS). The NAAQS are the pollutant concentrations below which, as determined by the USEPA, no adverse human health or environmental impacts are presumed to occur. Nevada has specific state AAQS, but these generally match the federal standards.

Table 4-10 presents the predicted impacts from the Proposed Action and compares them to the PSD increment and NAAQS. The values presented represent the highest results modeled at any receptor location for any of the meteorological conditions modeled.

Class II Area HAPS. Ambient impacts of hazardous air pollutant emissions were estimated by prorating the ISCST3 and CTSCREEN modeling results for the criteria pollutants based on the ratios of HAP emission rate to criteria emission rate for each pollutant and each source. Reasonable but conservative resulting 8-hour, 24-hour, and annual average HAP concentrations are presented in Table 4-11. These estimated impacts were compared to available standards (state and federal human health exposure guidelines) based on the exposure duration.

The estimated 8-hour average HAP concentrations were compared to the 8-hour Nevada Average Acceptable Ambient Air Concentrations [AAACs] (ATSDR, 2002a; USEPA, 1997). The AAACs are from the National Air Toxics Inventory Clearing House database and are also presented in the toxicological profiles published by the Agency for Toxic Substances and Disease Registry (ATSDR). AAACs are available for 8 of the 12 HAPs.

The estimated 24-hour average HAP concentrations were compared to the ATSDR Minimal Risk Levels (MRLs) [ATSDR, 2002b]. MRLs were derived based on exposures that occur over a 1- to 14-day time frame and are available for 5 of the 12 HAPs.

The estimated annual average HAP concentrations were compared to the U.S. EPA Region 9 Ambient Air Preliminary Remediation Goals (PRGs) [USEPA, 2002]. The PRGs are based on a chronic (long-term) exposure and are derived using a target risk level of 1×10^{-6} (for carcinogens) or a target hazard index of 1 (non-carcinogens). PRGs are available for 10 of the 12 HAPs.

TABLE 4-10
Estimated Reasonable but Conservative Impacts for the Proposed Action

Pollutant	Averaging Period	Maximum Predicted Impacts	Ambient Impact Standards	
			PSD Increment ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Nitrogen dioxide	Annual	12.6	25	100
Carbon dioxide	8-hour	51.7	NA	NA
	1-hour	406.6	NA	NA
Sulfur dioxide	Annual	0.9	20	80
	24-hour	4.5	91	365
	3-hour	21.8	512	1,300
PM10	Annual	2.1	17	50
	24-hour	9.4	30	150

As shown in Table 4-11, none of the estimated HAP concentrations exceed the available standards, based on the appropriate exposure term. Therefore, even if residences were located in close proximity to the site, it is very unlikely that the estimated HAP concentrations would result in an unacceptable risk to the occupants of those residences. The distance of the proposed Toquop facility from any residences or business makes this analysis even more conservative.

Although, none of the air standards presented in Table 4-11 are available for m,p-xylene and o-xylene, the potential impacts can be assessed using the standards for total xylenes, which is a mixture of m,p-xylene and o-xylene. In addition, Florida, Indiana, and North Dakota have 8-hour AAAC values for m,p-xylene and o-xylene ranging from 2,170 $\mu g/m^3$ to 4,400 $\mu g/m^3$ (USEPA, 1997); however, the estimated m,p-xylene and o-xylene average 8-hour air concentrations are nearly four orders of magnitude lower than these AAACs.

Class I Area Dispersion Modeling Analysis Results. Evaluation of air emission impacts on Federal Class I areas is focused on two primary topics. First, maximum ambient concentrations of criteria pollutants are estimated and compared to Class I area ambient air quality standards and Class I area allowable increment. Second, impacts of air emissions on Air Quality Related Values (AQRVs) within the Class I area are determined. In the western United States, AQRV evaluation is typically limited to evaluation of impacts on regional haze and AQRV impacts caused by acid deposition.

A CALPUFF screening model was used to predict impacts on the Grand Canyon National Park. National Weather Service meteorological data from Las Vegas were used for this analysis. This is the nearest existing set of data.

TABLE 4-11
Hazardous Air Pollutant Impact Analysis

HAP	Reasonable but Conservative Estimated Impacts			Nevada Average Acceptable Ambient Air Concentrations [8-hour][1] ($\mu g/m^3$)	8-hour Average Concentration Greater than Nevada AACS?	ATSDR Minimal Risk Level (MRL) [acute, 1 - 14 days][2,4] ($\mu g/m^3$)	24-hour Average Concentration Greater than ATSDR MRL	Region 9 Ambient Air PRG [chronic][3] ($\mu g/m^3$)	24-hour Average Concentration Greater than Region 9 PRG?
	8-Hour Average Concentration ($\mu g/m^3$)	24-hour Average Concentration ($\mu g/m^3$)	Annual Average Concentration ($\mu g/m^3$)						
Formaldehyde	4.9E-01	2.8E-01	7.0E-02	7.1E+01	No	3.3E+01	No	1.5E-01	No
1,3-Butadiene	2.7E-02	1.5E-02	3.9E.03	5.2E+04	No	NA[5]	—	3.7E-03	No
Acetaldehyde	5.2E-01	3.0E-01	7.5E-02	NA[5]	—	NA[5]	—	8.7E-01	No
Acrolein	4.4E-02	2.5E-02	6.3-03	6.9E+00	No	4.1E-02	No	2.1E-02	No
Ethylbenzene	6.3E-02	3.6E-02	9.0E-03	1.0E+04	No	8.1E+02	No	1.1E+03	No
Hexane	5.2E-01	2.9E-01	7.4E-02	4.3E+03	No	NA[5]	—	2.1E+02	No
Naphthalene	1.4E-02	8.0E-03	2.0E-03	1.2E +03	No	NA[5]	—	3.1E+00	No
Propylene oxide	1.1E-01	6.1E-02	1.5E-02	NA[5]	—	NA[5]	—	5.2E-01	No
Toluene	2.9E-01	1.6E-01	4.1E-02	8.9E+03	No	8.1E+02	No	4.0E+02	No
Xylene (m,p)	1.2E-01	6.9E-02	1.7E-02	NA[5]	—	NA[5]	—	NA[5]	—
Xylene (o)	1.1E-01	6.2E-02	1.5E-02	NA[5]	—-	NA[5]	—	NA[5]	—
Xylene (total)	2.2E-01	1.2E-01	3.1E-02	1.0E+04	No	8.1E+02	No	7.3E+02	No

Notes:

[1] ATSDR Toxicological Profile Information Sheets. http://www.atsdr.cdc.gov/toxpro2.html. March 2002.

[2] Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs) for Hazardous Substances. http://www.atsdr.cdc.gov/mrls.html. March 2002.

[3] U.S. Environmental Protection Agency. Region 9 Ambient Air Preliminary Remediations Goals.

[4] ATSDR Minimal Risk Level for ethylbenzene is based on a sub-chronic (2 weeks to 1 year) exposure term.

[5] NA = value is not available for this HAP

Three additional Class I areas exist within 200 kilometers (125 miles) of the Proposed Action plant site. These are the Sycamore Canyon Wilderness Area, Bryce Canyon National Park, and Zion National Park. Because the distances to these areas are greater than the distance to the Grand Canyon National Park, the managers of these areas suggested that an analysis of potential impacts on the Grand Canyon National Park only would be adequate (Hall, 2001; Notar, 2001). Facility impacts on the Grand Canyon National Park should exceed impacts at the other three areas.

Table 4-12 lists the maximum predicted impacts on ambient pollutant concentrations within the Grand Canyon National Park. All predicted impacts are well below PSD Class I modeling significance levels; therefore, the Proposed Action is presumed to have an insignificant impact on air quality in the area and a cumulative evaluation of the impacts on increment and NAAQS was not performed.

The CALPUFF screening analysis predicted that the reasonable but conservative impact on regional haze within the Grand Canyon National Park was a 3.5 percent change in atmospheric light extinction. In accordance with the FLAG guidance document, a facility predicted to cause a change of 5 percent or less is presumed to have an insignificant impact on visibility. Therefore, a cumulative impact analysis of impacts on the Grand Canyon National Park was not performed. The subsequent complete CALPUFF analysis predicted that the reasonable but conservative impact on regional haze within the Grand Canyon National Park was a 1.6 percent change in atmospheric light extinction.

Reasonable but conservative modeling, based on CALPUFF screening analysis of the Proposed Action impact on acid deposition in the Grand Canyon National Park indicates that the added deposition would not exceed 1.3×10^{-3} kilograms per hectare per year (kg/ha/yr) for nitrogen compounds and 1.3×10^{-3} kg/ha/yr for sulfur. These results are significantly less than the deposition analysis thresholds of 5.0×10^{-3} kg/ha/yr for nitrogen recommended by the 2001 FLAG

TABLE 4-12
Predicted Grand Canyon National Park Impacts for the Proposed Action, Alternative 1, Alternative 2, and Alternative 3

Parameter	Averaging Period	Maximum Predicted Impact at Grand Canyon ($\mu g/m^3$)	Class I Significance Level ($\mu g/m^3$)
Nitrogen oxides (NO_x)	Annual	0.0098	0.1
Sulfur dioxide (SO_2)	Annual	0.009	0.1
	24-hour	0.078	0.2
	3-hour	0.03	1.0
PM10	Annual	0.02	0.2
	24-hour	0.17	0.3

Guidance on Nitrogen Deposition Analysis Thresholds document and 5.0×10^{-3} kg/ha/yr for sulfur, as proposed but not yet finalized by the National Park Service (NPS). Because the estimated impacts of the Proposed Action were extremely low, the Proposed Action is presumed to create an minimal increase in the total deposition for the Grand Canyon National Park. Therefore, a more complete analysis of existing plus proposed deposition compared to the acid neutralization capacity of the Grand Canyon National Park waters was not performed.

Class II Area Visibility Impacts. As stated previously, the NPS requested an analysis of visibility impacts within the Lake Mead National Recreation Area (Notar, 2001). This included a CALPUFF analysis of impacts on regional haze and a VISCREEN analysis of discrete plume visibility impacts.

Regional Haze Impacts. The regional haze CALPUFF screening analysis predicted a reasonable but conservative 2.1 percent change in atmospheric light extinction resulting from the Proposed Action. Because this is well below the 5 percent threshold recommended in the FLAG document, no cumulative impact analysis of Lake Mead National Recreation Area regional haze was performed.

Discrete Plume Impacts. VISCREEN is a relatively simplistic Gaussian distribution model that assumes all plant emissions would form a single plume. On this basis, the four combustion turbine generator/duct burner stacks and the 16 cooling tower cells of the Proposed Action were modeled as a single plume blowing straight towards Lake Mead.

For the purpose of determining the reasonable but conservative meteorology to be used in determining discrete plume impacts, the VISCREEN guidance manual specifies that the user determine the most stable meteorological conditions occurring for at least 1 percent of the year.

For the Proposed Action, based on the Las Vegas meteorological data set used for the CALPUFF analysis, this reasonable but conservative meteorology was determined to be a “D” class stability and a 4 m/s windspeed. These data were used for the VISCREEN analysis.

No published standards exist for evaluation of discrete plume visual impacts in federal Class II areas. For federal Class I areas, the VISCREEN users’ manual suggests maximum allowable color contrast (“delta E”) of 2.0 for results viewed against terrain or sky, maximum allowable contrast of 0.5 for results viewed against sky, and maximum allowable contrast of 0.6 for results viewed against terrain.

For the Proposed Action, the model predicts that the reasonable but conservative color contrast and contrast, viewed against sky, would be 0.25 and -0.008, respectively, for situations where the observer is viewing the plume with the sun behind the observer, and 1.5 and 0.031, respectively, for situations where the observer is viewing the plume with the sun behind the plume. These results are well within the standards for Class I areas. The model predicts reasonable but conservative color contrast and contrast, viewed against terrain, of 0.083 and 0.01, respectively, with the sun behind the observer, and 2.3 and 0.015, respectively, with the sun behind the plume.

The model predicts that, under the right atmospheric conditions and with specific

relative angles between the observer, the plume, and the sun, the total Proposed Action plant emissions merging to form a single plume could be viewed against terrain at Lake Mead National Recreation Area. Predicted results are well within Class I area standards for all other situations.

These conditions could occur, at most, for 1 percent of the year. Less than 1 percent of the Lake Mead National Recreation Area is within the radius where these results were predicted. Furthermore, at the specified angles of sun, observer, and terrain, no elevated terrain against which the observer could view the plume exists. Therefore, VISCREEN predicts minimal impact on visibility within the Lake Mead National Recreation Area.

4.6.1.1.2 Pah Rah Parcel. No adverse air quality impacts on the Pah Rah parcel would occur as a result of the land exchange. Converting the Pah Rah parcel to public administration would reduce development potential on the parcel and the potential for related contributions to airborne emissions.

4.6.1.1.3 Mitigation. No mitigation is required.

4.6.1.2 Alternative 1

4.6.1.2.1 Impacts. Predicted impacts from Alternative 1 would be the same as those estimated for the Proposed Action.

4.6.1.2.2 Mitigation. No mitigation is required.

4.6.1.3 Alternative 2

4.6.1.3.1 Impacts

Construction. Predicted construction-related impacts from Alternative 2 would be essentially equal in all respects to those estimated for the Proposed Action. With a plant site location in the Tule Desert, Alternative 2 would require a much shorter water pipeline; however, a new transmission line the same length as the pipeline would be required. Thus, overall Alternative 2 would have impacts of equal magnitude to the Proposed Action, although the maximum impacts could occur in slightly different locations.

Operation

Class II Area Impacts. Alternative 2 is in an area of similar topography, climate, and meteorology as the Proposed Action. Maximum PM10 and SO_2 impacts from the Proposed Action were predicted to be in the East Mormon Mountains at an elevation of approximately 125 meters (410 feet) above and at a distance of 4 to 5 miles from the plant site. For Alternative 2, Jumbled Mountain reaches 243 meters (797 feet) above the plant site, begins rising above the desert at a distance of about 1 mile, and reaches its summit approximately 2 miles from the plant site. Therefore, especially given the use of the screening meteorological data set which weights all wind directions equally, it is highly likely that the predicted maximum PM10 and SO_2 impacts for Alternative 2 would be equal to or greater than the predicted maximum PM10 and SO_2 impacts for the Proposed Action.

For the Proposed Action, the highest predicted NO_x impact was between the plant site and the East Mormon Mountains. Because this impact occurred

on relatively level topography, it is unlikely that the maximum predicted NO_x impact for Alternative 2 would be any less than that for the Proposed Action. However, there is a chance that, given the closer proximity of mountains for Alternative 2, the predicted NO_x impacts for Alternative 2 could be higher than for the Proposed Action.

Class I Area Impacts. The Alternative 2 plant site would be 99 kilometers (62 miles) from the closest point of the Grand Canyon National Park, versus 78 kilometers (49 miles) for the Proposed Action plant site. Climate and meteorology of the two sites would be similar. Jumbled Mountain and the Tule Springs Hills are between the Alternative 2 plant site and the Grand Canyon National Park, providing complex terrain that may promote additional mixing or divert winds that may have blown from the plant site to the Grand Canyon National Park area.

It can, therefore, be assumed that the potential impacts of Alternative 2 on all pollutant concentrations within the Grand Canyon National Park would be less than Class I modeling significance levels, that Alternative 2 would cause less than the 3.5 percent change in atmospheric light extinction in the Grand Canyon National Park predicted for the Proposed Action, and that no unacceptable acid deposition within the park would occur.

Class II Area Visibility Impacts. An analysis of discrete plume visual impacts for Alternative 2 was not conducted. However the Alternative 2 plant site would be approximately 62 km (39 miles) from the Lake Mead National Recreation Area. There are no USEPA-approved discrete plume visual impact models that are valid for distances greater than 50 km (31 miles). Therefore, it would be impossible to conduct a similar analysis for Alternative 2, and the plant would be presumed to create no discrete plume visual impacts on the Lake Mead National Recreation Area.

Alternative 2 is 24 km (15 miles) further from the Lake Mead National Recreation Area than the Proposed Action. It is therefore assumed that a CALPUFF analysis of Alternative 2 impacts on Lake Mead National Recreation Area regional haze would demonstrate a worst-case impact of less than 2.1 percent change in atmospheric light extinction, and that Alternative 2 would also be demonstrated to have minimal impacts at the Lake Mead National Recreation Area.

4.6.1.3.2 Mitigation. No mitigation is required

4.6.1.4 Alternative 3

The air emissions resulting from Alternative 3 would be very similar to those of the Proposed Action. The only changes in air emissions would be the elimination of the small PM10 emissions from the cooling towers. Emissions from the combustion turbine generators, duct burners, auxiliary boilers, emergency generators, and fire water pumps would be identical to those of the Proposed Action.

Because of the stack downwash, slight variations in near-field ambient impacts could result. Downwash is the phenomena whereby the action of wind blowing past buildings and other structures nearby the stacks creates vortexes that can pull exhaust below the tip of the stack, thus creating changes to near-field impacts. Alternative 3 would add the large air-cooled condenser structures to the project,

and would likely cause rearrangement of other structures, thus changing downwash.

4.6.1.4.1 Impacts. Ambient impacts associated with Alternative 3 are anticipated to be very similar to those of the Proposed Action. Because of stack downwash, which is caused by small vortexes created when wind passes the structures surrounding the exhaust stacks, variations in ambient impacts may result from Alternative 3 as compared to the Proposed Action because the plant layout would change for Alternative 3. Furthermore, cooling towers create small levels of PM10 air pollution; very fine droplets of water are blown out the top of the tower, and the salts naturally present in the water droplet form crystals when the water itself evaporates after the droplet leaves the tower. Alternative 3 would eliminate this small source of particulate air pollution and thus would cause a small reduction in ambient impacts. Any ambient impact variations caused by either issue would be very minor and would be confined to the area immediately surrounding the project site.

4.6.1.4.2 Mitigation

No mitigation is required.

4.6.1.5 No Action Alternative

No new sources of air pollutant emissions would be added under the No Action Alternative. Therefore, no air quality impacts would result, and existing conditions described for the affected environment in Chapter 3 would continue.

4.6.2 Noise

This analysis addresses the potential temporary noise impacts from project construction activities, and the potential noise impacts from project operation and maintenance activities.

4.6.2.1 Proposed Action

4.6.2.1.1 Impacts

Toquop Area. Construction of the Proposed Action would result in a temporary (26-month) direct increase in ambient noise levels at the southern Toquop power plant site, along the access road to the site, at the wellfield, and along the western water pipeline alignment. The actual increase in ambient noise levels at any given location would depend on the construction activity occurring and the number and mix of construction vehicles and equipment in use.

Construction of a power plant can generally be divided into five phases that use different types of construction equipment. The five phases are: 1) site preparation and excavation; 2) concrete pouring; 3) steel erection; 4) mechanical; and 5) clean-up. Construction equipment generates both constant and impulse noise, depending on the type of equipment. Noise levels generated by construction equipment generally range from 85 to 98 dBA at 50 feet (CH2M HILL, 2001), and would vary, depending on the construction activity. Some blasting is anticipated during construction. The increased noise level (approximately 105 dBA at a distance of 1,000 feet) would have a duration of less than 2 seconds (CH2M HILL, 1994). These construction noise levels would be temporary, and noise levels at the source would not exceed 110 dBA. No sensitive receptors would be exposed to the noise. Lincoln County's Zoning Ordinance does not include a noise ordinance (Lincoln County, 2001b).

The greatest source of noise from operation of the Proposed Action would be the combustion turbine generators. Operation of the proposed power plant is expected to emit noise levels of approximately 60 dBA at approximately 550 feet over open land. No noise ordinances exist in Lincoln County, and no sensitive receptors would be exposed to the noise.

Pah Rah Parcel. Because no development would occur at the Pah Rah parcel as a result of implementing the Proposed Action, no change in ambient noise levels is expected.

4.6.2.1.2 Mitigation. No mitigation is required.

4.6.2.2 Alternative 1

4.6.2.2.1 Impacts. Construction impacts associated with Alternative 1 would be the same as those described for the Proposed Action because the same power plant would be constructed on the same parcel as described for the Proposed Action. In addition, a water pipeline similar to that described for the Proposed Action would be installed (eastern alignment instead of western alignment), and a wellfield and an improved access road similar to those described for the Proposed Action would be constructed under Alternative 1. Further, construction noise levels would be temporary and would not exceed 110 dBA. No sensitive receptors would be exposed to the noise. Lincoln County's Zoning Ordinance does not include a noise ordinance (Lincoln County, 2001b). Operation noise levels would be the same as described for the Proposed Action.

4.6.2.2.2 Mitigation. No mitigation is required.

4.6.2.3 Alternative 2

4.6.2.3.1 Impacts. Construction impacts associated with Alternative 2 would be the same as those described for the Proposed Action. Although the power plant would be constructed on the northern parcel instead of the southern parcel, the same noise-generating activities would be performed during plant construction. In addition, a gas pipeline following an alignment similar to the water pipeline alignment described for the Proposed Action would be installed. An overhead high-voltage electric transmission line also would be installed, and a wellfield and improvements to the access road similar to those described for the Proposed Action would be constructed under this alternative. Construction of these project components would emit noise levels similar to those expected from constructing the Proposed Action. Construction noise levels would be temporary and not exceed 110 dBA. No sensitive receptors would be exposed to the noise. Lincoln County's Zoning Ordinance does not include a noise ordinance (Lincoln County, 2001b). Operation noise levels would be the same as described for the Proposed Action.

4.6.2.3.2 Mitigation. No mitigation is required.

4.6.2.4 Alternative 3

4.6.2.4.1 Impacts. Although this alternative would consist of an air-cooled power plant instead of a water-cooled system, the same noise-generating activities would be performed during plant construction as those described for the Proposed Action, so construction impacts associated with Alternative 3 would be the

same as those described for the Proposed Action.

A 4-inch-diameter water pipeline (smaller than for the Proposed Action) and fewer deep wells (up to 3 for Alternative 3 rather than up to 15 for the Proposed Action) would be installed. In addition, the same gas and transmission line connections and improvements to the access road as are planned for the Proposed Action would be completed for Alternative 3. Construction of these project components would emit noise levels similar to those expected from constructing the Proposed Action. Construction noise levels would be temporary and not exceed 110 dBA. No sensitive receptors would be exposed to the noise. Lincoln County's Zoning Ordinance does not include a noise ordinance (Lincoln County, 2001b). The greatest source of noise from Alternative 3 would be the fans on the air-cooled condensers. Noise would also be generated by the combustion turbine generators to a lesser extent. Noise levels produced from operation of Alternative 3 would be higher than were described for the Proposed Action, but no sensitive receptors would be exposed to the noise.

4.6.2.4.2 Mitigation. No mitigation is required.

4.6.2.5 No Action Alternative

Trends and future conditions associated with noise in the Toquop and Pah Rah areas under the No Action Alternative are expected to be the same as existing conditions. Therefore, no impact on ambient noise levels would be expected with implementation of this alternative. Development may occur in the future in these areas, but the level and type of development and associated noise levels that would occur in these areas is unknown.

4.7 Visual Resources

This analysis addresses the potential temporary impacts on visual resources from project construction activities and the potential long-term impacts on visual resources from the presence of the proposed facilities.

4.7.1 Proposed Action

4.7.1.1 Impacts

4.7.1.1.1 Toquop Area. The visual impacts from constructing and operating the Toquop Energy Project under the Proposed Action would depend on the degree of change to the visual resource and the viewers' responses to that change. Impacts on visual resources during project construction would include the following:

- **Dust that would be generated.** Dust would be generated by earth-moving activities, construction vehicles and equipment, construction worker vehicles, materials delivery vehicles, and from areas within the construction zone that have been disturbed or where excavated material is stockpiled. Fugitive dust, if emitted in sufficient quantities and if adverse weather conditions persist, could impair or degrade existing views.

- **Presence of the construction equipment.** Depending on their values, interests, and preconceived notions and expectations, for some recreationists viewing the area, the presence of the construction equipment and its associated activities would detract from the views currently

experienced. For other recreationists, the presence of the equipment and the construction activities would be interesting and would add visual variety to the landscape.

- **Increased light emitted from construction areas if nighttime construction is conducted.** Depending on their values and expectations, recreationists may not like the visual intrusion caused by construction night lighting.

Visual impacts associated with the power plant would be limited to the plant site within the Toquop parcel. Changes to the landscape would be both short- and long-term. Construction duration would be approximately 26 months.

Visual impacts associated with the water pipeline would be limited to the project construction phase. During the construction period, an alignment area would be temporarily disrupted by machinery, excavated piles of dirt, trenches, construction vehicles and workers, and other disturbances associated with pipeline construction. However, these effects would be located in a remote area and would be temporary. Following construction, the pipeline would be buried and the surface would be restored to its original condition and grade. Therefore, no long-term changes would occur to the visual environment.

Existing visible nighttime lighting of other facilities in the region is minimal. The proposed power plant would require nighttime lighting for operational safety and security. It would create a new source of nighttime light, substantially increasing the amount of light emitted from the project site.

Levels of daytime glare at the project site are not expected to be affected because consultation with Lincoln County and the BLM would occur to determine the appropriate colors for project features. Colors would be selected that are anticipated to blend with the surrounding landscape to the extent feasible.

The southern power plant is expected to be visible from the Mormon Mountains WSA from an area due west of the southern plant site. Depending on how clear the day is, it is likely that the proposed plant would be visible from ridges in the Mormon Mountains WSA. However, at a distance of approximately 5.5 miles, individual project features would not likely be discernible. If there is a water vapor plume (likely to occur only on cool, moist early mornings, dissipating as the temperature increases and humidity decreases), it would likely be visible from the mountains. Although the plant is expected to be visible from this WSA, the plant's presence is not expected to detract from the recreationists' experience in the WSA.

Upgrading the existing southernmost 5 miles of access road (from I-15 north to the Clark County/Lincoln County boundary) would meet the objective of the BLM VRM Class III designation of that land. This is further discussed in *Appendix H, Bureau of Land Management Visual Contrast Rating Worksheet*. The analysis concludes that upgrading the frontage road and dirt road, as part of the Proposed Action, would result in a Form, Color, and Texture contrast rating of Weak, and a Line contrast rating of Weak to Moderate. The appendix includes a Visual Contrast Rating Worksheet prepared for the proposed upgraded roadway, in accordance with BLM protocols. In support of the worksheet,

photographs of the proposed access road (existing condition) were taken from a Key Observation Point (KOP) using a 35-millimeter single lens reflex camera and a 50-millimeter lens. KOPs are usually considered sensitive viewing locations; however, because no sensitive viewers/viewing locations exist in the project vicinity, this KOP was selected because of the visibility of the proposed access road from I-15. The KOP location where the photograph was taken and the direction the camera was focused are shown in *Appendix H, Figure 1*. *Appendix G, Figure 2a,* shows the existing view. *Appendix H, Figure 2b,* shows a simulation of the proposed access road prepared from the KOP.

Implementation of the Proposed Action (power plant, transmission line, water pipeline, natural gas connection, wellfield, and upgrades to the existing road from the Clark County/Lincoln County boundary north to the two project sites) is consistent with the BLM VRM Class IV designation of that land.

The proposed land exchange (Pah Rah parcel) is consistent with the BLM VRM Classes III and IV designations of that parcel.

4.7.1.1.2 Pah Rah Parcel. No impacts on visual resources from implementing the proposed land exchange would occur because no development or onsite activities would occur at the Pah Rah parcel as a result of the transaction.

4.7.1.2 Mitigation

No mitigation is required.

4.7.2 Alternative 1

4.7.2.1 Impacts

Construction impacts associated with Alternative 1 would be similar to those described for the Proposed Action. Impacts on visual resources from operation of Alternative 1 and from the presence of project features associated with this alternative would also be similar to those described for the Proposed Action. An easterly water pipeline alignment associated with this alternative (as opposed to a westerly alignment with the Proposed Action) would not result in a substantive difference in visual impacts from this alternative, when compared to the Proposed Action. This is because the pipeline is an underground project feature, resulting in short-term impacts to the landscape occurring during the project construction period, and minimal, if any, long-term changes to the landscape expected.

4.7.2.2 Mitigation

No mitigation is required.

4.7.3 Alternative 2

4.7.3.1 Impacts

Construction impacts associated with Alternative 2 would be similar to those described for the Proposed Action. The impact described for the Proposed Action relative to the water pipeline would not be applicable to this alternative. However, a similar impact is expected from construction of the natural gas pipeline that is part of Alternative 2. Impacts on visual resources from operation of Alternative 2 would also be similar to those described for the Proposed Action.

Visual impacts from the presence of project features associated with Alternative 2 would be similar in type, but of greater magnitude, than those described for the Proposed Action. This is because this alternative involves development of the power plant at the northern site rather than the southern site (as was the case for the Proposed Action). Siting the plant at the northern location requires other necessary changes to the landscape including a longer access road than was needed for the Proposed Action, an easterly gas pipeline alignment (not needed for the Proposed Action), and an easterly overhead electrical transmission line alignment (also not needed for the Proposed Action). A water pipeline (that was needed for the Proposed Action) would not be needed as part of this alternative.

Development of the power plant at the northern site, with implementation of Alternative 2, would locate the power plant features approximately 12 miles north-northwest of the southern plant site. This would result in it being even more obscured from view from I-15 and farther away from receptors than with the Proposed Action, resulting in fewer visual impacts from this project feature. The northern power plant would, however, be visible to recreationists in the Mormon Mountains and Clover Mountain WSAs and possibly from the Meadow Valley Range WSA. Its presence, however, would not detract from the recreationists' experience. Therefore, impacts on visual resources from the power plant would be similar to those described for the Proposed Action.

This alternative would result in an additional 12.2 miles of roadway that would be constructed, when compared to the Proposed Action. However, this additional landscape change would not be noticeable from I-15 because only the southernmost 0.4 mile of project access roadway that is oriented north-south is visible from I-15 (similar to what is seen with the Proposed Action). It is possible that the paved roadway would be visible to recreationists in the Mormon Mountains and Clover Mountain WSAs and possibly the Meadow Valley Range WSA; however, the presence of the roadway would not detract from the recreationists' experience. Therefore, impacts on visual resources from the roadway element of this alternative would be similar to those described for the Proposed Action.

A gas pipeline along an easterly alignment, which was not needed as part of the Proposed Action, would not result in a substantive difference in visual impacts by this alternative, when compared to the Proposed Action. This is because the pipeline is an underground project feature, resulting in short-term impacts to the landscape occurring during the project construction period, and minimal, if any, long-term changes to the landscape expected.

An overhead electrical transmission line also was not needed as part of the Proposed Action. The addition of transmission line towers to the area would result in a visual change to the landscape; however, the towers would be approximately 12 to 22 miles north of I-15 so their visibility from I-15 would be minimal. It is possible that they would be visible to recreationists in the Mormon Mountains WSA; however, the presence of the towers would not detract from the recreationists' experience. Also, because there is already an existing transmission line in the area, the transmission line that is proposed as part of this alternative

would be in character with those existing landscape modifications.

4.7.3.2 Mitigation

No mitigation is required.

4.7.4 Alternative 3

4.7.4.1 Impacts

Construction impacts of the power plant, western utility alignment, and access road associated with Alternative 3 would be similar to those described for the Proposed Action. In addition, impacts associated with operation of Alternative 3 relative to lighting and glare would be similar to those described for the Proposed Action. Because an air-cooled plant would be constructed as part of this alternative, no water vapor plumes are expected to occur.

Alternative 3 would result in a smaller amount of landscape being disturbed than the Proposed Action because the Alternative 3 footprint would require less land (80 acres versus 100 acres required for the Proposed Action). Alternative 3 would have more (and a different type of) condensers, no cooling towers, a smaller evaporation pond, a smaller equalization pond, and fewer deep wells in the wellfield than the Proposed Action. These differences in design would result in landscape changes that are similar to, but not the same as the Proposed Action. The primary differences in landscape changes with this alternative, when compared with the Proposed Action, are the air-cooled condensers because they are the power plant feature having the greatest mass. Partially offsetting that greater visual change (due to the larger structures) are the fewer number of wells that would be required and the smaller evaporation and equalization ponds that would be needed for this alternative.

Although this alternative design is different from that of the Proposed Action and Alternatives 1 and 2, its overall visual impact to the landscape from its physical presence would be similar to that of the Proposed Action. Similar to the Proposed Action, it is not expected to be visible from I-15 because of its distance from the freeway (approximately 12 miles). It is, however, expected to be visible to recreationists in the Mormon Mountains WSA from an area due west of the southern plant site, depending on how clear the day is. However, at a distance of approximately 5.5 miles, individual project features may not be clearly discernible. Although the plant associated with Alternative 3 is expected to be visible from this WSA, the plant's presence is not expected to detract from the recreationists' experience in the WSA.

4.7.4.2 Mitigation

No mitigation is required.

4.7.5 No Action Alternative

If the areas adjacent to or near the Toquop and Pah Rah parcels are developed, or as traffic levels increase on I-80 or I-15 in the future, views from and toward those parcels would change. Not implementing the project (the No Action Alternative) would result in no visual change to the landscape of the Toquop and Pah Rah parcels, if no other development on those parcels occurs.

4.8 Recreation Resources

This analysis addresses the potential impacts on recreation resources from development of the project.

4.8.1 Proposed Action

4.8.1.1 Impacts

4.8.1.1.1 Toquop Area. Transferring ownership of the 640-acre Toquop parcel from public to private would preclude the continuation of existing recreational opportunities on the 100-acre fenced portion of the parcel. However, this effect would not be substantive because recreation is mainly casual use in nature, including wildflower and bird viewing in spring, primitive camping, and OHV driving for pleasure. Careful well siting would minimize potential future conflicts between the OHV users and the aboveground production wells. Some hunting (primarily to the west in the East Mormon Mountains foothills) also occurs in the area. These opportunities would still be available on lands adjacent to the parcel. Implementation of the Proposed Action would not create a demand for recreation opportunities in the Toquop area, but it would provide improved access for individuals who wish to pursue recreation opportunities nearby.

4.6.1.1.2. Pah Rah Parcel. The proposed Pah Rah land exchange would have no adverse effect on existing recreation opportunities in the Pah Rah area. Transferring ownership from private to public would make the Pah Rah parcel available for public recreation, thus providing additional opportunities for recreation to occur.

4.8.1.2 Mitigation

No mitigation is required.

4.8.2 Alternative 1

4.8.2.1 Impacts

Effects of this alternative on recreational opportunities in the Toquop area would be the same as the effects described for the Proposed Action.

4.8.2.2 Mitigation

No mitigation is required.

4.8.3 Alternative 2

4.8.3.1 Impacts

Effects of this alternative on recreational opportunities in the Toquop area are expected to be the same as the effects described for the Proposed Action.

4.8.3.2 Mitigation

No mitigation is required.

4.8.4 Alternative 3

4.8.4.1 Impacts

Effects of this alternative on recreational opportunities in the Toquop area would be the same as the effects described for the Proposed Action. The one exception is that the potential for future use conflicts between OHV users and the aboveground production wells in the Tule Desert wellfield area is less with Alternative 3 than with the Proposed Action because the production wells associated with this alternative would be limited to 3 acres of land (rather than 15 acres for the Proposed Action, and Alternatives 1 and 2).

4.8.4.2 Mitigation

No mitigation is required.

4.8.5 No Action Alternative

Trends and future conditions associated with recreation in the Toquop area and Pah Rah parcel under the No Action Alternative are expected to be the same as existing conditions. Therefore, no impact on recreation resources is expected with implementation of this alternative. Development may occur in the future in these areas, which would likely increase the population, and consequently, the demand for recreation opportunities and facilities in those areas. The level and type of development, and associated recreation demand that may occur, are unknown.

4.9 Land Use, Prime or Unique Farmlands, and Rangelands

This analysis addresses the potential land use conflicts from developing the proposed project.

4.9.1 Proposed Action

4.9.1.1 Impacts

4.9.1.1.1 Toquop Area. Because the land adjacent to the southern Toquop parcel is primarily undeveloped, with some power production facilities located nearby, implementation of the Proposed Action would not be incompatible with existing adjacent land uses.

Because the Toquop area is not considered prime or unique farmland, no impacts on those land types would occur.

The southern Toquop parcel, which lies within the Gourd Spring Allotment, was removed from livestock management after the construction of the Gourd Spring ACEC fence. No AUMs would be lost from the exchange of this parcel. The well sites, monitoring well, and storage tank would remove up to 17 acres from current livestock use. A portion of the White Rock, Garden Springs, Summit Spring, and Snow Spring allotments may be affected, depending on the location of the well sites. The removal of these areas would not affect the management of livestock within these allotments. The water line would temporarily disturb up to 90 acres of rangeland that is currently being managed for livestock use. This disturbance would be reclaimed but would temporarily reduce the amount of available forage within the Garden Springs and Gourd Spring allotments. Because of the SOPs (see *Appendix B*) that would be followed for the installation of the water line, there would be no impact to the management of livestock. Existing range improvements would be encountered during the construction of the wells and water lines; however, SOPs would be followed in the construction of the wells and water lines to eliminate impacts.

4.9.1.1.2 Pah Rah Parcel. Because the Pah Rah parcel is not considered prime or unique farmland, no impacts on those land types would occur.

Transfer of the Pah Rah parcel, which lies within the Olinghouse Grazing Allotment with 696 AUMs, into the public domain may facilitate grazing because the BLM would be able to integrate the management of this parcel with other adjacent public lands.

After this *Proposed Toquop Land Disposal Amendment to the Caliente MFP and FEIS for the Toquop Energy Project* is completed (which would identify lands as

being available for disposal) and the Pah Rah/Toquop land exchange occurs, development of the Proposed Action would require obtaining a variance or special use permit to allow development of a non-agricultural facility in an agricultural-zoned area. In addition, ROWs/easements and coordination with others (relative to grazing issues) to develop the power plant and associated infrastructure would be required.

4.9.1.2 Mitigation

No mitigation is required beyond the fence proposed in *Section 4.5.2, Vegetation and Noxious Weeds.*

4.9.2 Alternative 1

4.9.2.1 Impacts

Because the land adjacent to the southern Toquop parcel is primarily undeveloped, with some nearby power production facilities, implementation of Alternative 1 would not be incompatible with existing adjacent land uses and would be the same as described for the Proposed Action.

Because the Toquop parcel is not considered prime or unique farmland, no impacts on those land types would occur. Effects on livestock management would be the same as described for the Proposed Action.

Development of Alternative 1 would require obtaining a variance or special use permit to allow development of a non-agricultural facility in an agricultural-zoned area. In addition, ROWs/easements and coordination with others (relative to grazing issues) to develop the power plant and associated infrastructure would be required, the same as what would be required to develop the Proposed Action. These development requirements are not considered impacts.

4.9.2.2 Mitigation

No mitigation is required beyond the fence proposed in *Section 4.5.2, Vegetation and Noxious Weeds.*

4.9.3 Alternative 2

4.9.3.1 Impacts

Because the land adjacent to the northern Toquop parcel is primarily undeveloped, with some power production facilities located nearby, implementation of Alternative 2 would not be incompatible with existing adjacent land uses and would be the same as described for the Proposed Action.

Because the Toquop parcel is not considered prime or unique farmland, no impacts on those land types would occur. Effects on livestock management within the wellfield and rights-of-way would be similar to those described for the Proposed Action. The Toquop parcel would remove 640 acres of rangeland (located within the 38,823-acre Garden Springs Allotment) that is currently being managed for 2,809 AUMs of livestock use, and it would affect existing range improvements located on and surrounding the parcel. Removal of 640 acres could result in a reduction of permitted grazing use of 46 AUMs on the Garden Springs allotment.

Development of Alternative 2 would require obtaining a variance or special use permit to allow development of a non-agricultural facility in an agricultural-zoned area. In addition, ROWs/easements and coordination with others (relative to grazing issues) to develop the power plant

and associated infrastructure would be required, the same as what would be required to develop the Proposed Action.

4.9.3.2 Mitigation

No mitigation is required beyond the fence proposed in *Section 4.5.2, Vegetation and Noxious Weeds*.

4.9.4 Alternative 3

4.9.4.1 Impacts

Because the land adjacent to the southern Toquop parcel is primarily undeveloped, with some nearby power production facilities, implementation of Alternative 3 would not be incompatible with existing adjacent land uses and would be the same as described for the Proposed Action.

Because the Toquop parcel is not considered prime or unique farmland, no impacts on those land types would occur. Effects on livestock management would be the same as described for the Proposed Action.

Development of Alternative 3 would require obtaining a variance or special use permit to allow development of a non-agricultural facility in an agricultural-zoned area. In addition, ROWs/easements and coordination with others (relative to grazing issues) to develop the power plant and associated infrastructure would be required, the same as what would be required to develop the Proposed Action. These development requirements are not considered impacts.

4.9.4.2 Mitigation

No mitigation is required beyond the fence proposed in *Section 4.5.2, Vegetation and Noxious Weeds*.

4.9.5 No Action Alternative

Trends and future conditions associated with land use in the Toquop area and Pah Rah parcel under the No Action Alternative are expected to be the same as existing conditions. Therefore, no conflicts with land use are expected with implementation of this alternative. Development may occur in the future in these areas; however the level and type of future development is uncertain. Such development is expected to either be in accordance with the areas' land planning documents, or may require variances, permits, easements, ROWs, or other coordination with individual landowners. These potential development requirements are not considered impacts.

4.10 Wilderness Study Areas, Areas of Critical Environmental Concern, and Wild and Scenic Rivers

This analysis addresses the potential impacts on Wilderness Areas, WSAs, Areas of Critical Environmental Concern (ACECs), and Wild and Scenic Rivers.

4.10.1 Proposed Action

4.10.1.1 Impacts

4.10.1.1.1 Toquop Parcel. Because the Toquop parcels are not within designated Wilderness Areas, WSAs, ACECs, or along a Wild and Scenic River, no impacts would occur. The potential wellfield abuts the Mormon Mountains WSA. Therefore, management prescriptions for those special management areas would not apply to any of the proposed project features, except for the proposed access road between I-15 and the southern Toquop

parcel, which would cross the Mormon Mesa ACEC.

The proposed access road is an existing dirt road and would require improvement to construct and operate the Proposed Action in both the Lincoln and Clark County portions. Improvements would include road widening to 24 feet, straightening in certain locations, and paving the entire 14.4-mile length of the road. This would potentially affect 216 acres (137 acres in Lincoln County and 79 acres in Clark County) of previously undisturbed lands contained in the construction right-of-way and 20 acres of staging areas in Lincoln County. All of the staging areas and the Clark County portion of the access road are in the Mormon Mesa ACEC, while 123 acres of the previously undisturbed 137 acres in Lincoln County are in the Mormon Mesa ACEC. Following reclamation, the net new long-term disturbance would be 65 acres (42 acres in Lincoln County and 23 acres in Clark County). This ACEC is a desert tortoise Special Management Area (SMA).

The ACEC is a ROW avoidance area in both Lincoln and Clark Counties. However, this is an upgrade to an existing road and will meet ACEC requirements in Lincoln County according to stipulations contained in the Caliente MFP that call for the use of existing roads for construction in ACECs and the avoidance of areas outside of corridors within ACECs. The project would also conform with the Las Vegas RMP, as follows: RW-1-e identifies desert tortoise ACECs as right-of-way avoidance areas. Therefore, ACI a/2a applies to any new or change to an existing RW and states "Manage each area based on the specific resource constraints identified in Tables 2-2 through 2-6." Table 2-2 is specifically directed at resource constraints for the desert tortoise ACECs covered by the Las Vegas RMP, which include the Mormon Mesa ACEC. Table 2-2 states that the following resource constraints apply to roads in ACECs: "Require reclamation of temporary roads. Authorize new roads in response to specific Proposed Actions where no feasible alternative exists. Ensure access to private property." Therefore, the improvement of the existing graveled access road to the proposed power plant site would be in conformance with the Las Vegas RMP.

4.10.1.1.2 Pah Rah Parcel. Because the Pah Rah parcel is not located within designated Wilderness Areas, WSAs, ACECs, or along a Wild and Scenic River, no impacts would occur.

4.10.1.2 Mitigation

No mitigation is required.

4.10.2 Alternative 1

4.10.2.1 Impacts

Implementation of Alternative 1 would not result in impacts on Wilderness Areas, WSAs, or Wild and Scenic Rivers, the same as the Proposed Action.

Alternative 1 would use the same access road across the Mormon Mesa ACEC as the Proposed Action.

4.10.2.2 Mitigation

No mitigation is required.

4.10.3 Alternative 2

4.10.3.1 Impacts

Implementation of Alternative 2 would not result in any impacts on Wilderness Areas, WSAs, or Wild and Scenic Rivers, the same as the Proposed Action.

Alternative 2 would use the same access road across the Mormon Mesa ACEC as the Proposed Action.

4.10.3.2 Mitigation

No mitigation is required.

4.10.4 Alternative 3

4.10.4.1 Impacts

Implementation of Alternative 3 would not result in impacts on Wilderness Areas, WSAs, or Wild and Scenic Rivers, the same as the Proposed Action.

Alternative 3 would use the same access road across the Mormon Mesa ACEC as the Proposed Action.

4.10.4.2 Mitigation

No mitigation is required.

4.10.5 No Action Alternative

Under the No Action Alternative, the existing access road to the transmission line would continue to be located within the Mormon Mesa ACEC.

4.11 Wastes, Hazardous and Solid

This analysis addresses the potential impacts from solid and hazardous waste generation, transport, and disposal for the Proposed Action and alternatives during project construction, operation, and maintenance activities.

4.11.1 Proposed Action

4.11.1.1 Impacts

4.11.1.1.1 Toquop Area. Based on the environmental controls outlined in the standard construction and operation procedures contained in *Appendix B, Standard Construction and Operation Procedures*, there should be no environmental impacts. A Spill Prevention Control and Countermeasures Plan (SPCCP), outlined in *Appendix B*, would provide procedures for cleaning up any future spill or release.

4.11.1.1.2 Pah Rah Parcel. No environmental impacts would result from the Proposed Action.

4.11.1.2 Mitigation

No mitigation is required.

4.11.2 Alternative 1

4.11.2.1 Impacts

There should be no hazardous or solid waste impacts associated with Alternative 1 for the same reasons as described for the Proposed Action.

4.11.2.2 Mitigation

No mitigation is required

4.11.3 Alternative 2

4.11.3.1 Impacts

No potential hazardous or solid waste impacts should be associated with Alternative 2 for the same reasons as described for the Proposed Action.

4.11.3.2 Mitigation

No mitigation is required.

4.11.4 Alternative 3

4.11.4.1 Impacts

There should be no hazardous or solid waste impacts associated with Alternative 3 for the same reasons as described for the Proposed Action.

4.11.4.2 Mitigation

No mitigation is required

4.11.5 No Action Alternative

If the areas near the Toquop and Pah Rah parcels are developed in the future, the potential for releases of hazardous or solid wastes associated with development and increased human activity (traffic, etc.) could increase. However, implementation of the No Action Alternative would not contribute to a hazardous or solid waste impact in the Toquop area or at the Pah Rah parcel.

4.12 Cultural and Historical Resources and Native American Religious Concerns

This section addresses potential impacts to cultural resources. Project-related impacts to resources eligible for the NRHP will be managed in accordance with the *Cultural Resources Programmatic Agreement* (*Appendix C*) between the BLM and Nevada SHPO for the Toquop Energy Project. This Programmatic Agreement (PA) contains stipulations to ensure that historic and prehistoric properties eligible for the NRHP will be treated to avoid or mitigate project-related effects to the extent practicable and to satisfy BLM's Section 106 responsibilities.

4.12.1 Proposed Action

4.12.1.1 Impacts

4.12.1.1.1 Toquop Area. Ten archaeological sites (eight prehistoric, two historic) and two isolated artifacts could be affected by construction or by change of ownership resulting from the proposed land exchange. All of these cultural resources are ineligible for the NRHP. Indirect impacts could potentially result from greater human activity in the area and possibly increased OHV use.

The BLM initiated consultation with several Southern Paiute tribes concerning both the initial land exchange proposal as well as the ensuing Toquop Energy Project. Several responding tribes made a site visit, and concerns were raised about possible effects to the Salt Song Trail, a property of traditional cultural or religious importance. Subsequently, among those tribes expressing initial concerns, one tribe indicated that this property does not extend into the project area, and another tribe indicated it has no concerns with the Proposed Action or its alternatives. Otherwise, BLM determined it had not received enough information about this property's location or its current use to assess possible project-related effects in relation to expressed concerns. No tribe

has responded to BLM's request for more specific information about this property's location or possible effects on religious practitioners. Additional information on consultation is provided in *Section 5.3.2, Native American Consultation.*

4.12.1.1.2 Pah Rah Parcel. The land exchange would not threaten the cultural resources found in the Pah Rah parcel. Transfer of this parcel to public ownership may help ensure long-term protection/stewardship of cultural resources on the parcel. As summarized by Burke (2001):

"The proposed land exchange poses no known effects to the integrity of these cultural resources; the only result would be to move these cultural resources into a different management milieu involving various federal laws and regulations rather than local and state regulations which may now apply. No other activity or undertaking is known or anticipated at this time that has the potential to affect the integrity of these resources. No further action is recommended in relation to the proposed land exchange itself."

Burke (2001) also notes that the "BLM received no formal responses from Indian tribes following a written BLM notice of the exchange proposal and a request for information about resources of concern or interest to the tribes in the area or for any expressions of concern for the proposal generally."

4.12.1.2 Mitigation

Beyond the Programmatic Agreement with SHPO, no mitigation is required. No special consideration is necessary for ineligible cultural resources sites or isolated artifacts. The Proposed Action can therefore proceed with no requirements for avoidance or mitigation of known historic properties.

The potential exists for buried cultural resources not visible on the surface survey, although the geomorphic context of the Proposed Action makes the presence of any such sites unlikely. This low probability of buried deposits precludes the need of archaeological monitors during construction.

Because only a records review has been conducted for the wellfield area, all well locations and associated new access routes must be subjected to a Class III survey prior to any construction, in accordance with terms of the PA.

The PA provides specific procedures for handling discoveries during construction. The BLM will ensure that any human remains, grave goods, items of cultural patrimony, and sacred objects encountered during the undertaking are treated with the respect due such materials. In accordance with the terms of the PA, human remains and associated grave goods found on public land will be handled according to the provisions of the Native American Graves Protection and Repatriation Act (NAGPRA) and its implementing regulations (43 CFR 10).

4.12.2 Alternative 1

4.12.2.1 Impacts

Twelve archaeological sites (eight prehistoric, two historic, two with both prehistoric and historic components) and nine isolated artifacts could be affected by construction or by change of ownership resulting from the proposed land exchange. One site is eligible for NRHP status, the rest are ineligible. All isolates are ineligible. Indirect impacts could poten-

tially result from greater human activity in the area and possibly increased OHV use.

Issues regarding Native American concerns are the same as those for the Proposed Action.

4.12.2.2 Mitigation

For ineligible sites, mitigation for Alternative 1 would be the same as described for the Proposed Action. Regarding the one NRHP eligible site, further clarification is necessary. While located within the right-of-way, the site is approximately 30 feet above the roadbed in rock outcrop. It is unlikely that project-related activities will affect this area. Thus, no special mitigation measures are necessary at this time, but a professional archaeologist must be present to monitor construction activities near the site.

4.12.3 Alternative 2

4.12.3.1 Impacts

Six archaeological sites (two prehistoric, two historic, two with both prehistoric and historic components) and ten isolated artifacts could be affected by construction or by change of ownership resulting from the proposed land exchange. One site is eligible for NRHP status, the rest are ineligible. All isolates are ineligible. Indirect impacts could potentially result from greater human activity in the area and possibly increased OHV use.

Issues regarding Native American concerns are the same as for the Proposed Action and Alternative 1.

4.12.3.2 Mitigation

Mitigation for Alternative 2 would be the same as that described for Alternative 1.

4.12.4 Alternative 3

4.12.4.1 Impacts

Ten archaeological sites (eight prehistoric and two historic) and two isolated artifacts could be affected by construction or by change of ownership resulting from the proposed land exchange. All of these cultural resources are ineligible for the NRHP. Indirect impacts could potentially result from greater human activity in the area and possibly increased OHV use.

Issues regarding Native American concerns are the same as those for the Proposed Action.

4.12.4.2 Mitigation

Mitigation for Alternative 3 would be the same as described for the Proposed Action.

4.12.5 No Action Alternative

The Pah Rah parcel would remain in private ownership. There are no local, state, or other non-federal laws or regulation affecting how a non-federal action would take into account possible effects on cultural resources, leaving them in the same unprotected status they now have.

4.13 Indian Trust Assets

4.13.1 Proposed Action and Action Alternative

4.13.1.1 Toquop Area

Indian Trust assets (ITAs) are legal interests in assets held in trust by the federal government for Indian tribes or individuals. The Department of the Interior Order No. 3175 requires all its bureaus and offices to explicitly address

anticipated effects on ITAs in planning, decision, and operation documents.

No impacts on Indian Trust assets would occur. There are no Indian Trust assets in the project area for the Proposed Action, Alternative 1, Alternative 2, or Alternative 3.

4.13.1.2 Pah Rah Parcel

There are no Indian Trust assets on the Pah Rah parcel.

4.13.2 No Action Alternative

The No Action Alternative would not affect Indian Trust assets.

4.14 Environmental Justice

Executive Order 12898 requires an analysis of a potential disproportional effects of a project on minority and low-income populations. This analysis addresses the potential impacts on minority and low-income populations in the Clark, Lincoln, and Washoe county areas.

4.14.1 Proposed Action

4.14.1.1 Impacts

Implementation of the Proposed Action would not result in any property takings from minority or low-income populations.

4.14.1.1.1 Toquop Area. No health hazard impacts would be created for minority or low-income populations in Clark or Lincoln County as a result of implementation of the Proposed Action. In addition, no hazardous waste impacts on minority or low-income populations in the two counties are expected from implementation of the Proposed Action.

Adverse economic impacts are not expected to accrue to Clark or Lincoln County. Therefore, no adverse economic impacts on minority or low-income populations would occur.

Implementation of the Proposed Action would not require the relocation of any people. Therefore, no relocations of minority or low-income populations would occur.

4.14.1.1.2 Pah Rah Parcel. No health hazard impacts, hazardous waste impacts, or adverse economic impacts would accrue to minority or low-income populations in Washoe County. No relocations would be required.

4.14.1.2 Mitigation

No mitigation is required.

4.14.2 Alternative 1

4.14.2.1 Impacts

Implementation of Alternative 1 would not result in any impacts on minority or low-income populations, the same as the Proposed Action.

4.14.2.2 Mitigation

No mitigation is required.

4.14.3 Alternative 2

4.14.3.1 Impacts

Implementation of Alternative 2 would not result in any impacts on minority or low-income populations, the same as the Proposed Action.

4.14.3.2 Mitigation

No mitigation is required.

4.14.4 Alternative 3

4.14.4.1 Impacts

Implementation of Alternative 3 would not result in any impacts on minority or low-income populations, the same as the Proposed Action.

4.14.4.2 Mitigation

No mitigation is required.

4.14.5 No Action Alternative

Trends and future conditions associated with the Toquop and Pah Rah areas under the No Action Alternative are expected to be the same as existing conditions. Therefore, no impact on minority or low-income populations is expected with implementation of this alternative.

4.15 Paleontological Resources

4.15.1 Proposed Action and Alternatives

4.15.1.1 Toquop Area

Surface evaluation of the Proposed Action and its alternatives resulted in no paleontological resources.

4.15.1.2 Pah Rah Parcel

The Pah Rah parcel contains no fossil-bearing geology. There would be no impacts on paleontological resources in the Pah Rah parcel.

4.15.2 No Action Alternative

The No Action Alternative would have no effect on paleontological resources.

4.16 Socioeconomics

This section presents the potential effects of the Proposed Action and alternatives on the social and economic conditions in Clark, Lincoln, and Washoe counties.

Input-output analysis was used to determine the economic impacts of project construction and operation on the combined regional economy of Lincoln and Clark counties. These two counties are assumed to be the pertinent region of influence for the economic impacts of the construction and operation of the Proposed Action and alternatives. A set of regional input-output multipliers was generated for the two-county region using the 1998 IMPLAN data set. *Appendix I* describes the modeling procedures and assumptions used in the analysis of the regional impacts estimated for the Proposed Action and alternatives.

The estimated project costs for construction and operation, used in the analysis, was provided by Toquop Energy. These costs were analyzed to estimate the effects on other industries in the two-county region of influence.

4.16.1 Proposed Action

4.16.1.1 Impacts

4.16.1.1.1 Toquop Area

Economic Impacts of Construction

The total estimated construction cost of the Proposed Action is approximately

$695 million, of which $175 million would remain in the region of influence. The total annual estimated labor cost during construction is $34 million, all of which would be spent within the region of influence. This construction labor estimate was provided by Toquop Energy and is based on the company's experience with similar projects. Table 4-13 shows the estimated project cost for the Proposed Action.

Population. Construction workers would be hired primarily from the local labor force. This includes workers from the Las Vegas metropolitan area; Mesquite and Overton, Nevada; and St. George, Utah. These workers are expected to commute daily to the project construction site. It is recognized that some construction workers may arrange for temporary residency (in rental homes or at recreational vehicle [RV] parks) in the Mesquite, Nevada, or the St. George, Utah, areas, which are relatively close to the project site. However, it is expected that the majority of construction workers would not choose to do so.

Construction workers and their families are not expected to relocate to the Clark/Lincoln County area from other areas. Workers having specialized skills may move to the area from other areas. Therefore, no increase to a minor increase in the population of the Clark/Lincoln County area is expected from constructing the Proposed Action.

TABLE 4-13
Estimated Project Cost for the Proposed Action[a]

Project Feature	Construction Cost Estimate ($ Million)	Percent Local (%)	Local Construction Cost Estimate ($ Million)
Power plant[b]	637	21	134
Access road	25	100	25
Water pipeline	12	50	6
Wells, wellfield electrical, storage tank	21	50	10
Total	695[c]	25	175

a Values provided by Toquop Energy
b Plant cost includes power block, ponds, water treatment equipment, cooling tower, condenser
c Does not include $23.1 million in water rights

Employment. According to Toquop Energy, the Proposed Action would generate peak and average construction employment levels of 950 and 500 workers, respectively, in the combined Lincoln and Clark County area. Project construction is expected to last 26 months, and annual construction payroll is estimated at $34 million. Although the unemployment rate in the region is not exceptionally high (the 2001 average was 7.2 percent in Lincoln County and 5.5 percent for Clark County), construction workers are expected to be hired from the local labor force. Thus, most construction workers would not relocate from other areas in the state or the country. Workers with specialized skills may be imported from other areas; however, this number is expected to be low when compared to the total number of construction workers required for construction of the Proposed Action.

Assuming an average annual direct construction employment level of 500 jobs, the resulting total employment generated would be about 875 jobs. This estimate is derived from the Type Social Accounting Matrix (SAM) employment multiplier of 1.75 for IMPLAN Sector 50: New Utility construction. The 875 jobs is the sum of the direct employment (500 jobs) and the indirect and induced employment of approximately 175 and 200 jobs, respectively. Indirect employment refers to the employment that is generated by the goods and services provided to construct and operate the Proposed Action. Induced employment refers to the employment generated by household spending, and includes the goods and services purchased by employees of the project.

Employment effects during the construction phase would be short-term because the jobs created would only last during the construction period. Although the effect of project construction on regional employment would be beneficial, it would increase employment in the region by less than 0.5 percent.

Unemployment. The total estimated number of jobs to be created by project construction in the Clark/Lincoln County area is 875. The creation of these jobs would have a slight beneficial impact on the unemployment rate; however, because the jobs created would be temporary, the benefit would also be temporary. Therefore, the creation of these jobs is not expected to change the unemployment rate in the region. Because only a small number of construction workers are expected to reside outside of the Clark/Lincoln County area, the unemployment rates in other areas would also not be affected.

Earnings and Income. Toquop Energy has indicated that the construction of the Proposed Action, including the power plant, access road, and water pipeline would result in an annual construction payroll of $34 million. The combined Lincoln and Clark County region Type SAM labor income multiplier for IMPLAN Sector 50: New Utility Construction is 1.46, therefore, the construction activities would generate an additional $16 million in indirect and induced labor income within the two-county region. The indirect and induced earnings were estimated to be approximately $8 million each. Because only a small number of construction workers are expected to reside outside of the Clark/Lincoln County area, earnings and income in other areas are not expected to change.

Income that would be generated during the construction phase is considered short-term because the additional income to the region would only last during the construction period. The total income effect of $50 million resulting from project construction would be beneficial, but not substantial, when compared to the two-county regional total personal income of $29 billion.

Tax Receipts. Lincoln County would collect sales and use tax on all real property purchased and delivered to the project site at a combined rate of 6.75 percent (2 percent sales tax, 2.25 percent local school support tax, 0.5 percent basic city-county relief tax, 1.75 percent supplemental city-county relief tax, and 0.25 percent infrastructure). The construction cost of the Proposed Action is estimated at approximately $695 million, of which approximately $70 million would be construction payroll. Assuming 75 percent of the remaining construction cost is for goods and materials, sales and use taxes in the range of $32 million would be generated from an estimated increase in taxable sales of about $470 million

These revenues are paid to the State of Nevada, which distributes money back to all counties. Of the cumulative sales and use tax rate of 6.75 percent, 3 percent would be disbursed back to the county of origin (Lincoln County for taxes on goods and materials delivered to the project site). Therefore, Lincoln County would be expected to collect approximately $14 million during the 26-month construction period (of the $32 million), in addition to the County's portion of the revenue generated from the remaining 3.75 percent of the cumulative tax rate. This would be a temporary (26-month) benefit to the County, increasing the County's sales tax receipts (the FY 1999-2000 sales tax was estimated at $1.7 million).

Clark County, along with all other Nevada counties, would receive portions of the remaining 3.75 percent of the sales and use tax collected on the estimated increase in taxable sales associated with project construction. This portion of sales tax redistributed to Clark County would be small relative to existing county sales and use tax receipts.

No construction activities would be associated with the proposed land exchange. However, the Toquop parcel (either the southern or northern parcel) would change to private ownership as part of the land exchange. The exchange of one parcel would generate a relatively small amount of property tax income for Lincoln County, in comparison to the $2.3 million in total property tax revenue generated in FY 1999-2000.

Housing. It is expected that the labor supply in the Clark/Lincoln County area is large enough that construction workers would not need to relocate from outside the area to construct the Proposed Action. If specialized labor is required that cannot be obtained in Clark County or Lincoln County, the number of people expected to move to the Clark/Lincoln County area from other areas is expected to be low. Housing vacancy rates are about 8.5 percent for Clark County and 29.3 percent for Lincoln County based on the 2000 Census. Because it is likely that most construction workers would be local residents, demand for housing is not expected to change as a result of project construction, and the housing vacancy rate would not be affected.

If construction workers choose to reside in RV parks in Mesquite or Overton, Nevada, nine RV parks with approximately 800 RV sites are available. If they choose to reside in RV parks in the St. George, Utah, area, six RV parks with 920 sites are available. Therefore, an adequate number of RV spaces is expected to be available to construction workers during project construction.

Economic Impacts of Operation

Operation of the Proposed Action would result in indirect and induced economic impacts that would occur within the region of influence. These indirect and induced impacts represent permanent increases in the region's economy. The indirect and induced impacts would result from annual expenditures on payroll as well as those on operations and maintenance.

The total estimated annual operation cost of the Proposed Action is $15.5 million, of which $13 million is the fixed annual operating cost and $2.5 million is annual payroll. All of these costs are expected to remain in the region of influence.

Population. Changes in the Clark/Lincoln County population as a result of operating the Proposed Action are not expected to occur from employment opportunities generated by the project. The operation workforce is very low (estimated at 25) and is expected to be hired from the local area.

Employment. The Proposed Action operational workforce is estimated to be 25. Operational personnel are expected to be hired from the local (Clark County and Lincoln County) workforce unless specialized expertise is required and the workers with specialized skills cannot be hired from the local area.

The 25 new jobs associated with the Proposed Action are anticipated to generate an additional 25 jobs within the two-county region. This estimate is based on the two-county region Type SAM employment multiplier of 2.03, associated with IMPLAN Sector 443: Electrical Services. Of the additional 25 additional jobs, 10 would be from indirect employment and 15 would be from induced employment. The 10 indirect jobs would be created in other industries as a result of operation of the plant by the 25 employees. The 15 induced jobs would result from the spending of earnings by the 35 people who would be employed at the 25 direct and 10 indirect jobs that would be created.

Employment effects during the operational phase would be permanent because the jobs created would remain throughout the life of the project. Although the 50 total additional jobs generated by the Proposed Action would be beneficial to the regional economy, the effect of project operation on regional employment would be minor relative to the 372,000 total employment reported for the two-county region of influence.

Unemployment. The total estimated number of jobs to be created in the Clark/Lincoln County area by project operation is 50. The creation of these jobs would not change the unemployment rate in the region.

Earnings and Income. Toquop Energy has indicated that the plant operation would have an annual payroll of $2.5 million. Based on this direct increase in labor income, the project operation phase would result in a total increase in labor income within the two-county region of about $3.7 million. This estimate is derived from the IMPLAN sector 433 labor income

multiplier of 1.49. The indirect and induced earnings are estimated at approximately $0.6 million each

Income that would be generated during the operational phase is considered permanent because the additional income to the Clark/Lincoln County region would remain throughout the life of the project. The income effect of $3.7 million resulting from project operation would be beneficial, but not substantial, when compared to the $29 billion total personal income level of the two-county region of influence.

Tax Receipts. Lincoln County would collect sales and use tax on all real property purchased and delivered to the project site at a combined rate of 6.75 percent. The annual fixed cost operating budget is anticipated to be approximately $13 million, excluding the cost of natural gas. If the entire annual operating budget represented purchases subject to Lincoln County sales tax, this would represent a substantial increase for Lincoln County, which reported taxable sales of $25.2 million for fiscal year 1999-2000. Of the 6.75 percent combined tax rate, 3 percent is collected and disbursed directly to the collecting county. This would represent an annual payment of approximately $390,000 to Lincoln County, in addition to the county's portion of the revenue generated from the remaining 3.75 percent of the combined tax rate. This increase in sales tax receipts to Lincoln County would be a benefit. The additional sales tax revenue to Clark County would represent a minor benefit to Clark County.

According to Nevada Revised Statutes, if electricity is sold outside of Lincoln County, the project facilities would be centrally assessed in combination with any of the owners of other Nevada holdings associated with the generation and transmission of electricity (NRS 361.320). The estimated annual property tax attributed to the Proposed Action would be approximately $7 million based on project capital cost ($695 million), the assessment rate (35 percent), and the average property tax rate (3 percent). If the project is centrally assessed, the disbursement of this tax to Lincoln County and Clark County would be governed by rules established by the Nevada Tax Commission and would depend on various factors that are unknown at this time. However, any increase in property taxes that would accrue to Lincoln County would be a benefit because of the county's relatively small tax base (the 1999-2000 total property tax collection was projected to be $2.3 million). Additional tax revenues from the Proposed Action to Clark County would be minor, relative to the property taxes collected in Clark County.

As discussed previously, Lincoln County's property tax revenues would increase because of the Toquop parcel (either the southern or northern parcel) being transferred from federal (BLM) jurisdiction to private ownership.

Other Income. Water rights that would be required to supply up to 7,000 acre-feet of water per year from the Tule Desert wellfield necessary to operate the Toquop Energy Project have been jointly applied for by Vidler Water Company, Inc. (a sister company of NLRC) and Lincoln County. Toquop Energy would lease and use these water rights for the 42-year life of the project at a cost of approximately $23.1 million. Lincoln County's estimated income for the water rights lease is approximately $9 million over the life of the project.

Infrastructure Construction and Operation Impacts

Education. It is expected that most of the construction workers and operation personnel would be from the region of impact (Clark and Lincoln counties), and would not be relocating their families to the area. Therefore, additional school capacity would not be required in the Clark/Lincoln County area because additional students are not expected to enroll in local schools.

Police Protection. Because additional residents are not expected to relocate to the Clark/Lincoln County area to construct or operate the project, existing police protection services would continue to serve the current population. This is also true if construction workers lived at RV parks in the communities of Mesquite, Overton, or St. George.

The response time from the Pioche Sheriff Station to the Toquop area is approximately 2 hours. Because of the distance between the sheriff's department and the Toquop area, it may be difficult to adequately serve the Toquop area with existing staff. If determined necessary, an additional deputy would be hired to serve the southern portion of Lincoln County (Bradfield, 2001).

The Lincoln County Sheriffs Department has indicated that the Caliente substation is the closest to the project site (approximately 50 miles). Mutual aid agreements or an additional station may be needed to adequately serve the project (Willcock, 2001). Providing services to the project would put a strain on Lincoln County's police protection services (Carriger, 2001).

To minimize the strain that is expected to occur to Lincoln County police protection from construction and operation of the Proposed Action, measures that could include, but not be limited to, the following are included in the Proposed Action: develop a police agreement with Lincoln County and/or the City of Mesquite to provide additional personnel and services to the project site.

The method implemented to reduce the strain to either Lincoln County or the City of Mesquite police protection would be developed in consultation with and approved by the City or Lincoln County.

Fire Protection. Because additional residents are not expected to relocate to the Clark/Lincoln County area to construct or operate the project, existing fire protection services would continue to serve the current population. This is also true if construction workers lived at RV parks in the communities of Mesquite, Overton, or St. George.

The response time from the Alamo Fire Station to the Toquop area is approximately 2 hours. Because of the distance between the Fire Department and the Toquop area, it may be difficult to adequately serve the Toquop area with existing staff (Bradfield, 2001).

The Lincoln County Sheriffs Department stated that the Caliente fire station is the closest to the project site (approximately 50 miles). Mutual aid agreements or an additional station may be needed to adequately serve the project (Willcock, 2001). Providing services to the project would put a strain on Lincoln County's fire protection services (Carriger, 2001).

To minimize the strain that is expected to occur to Lincoln County fire protection

from construction and operation of the Proposed Action, measures that could include, but not be limited to, the following are included in the Proposed Action:

- Provide onsite fire equipment and services
- Develop a fire agreement with Lincoln County and/or the City of Mesquite to provide additional personnel and services to the project site

The method implemented to reduce the strain to either Lincoln County or the City of Mesquite fire protection would be developed in consultation with and approved by the City or Lincoln County.

Hospitals and Medical Care. Additional residents are not expected to relocate to the Clark/Lincoln County area to construct or operate the project. Therefore, additional hospital beds and medical care staff and equipment would not be required to serve additional population.

Lincoln County would be responsible for providing medical care in case of emergency at the project site (Carriger, 2001). Ambulance services are available in Alamo, Pioche, Caliente, and Panaca (Thompson, 2001).

The Grover C. Dils Hospital in Caliente is located approximately 50 miles north of the southern Toquop site—although driving distance to Caliente from the project site is approximately 170 miles (Carriger, 2001). The hospital has an emergency department that handles everything but surgery. Those patients are sent to Las Vegas or St. George (Thompson, 2001).

The Dixie Medical Center, located in St. George, is about 30 miles from the project site. The medical center is currently being expanded. The medical center has an emergency department that can handle serious injuries (Lindsay, 2001).

The remoteness of the site would put a strain on existing Lincoln County medical services (Carriger, 2001).

To minimize the strain that is expected to occur to Lincoln County emergency medical services from construction and operation of the Proposed Action, measures that could include, but not be limited to, the following are included in the Proposed Action:

- Provide onsite emergency medical equipment and services
- Develop a medical aid agreement with Lincoln County and/or the City of Mesquite to provide additional personnel and services to the project site

The method implemented to reduce the strain to either Lincoln County or the City of Mesquite emergency medical services would be developed in consultation with and approved by the City or Lincoln County.

Water and Wastewater. It is anticipated that water required to construct the Proposed Action would be trucked from the Tule Desert wellfield to the project construction site (facility site and along the alignments) for construction activities and dust control. It would also be pumped from the Tule Desert wells and delivered to the site via pipeline after the pipeline is completed.

Water for operation of the Proposed Action over the life of the project would be obtained from the deep wells to be located in the Tule Desert. Water rights

that would be required to supply up to 7,000 acre-feet of water per year from the Tule Desert wellfield necessary to operate the project under the Proposed Action have been jointly applied for by Vidler Water Company, Inc. (a sister company of NLRC) and Lincoln County. Toquop Energy would lease and use these water rights for the 42-year life of the project.

The wells drilled in the Tule Desert in Lincoln County are capable of providing water in sufficient quantities to support the project facilities during operation. Therefore, there would be no impact on existing local water purveyors.

Portable toilets would be available at the project site and along the alignments for construction workers during construction of the Proposed Action. Sanitary wastes would be treated onsite during project operation.

Because additional residents are not expected to relocate to the Clark/Lincoln County area to construct or operate the project, additional water and wastewater systems would not be required as a result of implementing the project.

Natural Gas. Because workers are not expected to relocate to the area from outside the Clark/Lincoln County area to construct or operate the Proposed Action, additional residents are not expected to move to the area. Therefore, natural gas demand is not expected to increase as a result of the Proposed Action. This would also be true if construction workers lived at RV parks in the communities of Mesquite, Overton, or St. George.

Negotiations are underway with the Kern River Gas Transmission Company regarding interconnecting with the natural gas pipeline. The Kern River Gas Transmission Company has adequate capacity in the 36-inch Kern River pipeline that crosses the southeast corner of the southern Toquop parcel to supply gas for operation of the Proposed Action.

Telephone. Because no increase in population is expected as a result of the project, construction and operation of the Proposed Action is not expected to affect telephone services in the Clark/Lincoln County area. This is also true if construction workers lived at RV parks in the communities of Mesquite, Overton, or St. George. Communications during construction would be accomplished via a microwave system that would be constructed at the power plant site.

Electricity. Because workers are not expected to relocate to the area from outside the Clark/Lincoln County area to construct or operate the Proposed Action, additional residents are not expected to move to the area. Therefore, electrical demand is not expected to increase as a result of the Proposed Action. This is also true if construction workers lived at RV parks in the communities of Mesquite, Overton, or St. George.

4.16.1.1.2 Pah Rah Parcel

Construction

No construction activities would be associated with the proposed land exchange. The proposed land exchange (Pah Rah parcel) would, therefore, have no effect on existing population levels, existing employment levels, existing unemployment rates, existing earnings and income, or existing housing in Washoe County.

The proposed land exchange (Pah Rah parcel) would result in the existing

privately-owned parcel in Washoe County changing to federal (BLM) jurisdiction. Property taxes that are currently generated for Washoe County from the privately owned parcel would be eliminated with the property transfer to BLM ownership.

Operation

The proposed land exchange (Pah Rah parcel) would not affect Washoe County population levels, employment levels, or unemployment rates over the long term.

Infrastructure

No construction or operation activities would be associated with the proposed land exchange. The proposed land exchange (Pah Rah parcel) would, therefore, have no effect on local public schools, police protection requirements, fire protection requirements, medical care requirements, water and wastewater facilities, natural gas providers, telephone service providers, or electricity providers in Washoe County.

4.16.1.2 Mitigation

No mitigation is required.

4.16.2 Alternative 1

4.16.2.1 Impacts

4.16.2.1.1 Construction Impacts. The effects on employment, unemployment, income, and tax receipts associated with Alternative 1 would be the same as those described for the Proposed Action because the estimated construction labor force requirements, labor payroll, and construction costs are the same as those assumed for the Proposed Action. In addition, the impacts on population, housing, and community infrastructure would be the same as described for the Proposed Action.

4.16.2.1.2 Operation Impacts. The effects on employment, unemployment, income, tax receipts, and income to Lincoln County from the water rights lease associated with Alternative 1 would be the same as described for the Proposed Action because the operation costs and labor requirements for both alternatives are estimated to be the same. In addition, the impacts on community infrastructure would be the same as described for the Proposed Action.

4.16.2.2 Mitigation

No mitigation is required.

4.16.3 Alternative 2

4.16.3.1 Impacts

4.16.3.1.1 Construction Impacts. The total estimated construction cost for Alternative 2 is approximately $739 million, of which $206 million would remain in the region of influence. The total annual estimated labor cost during construction is $34 million, all of which would be spent within the region of influence. Table 4-14 shows the estimated project cost for Alternative 2.

Population. The effects on population in the Clark/Lincoln County area from construction of Alternative 2 would be the same as described for the Proposed Action.

Employment. Toquop Energy has indicated that Alternative 2 would generate estimated peak and average construction employment of 950 and 500, respectively. Project construction is expected to last

TABLE 4-14
Estimated Project Cost for Alternative 2[a]

Project Feature	Construction Cost Estimate ($ Million)	Percent Local (%)	Local Construction Cost Estimate ($ Million)
Power plant[b]	637	21	134
Access road	43	100	43
Gas pipeline	15	50	8
Transmission line	23	50	12
Wells, wellfield electrical, storage tank	21	50	10
Total	739[c]	28	206

[a]Values provided by Toquop Energy.
[b]Plant cost includes power block, ponds, water treatment equipment, cooling tower, condenser.
[c]Does not include $23.1 million in water rights.

26 months. Although the unemployment rate in the region is not exceptionally high (the 2001 average unemployment rate was 7.2 percent in Lincoln County and 5.5 percent in Clark County), construction workers are expected to be hired primarily from the local labor force. Thus, most construction workers would not relocate from other areas in the state or the country. Workers with specialized skills may be imported from other areas; however, this number is expected to be low compared to the total number of construction workers required to construct this alternative.

Although the total cost associated with the construction of Alternative 2 would be somewhat higher than the Proposed Action, the estimated construction labor force is anticipated to be the same as for the Proposed Action. Therefore, the indirect and induced employment would be the same as those reported for the Proposed Action (a total temporary increase in employment of about 875 jobs).

Unemployment. The total estimated number of jobs that would be created by project construction in the Clark/Lincoln County area is 875. The creation of these jobs would have a slight beneficial impact on the unemployment rate; however, because the jobs created would be temporary, the benefit would also be temporary. Therefore, the creation of these jobs is not expected to change the unemployment rate in the region. Because only a small number of construction workers are expected to reside outside of the Clark/Lincoln County area, the unemployment rates in other areas would also not be affected.

Earnings and Income. Similar to the employment impacts, because the anticipated construction labor force requirements and payroll would be the same as for the Proposed Action, the total labor income would be the same as for the Proposed Action (a temporary annual increase of about $50 million during the construction period). Because only a small number of construction workers are expected to reside outside of the Clark/Lincoln County area, earnings and income in other areas are not expected to change.

Income generated during the construction phase would be considered short-term because the additional income to the region would only last during the construction period. The income effect of $50 million resulting from Alternative 2 construction would be beneficial, but not substantial, when compared to the two-county regional total personal income of $29 billion.

Tax Receipts. The estimated construction cost of Alternative 2 is approximately $739 million, which is somewhat higher than the costs of the Proposed Action. The temporary beneficial impact to Lincoln County and Clark County, in terms of increased sales and use tax disbursements from the construction of Alternative 2 components would be of the same magnitude as for the Proposed Action, but would be slightly higher.

Housing. The impacts on housing from construction of Alternative 2 would be the same as those described for the Proposed Action for the Clark/Lincoln County area.

Community Infrastructure. The impacts on community infrastructure from construction of Alternative 2 would be similar to those described for the Proposed Action for the Clark/Lincoln County area and would be the same as described for the Proposed Action for Washoe County. Alternative 2 would not require a pipeline to convey water (as the Proposed Action does), but would still require the development of the water wells in the Tule Desert. Alternative 2 would also require the construction of a transmission line and gas pipeline, which the Proposed Action would not require.

4.16.3.1.2 Operation Impacts. The effects on employment, unemployment, income, tax receipts, and income to Lincoln County from the water rights lease associated with Alternative 2 in the Clark/Lincoln County area would be the same as those described for the Proposed Action because the operation costs for both alternatives are estimated to be the same. In addition, the impacts on population, housing, and community infrastructure in the Clark/Lincoln County area would be the same as those described for the Proposed Action.

4.16.3.2 Mitigation

No mitigation is required.

4.16.4 Alternative 3

4.16.4.1 Impacts

4.16.4.1.1 Construction Impacts. The total estimated construction cost for Alternative 3 is approximately $714 million, of which $172 million would remain in the region of influence. The total annual estimated labor cost during construction is $34 million, all of which would be spent within the region of influence. Table 4-15 shows the estimated project cost for Alternative 3.

TABLE 4-15
Estimated Project Cost for Alternative 3[a]

Project Feature	Construction Cost Estimate ($ Million)	Percent Local (%)	Local Construction Cost Estimate ($ Million)
Power plant[b]	682	21	143
Access road	25	100	25
Water pipeline	3	50	2
Wells, wellfield electrical, storage tank	4	50	2
Total	714[c]	24	172

[a]Values provided by Toquop Energy.
[b]Plant cost includes power block, ponds, water treatment equipment, air cooled condenser.
[c]Does not include $0.4 million in water rights.

Population. The effects on population in the Clark/Lincoln County area from construction of Alternative 3 would be the same as described for the Proposed Action.

Employment. Toquop Energy has indicated that Alternative 3 would generate estimated peak and average construction employment of 950 and 500, respectively. Project construction is expected to last 26 months. Although the unemployment rate in the region is not exceptionally high (the 2001 average unemployment rate was 7.2 percent in Lincoln County and 5.5 percent in Clark County), construction workers are expected to be hired primarily from the local labor force. Thus, most construction workers would not relocate from other areas in the state or the country. Workers with specialized skills may be imported from other areas; however, this number is expected to be low compared to the total number of construction workers required to construct this alternative.

Although the total cost associated with the construction of Alternative 3 would be somewhat higher than the Proposed Action, the estimated construction labor force is anticipated to be the same as for the Proposed Action. Therefore, the indirect and induced employment would be the same as those reported for the Proposed Action (a total temporary increase in employment of about 875 jobs).

Unemployment. The total estimated number of jobs that would be created by project construction in the Clark/Lincoln County area is 875. The creation of these jobs would have a slight beneficial impact on the unemployment rate; however, because the jobs created would be temporary, the benefit would also be temporary. Therefore, the creation of these jobs is not expected to change the unemployment rate in the region. Because only a small number of construction workers are expected to reside outside of the Clark/Lincoln County area, the unemployment rates in other areas would also not be affected.

Earnings and Income. Similar to the employment impacts, because the anticipated construction labor force requirements and payroll would be the same as for the Proposed Action, the total labor income would be the same as for the

Proposed Action (a temporary annual increase of about $50 million during the construction period). Because only a small number of construction workers are expected to reside outside of the Clark/Lincoln County area, earnings and income in other areas are not expected to change.

Income generated during the construction phase would be considered short-term because the additional income to the region would only last during the construction period. The income effect of $50 million resulting from Alternative 3 construction would be beneficial, but not substantial, when compared to the two-county regional total personal income of $29 billion.

Tax Receipts. The estimated construction cost of Alternative 3 is approximately $714 million, which is somewhat higher than the costs of the Proposed Action. The temporary beneficial impact to Lincoln County and Clark County, in terms of increased sales and use tax disbursements from the construction of Alternative 3 components would be of the same magnitude as for the Proposed Action, but would be slightly higher.

Housing. The impacts on housing from construction of Alternative 3 would be the same as those described for the Proposed Action for the Clark/Lincoln County area.

Community Infrastructure. The impacts on community infrastructure from construction of Alternative 3 would be similar to those described for the Proposed Action for the Clark/Lincoln County area.

4.16.4.1.2 Operation Impacts. The effects on employment, unemployment, income, and tax receipts associated with Alternative 3 in the Clark/Lincoln County area would be the same as those described for the Proposed Action because the operation costs for both alternatives are estimated to be the same. The only exception is the reduction in quantity of water leased from 7,000 acre-feet per year (for the Proposed Action, Alternative 1, and Alternative 2) to 170 acre-feet per year for Alternative 3. Lincoln County would not receive an income for this lower quantity of water leased.

In addition, the impacts on population and community infrastructure in the Clark/Lincoln County area would be the same as those described for the Proposed Action.

4.16.4.2 Mitigation

Because no impacts are expected with implementation of Alternative 3, no mitigation is required.

4.16.5 Tax Receipts if No Land Disposal Were to Occur under the Proposed Action, Alternative 1, Alternative 2, or Alternative 3

4.16.5.1 Construction Impacts

If no land disposal were to occur as part of the Proposed Action, Alternative 1, Alternative 2, or Alternative 3, and the BLM granted ROWs to accommodate project features, Lincoln County would collect sales and use tax on all personal property purchased and delivered to the project site. Sales and use taxes in the range of $32 million would be generated and paid to the State of Nevada. Lincoln County would be expected to collect approximately $14 million during the 26-month project construction period, in

addition to the county's portion of the revenue generated from the remaining 3.75 percent of the cumulative tax rate. This would be a temporary (26-month) benefit to the County, increasing the County's sales tax receipts (the FY 1999-2000 sales tax receipts were estimated at $1.7 million).

The portion of sales tax collected during the construction of the Proposed Action or one of the three action alternatives that would be disbursed back to Clark County would be small relative to existing county receipts.

If no land disposal were to occur as part of the proposed project, the Pah Rah parcel would remain a privately owned parcel and would continue to generate property taxes for Washoe County. In turn, the Toquop parcel (either the southern or northern parcel) would remain in public ownership, and would, therefore, not generate property tax revenue for Lincoln County. The lack of disposal of one parcel to private ownership would not adversely affect Lincoln County. However, the lack of a disposal would eliminate the property tax benefit that would accrue to the county with implementation of the Proposed Action or one of the three action alternatives. The property tax revenue that Lincoln County currently generates (approximately $2.3 million in 1999-2000) would not be affected.

4.16.5.2 Operation Impacts

Lincoln County would collect sales and use tax on all real property purchased and delivered to the project site. The annual fixed cost operating budget is anticipated to be approximately $13 million, excluding the cost of natural gas. If the entire annual operating budget represented taxable sales, this would represent a substantial increase for Lincoln County, with reported taxable sales of $25.2 million for fiscal year 1999-2000. Of the 6.75 percent combined tax rate, 3 percent is collected and disbursed directly to the collecting county. This would represent an annual payment of approximately $390,000 to Lincoln County, in addition to the county's portion of the revenue generated from the remaining 3.75 percent of the combined tax rate. This increase in sales tax receipts to Lincoln County would be a benefit. The additional sales tax revenue to Clark County would represent a minor benefit to Clark County.

According to Nevada Revised Statutes, if electricity is sold outside of Lincoln County, the project facilities would be centrally assessed in combination with any of the owners of other Nevada holdings associated with the generation and transmission of electricity (NRS 361.320).

As discussed previously, Washoe County would continue to collect property tax revenues for the Pah Rah parcel.

4.16.6 No Action Alternative

Trends and future conditions associated with the social and economic conditions of Clark County and Lincoln County under the No Action Alternative are expected to be the same as existing conditions. As urban development occurs, construction employment would be generated, and as new businesses open, additional long-term employment, earnings, income, and taxes would be generated.

If the No Action Alternative were implemented, the Caliente MFP would not be amended; the Toquop/Pah Rah land exchange would not occur; and no power plant would be constructed in Lincoln

County. As a result, no short- and long-term employment, personal earnings and income, and tax receipts would be generated. In addition, neither Toquop parcel in Lincoln County would be transferred to private ownership, and, therefore, would not generate property taxes in that county. Taxes that are currently generated in Washoe County from the Pah Rah parcel would continue to be generated.

If the No Action Alternative were implemented and an electricity shortage occurs in the future as a result of the growth that is occurring in Clark County and in the Southwest, commercial and residential electric accounts may be expected to pay higher rates as alternative sources of electricity are obtained. If the prices are too high or if there is an electricity shortage, businesses or industries may close and leave the area, affecting local employment and earnings, income, and tax receipts.

4.17 Transportation

This analysis addresses the potential temporary traffic impacts from project construction activities, and the potential traffic impacts from project operation.

4.17.1 Proposed Action

4.17.1.1 Impacts

4.17.1.1.1 Toquop Area. Construction of the Proposed Action would result in a temporary (26-month) direct increase in average daily traffic (ADT) on I-15 near the East Mesa Interchange (Exit 109). Normal construction hours are expected to be from 6:00 a.m. to 3:00 p.m. on weekdays. Some activities may require extended construction hours, and nighttime construction may be necessary to meet the overall project schedule.

Average construction workforce is estimated at 500, resulting in an increase of 1,000 average daily vehicle trips in that area if each worker drove alone to and from the project site. Peak workforce is estimated at 950, resulting in an increase of 1,900 average daily vehicle trips in that area if each worker drove by himself to and from the project site. These are increases of 5 percent and 10 percent, respectively, over the future (2003) estimated ADT level of 18,818. In either instance, these are substantial increases in ADT on I-15. A review of hourly traffic volume along I-15 east of the East Mesa Interchange indicates the following travel characteristics for this area:

- Transient traffic entering and leaving Nevada, and not commuter traffic, occurs on this stretch of freeway. Traffic from Utah arrives near the East Mesa Interchange between 9:00 a.m. to 10:00 a.m.; peak traffic in that area is 10:00 a.m. to 11:00 a.m. (Leegard, 2001).
- For all days of the week, traffic levels are lowest at 2:00 a.m. After 2:00 a.m., traffic levels slowly begin to increase until they reach their peak between 2:00 and 4:00 p.m. After 4:00 p.m., traffic levels decrease (Leegard, 2001)
- Daily southbound (west) traffic levels are higher than northbound (east) traffic levels

Construction workers are assumed to travel daily to the project site from either the Las Vegas metropolitan area; Mesquite or Overton, Nevada; or St. George, Utah. If each worker travels to the project site in a personal vehicle, the increase in ADT

along I-15 during the project construction period would range from 5 to 10 percent. The workers would travel to the project site between 4:30 a.m. and 6:00 a.m., which is during a relatively low traffic period (peak morning traffic on I-15 in that area is from 10:00 a.m. to 11:00 a.m.).

This would result in a temporary adverse traffic impact on I-15 near the East Mesa Interchange. This is because adding 500 cars to I-15 between 3:00 p.m. and 4:00 p.m. would be an increase of approximately 84 percent in traffic. Adding 950 cars to I-15 between 3:00 p.m. and 4:00 p.m. would be an increase of approximately 159 percent in traffic.

Adding 500 to 950 cars to the East Mesa Interchange off ramp at the start of a shift and at the onramp at the end of a shift to exit and enter I-15 would affect traffic flow at the interchange at these two times of day. Throughout the rest of the day, the interchange onramp and off ramp traffic flow would not be affected.

Parking for construction workers would be provided at the power plant site which has sufficient area to accommodate large numbers of personal vehicles.

If construction workers are required to work at night, the additional traffic would not result in an impact on I-15 traffic. The increased traffic from project construction would be a high percentage of the existing nighttime traffic levels because the existing traffic numbers are so low (ranging from 255 to 1,313 between 6:00 p.m. and 6:00 a.m.).

In addition to construction workforce traffic, traffic would also be generated from equipment deliveries. However, once equipment is delivered to the project area, no effect on traffic would occur until the equipment is removed from the project area. These infrequent deliveries would not result in an impact on I-15 traffic. Deliveries of materials and concrete would also generate traffic, and would average 10 deliveries per day over the 26-month construction period. This would result in approximately 20 daily vehicle trips (10 trips accessing the project area and 10 trips leaving the project area). This increase in traffic would not adversely impact I-15 traffic. At the East Mesa Interchange, these 20 daily trips would result in a 6 percent increase in offramp traffic when traveling east/northbound on I-15, and a 4 percent increase in offramp traffic when traveling west/southbound.

A review of the capacity of the one-lane concrete underpass that crosses under I-15 at the East Mesa Interchange indicates that no improvements would be required to accommodate construction workforce and delivery traffic. Construction worker transport vehicles are all expected to be inbound to the project site at the start of a work shift, and would all be outbound from the project site at the end of a shift. Vehicles coming from opposing sides of the underpass would be required to give the right-of-way to the vehicle that arrived first at the underpass, in accordance with current traffic laws. Vehicles that are too large to pass through the underpass at the East Mesa Interchange would access the site by exiting and then later returning to I-15 via the Riverside-Bunkerville Interchange (Exit 112) and/or the Carp-Elgin Interchange (Exit 100), depending whether the vehicles are traveling eastbound or westbound.

Because I-15 was constructed to handle interstate traffic, it has been designed to handle the loads of semi-trucks and trailers. Therefore, construction of the Proposed Action would not affect existing

roadway condition. Prior to project construction, the access road to the southern Toquop parcel would need to be improved to accommodate materials delivery vehicles, equipment, and construction worker transport vehicles. Portions of the road would need to be widened to two lanes and straightened where necessary, and the entire length of the access road from I-15 to the south Toquop parcel would need to be paved.

Operation of the Proposed Action would be 24 hours per day, 365 days per year. The plant would be operated by 15 employees from 7:00 a.m. to 3:00 p.m.; 5 employees from 3:00 p.m. to 11:00 p.m.; and 5 employees from 11:00 p.m. to 7:00 a.m. These 25 employees would require an additional 50 vehicle trips per day: 20 trips at 7:00 a.m., 20 trips at 3:00 p.m., and 10 trips at 11:00 p.m. This amount of operation-induced traffic would not affect I-15 or East Mesa Interchange offramp traffic patterns.

The Proposed Action would result in increased traffic on the access road to the Southern Toquop Parcel and the wellfield. Several trucks and semi-trailers that currently drive to the well site have created powdered roads and have rutted the roads when they are wet. Paving the road and regulated speeds of project vehicles would reduce the potential for further road impacts.

Transportation-related measures to manage traffic during project operation are included in the Proposed Action and are described in *Appendix B, Standard Construction and Operation Procedures.* Measures include: vehicles coming from opposing sides of the underpass at the East Mesa Interchange during project construction would be required to give the right-of-way to the vehicle that arrived first at the underpass; and scheduling project vehicles during peak construction periods so that they arrive at the one-lane underpass at intervals considered suitable to provide smooth traffic flow patterns.

4.17.1.1.2 Pah Rah Parcel. Because no development would occur at the Pah Rah parcel, no changes in existing traffic levels on I-80 and SR-447 are expected.

4.17.1.2 Mitigation

The construction contractors will be encouraged to use staggered work shifts to minimize transportation conflicts.

4.17.2 Alternative 1

4.17.2.1 Impacts

Traffic impacts associated with Alternative 1 for both construction and operation would be the same as those described for the Proposed Action.

4.17.2.2 Mitigation

Mitigation described for the Proposed Action in the Toquop area also would be applicable to Alternative 1.

4.17.3 Alternative 2

4.17.3.1 Impacts

Traffic impacts associated with Alternative 2 for both construction and operation would be similar to those described for the Proposed Action, plus the access road would be extended to the northern Toquop parcel under Alternative 2.

4.17.3.2 Mitigation

Mitigation described for the Proposed Action in the Toquop area also would be applicable to Alternative 2.

4.17.4 Alternative 3

4.17.4.1 Impacts

Traffic impacts associated with Alternative 3 for both construction and operation would be the same as those described for the Proposed Action.

4.17.4.2 Mitigation

Mitigation described for the Proposed Action in the Toquop area also would be applicable to Alternative 3.

4.17.5 No Action Alternative

Trends and future conditions associated with traffic in the Toquop and Pah Rah areas under the No Action Alternative are expected to be the same as existing conditions. Therefore, no impact on existing traffic levels is expected with implementation of this alternative. Development may occur in the future in these areas, but the level and type of development that would occur and the associated traffic conditions is unknown.

4.18 Cumulative Impacts

4.18.1 Introduction

This section addresses potential cumulative impacts that would result from the effects of the Proposed Action or action alternatives when combined with the effects of other past, present, and reasonably foreseeable future projects. Reasonably foreseeable projects include those future actions that have been sufficiently defined to be: 1) relevant to potential impacts; 2) within the project area of influence; and 3) of a magnitude that could potentially result in a significant cumulative impact. Nine large interrelated projects were identified in *Section 1.8* of Chapter 1 whose effects may extend across a broad range of resources assessed in this document and possibly result in cumulative impacts on those resources. Descriptions of these interrelated projects and their geographic area of analysis are presented in the following text in *Section 4.18.2, Description of Interrelated Projects.* A discussion of the specific resources not cumulatively impacted is presented in *Section 4.18.3, Resources Not Cumulatively Impacted*. This section is followed by a discussion of resources that were analyzed in detail for potential cumulative impacts (see *Section 4.18.4, Resources Analyzed in Detail for Potential Cumulative Impacts*).

Potential cumulative effects of the nine interrelated projects, and of any other interrelated projects whose potential cumulative effects would be very resource-specific (for example, other projects that may only affect air quality), are described in the following text. Data on interrelated projects were sufficient for determining those resource areas where cumulative impacts would be expected and where they would not, and for assessing qualitatively or quantitatively (depending on the level of detail available) the potential for cumulative impacts on regionally important resources such as ground water, desert tortoise, air quality, and others.

Resource areas that would not be subject to cumulative impacts, and the associated rationale, are identified and not analyzed further.

4.18.2 Description of Interrelated Projects

Descriptions of the nine large interrelated projects that were considered in the cumulative impact analysis follow. They include three land development projects, five power plant projects, and one natural gas pipeline project. Map 1-3 in Chapter 1 shows the locations of these projects in relation to the Toquop Energy Project proposed southern and northern power plant sites.

4.18.2.1 Sale and Build-Out of Mesquite Lands Act Property

The BLM is proposing to transfer, by direct sale at fair market value, approximately 10,540 acres of public land to the City of Mesquite in Clark County, Nevada. The land has been separated into two parcels. The Joint-Venture Parcel covers approximately 5,540 acres and is north and west of the City of Mesquite and north of the Virgin River. The Contiguity Parcel covers approximately 5,000 acres, and is adjacent to and west of the Joint-Venture parcel and primarily south of I-15. The Mesquite Lands Act gives the City of Mesquite exclusive rights to purchase these two parcels from the United States (PBSJ 2000). The Toquop Energy Project southern parcel that is associated with the Proposed Action, Alternative 1, and Alternative 3 is approximately 12 miles northwest of the City of Mesquite. The Toquop Energy Project northern parcel is approximately 24 miles north-northwest of the City of Mesquite.

The City of Mesquite proposes to purchase and use these lands to promote orderly and quality urban development projects within the City of Mesquite. The City would sell and/or lease designated tracts to pre-qualified developers for use in establishing master-planned residential and thematic commercial developments consistent with the City's goals. Development potentials include residential, recreation, and commercial/industrial uses as well as open space. The City of Mesquite plans to acquire the Joint-Venture Parcel first, with build-out perhaps extending over approximately 20 to 30 years. Individual project developments may involve from approximately 320 to 500 acres, with the City and each selected project developer entering into a development agreement of at least 20 years. The overall anticipated build-out period of the Mesquite Lands Act property is approximately 50 years (PBSJ 2000). At buildout the project would require an estimated 11,000 afy of water.

The Environmental Assessment (EA) for the proposed sale and build-out of the Mesquite Lands Act property states that proposed development within the Joint-Venture and Contiguity Parcels will conform to the measure and objectives presented in the City of Mesquite's Long-Range Comprehensive Master Plan Population Element (PBSJ 2000). The EA concludes that adherence to the development and growth goals and objectives of the City's Long Range Comprehensive Master Plan while implementing the proposed development would provide benefits to the City of Mesquite and would reduce potential adverse impacts to population and socioeconomics to a level of less than significant (PBSJ 2000).

4.18.2.2 Sale and Build-Out of Lincoln County Land Act Property

The Lincoln County Land Act of 2000 (LCLA) identified for disposal approximately 13,500 acres of public

lands in Lincoln County, Nevada. In Phase 1 of the LCLA, the BLM is proposing to transfer 6,478 acres of this public land to private ownership by competitive sale. These lands are located in southeastern Lincoln County, north of Mesquite, Nevada. The Toquop Energy Project southern parcel is approximately 10 miles northwest of the LCLA lands and the northern parcel is approximately 22 miles north-northwest of the LCLA lands. Lands to be sold are currently undeveloped but are suitable for community development including public use and improvements. The Phase 1 competitive sale of 6,478 acres of transferred lands has been offered in three separate parcels of 4,357 acres, 2,009 acres, and 112 acres, rather than multiple smaller parcels, to better ensure development of planned communities and infrastructure (BLM 2001c).

Development and Conveyance Agreements between the developer and Lincoln County will require a land use map showing the general concept for master planned development of the acquired property, how the land will be used, the required public use conveyances, the public uses required, public use locations, and public use improvements. It is expected that development will occur at a density of 3.3 dwellings per gross acre and in planned units with clustering of village-like communities (BLM 2001c). The EA prepared for the sale and build-out of the Mesquite Lands Act property (PBSJ 2000) stated that the public lands identified for transfer to Lincoln County under the LCLA are located north of and adjacent to the Joint-Venture Parcel of the Mesquite Lands Act property. The EA stated further that Lincoln County lands transferred under the LCLA would be developed for municipal purposes similar to those being considered for the Joint-Venture Parcel, including residential, commercial, light industrial, and associated transportation (PBSJ 2000).

The EA prepared for the proposed LCLA stated that build-out of Phase I would occur over a 20-year period (BLM 2001c). The EA estimated that at build-out, the Phase I sale area would contain 21,377 dwellings, a population that could reach 57,718 residents (average of 2.7 persons per dwelling), and require approximately 21,400 acre-feet of water per year (approximately 1 acre-foot of water per year per dwelling) (BLM 2001c). The remaining approximately 7,000 acres of public lands in Lincoln County that would be disposed of under the LCLA would presumably be offered for competitive sale at some point in the future with the same development and conveyance agreement stipulations as described for the sale of Phase 1 lands. These Phase II lands would be adjacent to Phase I lands and have an estimated initial residential development capacity of approximately 14,000 dwelling units (BLM 2001c). This equates to approximately 37,800 residents and the annual need for approximately 14,000 acre-feet of water.

4.18.2.3 Coyote Springs Development Project

Coyote Springs Investment, LLC, (CSI) states that the proposed Coyote Springs Development Project will provide rural Nevada with a unique new town community. This development will be approximately 50 miles north of Las Vegas and roughly 50 miles west of the Toquop Energy Project site. The development area includes approximately 42,800 acres located east of U.S. Highway 93 and north of State Route 168 in the Coyote Spring Valley.

Approximately one-third of the land held by CSI is in Clark County and two-thirds is in Lincoln county (Stantec Consulting, PG Morros Corp., and Coyote Springs Investment, LLC 2001).

The Coyote Springs community, as envisioned, will consist of a series of neighborhoods with villages nestled between open space corridors. Initially, the community focus will be as a second-home retreat and destination vacation environment centered on golf courses. As it matures, the community will move toward self-reliance, with a full range of primary residential, commercial, and public facilities. These would include schools, grocery stores, and medical, police, and fire facilities The development schedule for the Coyote Springs project covers over 40 years (Stantec Consulting, PG Morros Corp., and Coyote Springs Investment, LLC 2001).

CSI plans to begin the entitlement process for approximately 13,100 acres in Clark County. Final build-out estimates for the Clark County portion of the Coyote Springs Development are for approximately 47,500 residential units, together with commercial and recreational facilities. CSI anticipates densities in the Lincoln County portion of the project will be similar to densities for Clark County. The final level of build-out in Lincoln County will depend on the amount of water resources available to the project. The project is estimated to require 59,000 afy of water.

4.18.2.4 Moapa Paiute Energy Center

The Moapa Band of Paiutes proposes to lease land and water use on the Moapa River Indian Reservation to the Calpine Corporation for the construction, operation, and maintenance of the Moapa Paiute Energy Center. A 760-MW water-cooled, natural gas-fired power plant would be located on the Reservation in Clark County, Nevada, approximately 10 miles southwest of the City of Moapa and 45 miles northeast of the City of Las Vegas (PBSJ 2001). The site is approximately 45 miles southwest of the Toquop Energy Project site. The proposed project also would include the following facilities:

- 5.2 miles of 500-kV transmission line connecting the proposed power plant to the existing Nevada Power Company Crystal Substation
- 0.6 mile of 16- to 20-inch-diameter, natural gas pipeline connecting the proposed power plant to the Kern River Natural Gas Pipeline
- Approximately 10 ground water wells and associated pipelines adjacent to the power plant
- Approximately 7 miles of a new 24-foot-wide access road from the proposed power plant to I-15 and its frontage road

Project construction is expected to last about 2 years, with operations scheduled to begin in 2003. Land disturbance would total approximately 222 acres, including 197 acres of Tribal land and 25 acres of BLM-administered land. The project would create about 400 local construction jobs at the peak of construction and have a total estimated construction cost of approximately $500 million. Once operational, the project would employ approximately 20 to 30 full-time local workers and have an annual operating cost of approximately $16 million, exclusive of fuel costs and major periodic maintenance costs. The land and water lease would be for 25 years, with a potential 20-year

renewal Water requirements are estimated to be 6,450 afy (PBSJ 2001).

4.18.2.5 Meadow Valley Generating Project

Pacific Gas & Electric National Energy Group (PG&E NEG) proposes to construct and operate the Meadow Valley Generating Project. A 1,000-MW water-cooled, natural gas-fired power facility would be located on a 155-acre site in northeastern Clark County, Nevada, 1.5 miles northwest of the City of Moapa. This site is approximately 37 miles southwest of the Toquop Energy Project site. The proposed Meadow Valley power plant site is within a 640-acre parcel of public land scheduled for disposal. The proposed project also would include the following facilities [PBSJ 2001, Federal Energy Regulatory Commission (FERC) and California State Lands Commission (CSLC) 2002]:

- 22 miles of 20-inch-diameter water lines to surface water and ground water sources, plus ground water wells along Meadow Valley Wash in Clark and Lincoln Counties
- 19 miles of 500-kV transmission line connecting the proposed power plant to the existing Nevada Power Company Crystal Substation
- 9 miles of 69-kV transmission line and 9 miles of 34.5-kV distribution line
- 0.8 mile of 20-inch-diameter, natural gas pipeline connecting the proposed power plant to the Kern River Natural Gas Pipeline

Project construction was scheduled to begin in 2002, with operations beginning in 2004 (PBSJ 2001). The project would create about 800 local construction jobs at the peak of construction, with approximately $40 million in material, equipment, and services to be purchased locally during construction. Once operational, the project would employ approximately 40 full-time local workers, with $6 to $7 million spent annually to purchase supplies and equipment. At the end of the power plant's expected life, water rights that had been purchased from local sources and water infrastructure would be donated to the Moapa Valley Water District and used to serve the local community's water needs. (PBSJ 2001). Water demand is assumed to be less than 100 afy based on the demand of similar plants.

4.18.2.6 Moapa Energy Facility Project

Duke Energy Moapa, LLC, is constructing and proposes to operate the Moapa Energy Facility Project. A 1,200-MW air-cooled, natural gas-fired power plant and ancillary facilities would be located on private land in the Apex Industrial Park in Clark County, Nevada. This site is approximately 26 miles southwest of the City of Moapa and 61 miles southwest of the Toquop Energy Project site. The proposed project also would include the following facilities:

- Two 4.8-mile long 500-kV transmission lines from the proposed power plant to the Nevada Power Company Harry Allen Substation
- A 3.8-mile-long, 16-inch-diameter natural gas pipeline connecting the proposed power plant to the Kern River Natural Gas Pipeline

Estimated permanent ground disturbance associated with power plant, transmission line, and gas tap construction would total

approximately 85 acres. The peak number of workers would be fewer than 100. The power plant is expected to have a nominal life of 30 years (PBSJ 2001, FERC and CSLC 2002).

4.18.2.7 Apex Generating Station Project

Mirant, Inc. is constructing and proposes to operate the Apex Generating Station Project. A 550-MW air-cooled, natural gas-fired power plant and ancillary facilities would be located on private land in the Apex Industrial Park in Clark County, Nevada. This site is approximately 24 miles southwest of the City of Moapa and 59 miles southwest of the Toquop Energy Project site. Two 500-kV transmission lines would connect the proposed power plant to the Nevada Power Company Harry Allen Substation. The Kern River Natural Gas Pipeline passes near the proposed plant site. Estimated permanent ground disturbance associated with power plant, transmission line, and gas tap construction would total approximately 77 acres. Construction is scheduled for completion in 2004. The power plant would have a nominal life of 30 years (PBSJ 2001, FERC and CSLC 2002). Water demand is assumed to be less than 100 afy based on the demand of similar plants.

4.18.2.8 Silverhawk Power Station Project

Pinnacle West Energy is constructing and proposes to operate the Silverhawk Power Station Project. A 550-MW natural gas-fired, combined cycle power plant and ancillary facilities would be located on private land in the Apex Industrial Park in Clark County, Nevada. This site is approximately 25 miles southwest of the City of Moapa and 60 miles southwest of the Toquop Energy Project site. Facility construction is anticipated to take 2 years and be complete in 2004 (PBSJ 2001, FERC and CSLC 2002). Permanent ground disturbances at this site would be expected to be similar to that for the two other Apex Industrial Park power plant projects described in the previous text. Water demand is assumed to be less than 100 afy based on the demand of similar plants.

4.18.2.9 Kern River 2003 Expansion Project

Kern River Gas Transmission Company (KRGT) is constructing and plans to operate facilities to expand the existing KRGT interstate natural gas pipeline system, extending from the City of Opal in southwestern Wyoming to the City of Mojave in southern California. The expansion would provide additional capacity to serve customers in Utah, Nevada, and California. The proposed project would involve the construction and operation of 717.5 miles of underground pipeline and appurtenant facilities as follows (FERC and CSLC 2002):

- 634.5 miles of 36-inch-diameter pipeline in Wyoming, Utah, Nevada, and California
- 82.2 miles of 42-inch-diameter pipeline in California
- 0.8 mile of 12-inch-diameter pipeline in Wyoming
- 163,700 horsepower of compression at three new and six existing compressor stations
- Modifications to five existing meter stations

Nominal construction right-of-ways would be approximately 75 to 80 feet wide. The proposed pipeline would loop or parallel an existing KRGT pipeline and pass through Lincoln County and Clark County, Nevada (FERC and CSLC 2002). The existing and proposed KRGT natural gas pipeline routes cross the southeast corner of the Toquop Energy Project southern parcel that is associated with the Proposed Action, Alternative 1, and Alternative 3. The estimated pipeline construction workforce in Clark and Lincoln Counties would range from 400 to 450 workers. Construction of the entire pipeline would take about 1 year and is scheduled to be complete in 2003 (FERC and CSLC 2002).

4.18.3 Resources Not Cumulatively Impacted

Results of impact analyses presented in *Sections 4.2* through *4.17* of this chapter show that some resources in the Toquop Energy Project area and Pah Rah parcel would either not be impacted by the Proposed Action or Alternatives 1, 2, or 3. These resource areas are identified in Table 4-16 as not being selected for detailed analysis for cumulative impacts.

4.18.4 Resources Analyzed in Detail for Potential Cumulative Impacts

The potential for cumulative impacts was analyzed for the resources impacted by the Proposed Action or Alternatives 1, 2, or 3. Some resources in the Toquop Energy Project area would either: 1) not be impacted by the Proposed Action or Alternatives 1, 2, or 3; or 2) potential impacts would be very minor, localized, and not overlap with the area of influence for interrelated projects. In these instances, neither the Proposed Action nor any of the action alternatives would contribute to cumulative impacts and these resources were not analyzed further. Other resource areas were analyzed in further detail and are discussed in the text below. The resources to be analyzed and the potential interrelated projects that may have cumulative effects are identified in Table 4-16, along with the level of analysis required. Table 4-17 summarizes the water demands and acres of land disturbance and for each of the interrelated projects.

There would be no cumulative impacts on resources in the Pah Rah area as a result of the proposed Toquop Project.

TABLE 4-16
Summary of Resource Area and Interrelated Project Analysis for Cumulative Impacts

Resource Area	Resource Area Selected for Detailed Analysis?	Interrelated Projects Analyzed (see legend)
Surface Water Hydrology	No	None
Recreation Resources	No	None
Land Use, Prime or Unique Farmlands, and Rangelands	No	None
Wild Horses and Burros	No	None
Hazardous and Solid Wastes	No	None
Indian Trust Assets	No	None
Environmental Justice	No	None
Paleontological Resources	No	None
Soils and Geology	Yes	1 through 9
Ground water resources	Yes	1 through 8
Biological resources	Yes	
Threatened and endangered species	Yes	1 through 9
Vegetation and noxious weeds	Yes	1 through 9
Wildlife and fisheries resources	Yes	1 through 9
Wetlands/riparian zones, floodplains, and Waters of the United States	Yes	9
Air quality and noise	Yes	
Air quality	Yes	1 through 9
Noise	Yes	9
Visual resources	Yes	9
Wilderness Study Areas, Areas of Critical Environmental Concern, and Wild and Scenic Rivers	Yes	1 through 9
Cultural and historical resources and Native American religious concerns	Yes	9
Socioeconomics	Yes	1 through 9
Transportation	Yes	9

1 – Mesquite Land Act
2 – Lincoln County Land Act
3 – Coyote Springs Development
4 – Moapa Paiute Energy Center
5 – Meadow Valley Generating Station
6 – Moapa Energy Facility
7 – Apex Generating Station
8 – Silverhawk Power Station
9 – Kern River 2003 Expansion

TABLE 4-17
Resource Utilization of Interrelated Projects

Interrelated Project	Ground Water Use (acre-feet/year)	Disturbed Acres (Total Project)
Mesquite Land Act (Phase I and II)	11,000 by 2020	10,540
Lincoln County Land Act (Phase I and II)	35,377 at buildout	13,500
Coyote Springs Development	59,500 at buildout	42,800
Moapa Paiute Energy Center	6,450	222
Meadow Valley Generating Station	Assumed 7,000	155
Moapa Energy Facility	Assumed less than 100	85
Apex Generating Station	Assumed less than 100	77
Silverhawk Power Station	Assumed less than 100	Assumed less than 100
Kern River 2003 Expansion	0	2,022
Subtotal	**119,627**	**69,461**
Toquop Energy Project (Proposed Action)	Up to 7,000	449 (includes temporary and long-term, 182 acres permanent disturbance)
Total	**126,627**	**69,910**

4.18.4.1 Soils and Geology

Potential project-related impacts on biological soil crusts would be localized and cumulative effects are a potential. Unfortunately, no data are available for interrelated projects that demonstrate any impact on biological soil crusts by those projects. Therefore, an assessment of cumulative impacts is not possible.

4.18.4.2 Ground Water Resources

4.18.4.2.1 Proposed Action. Section 4.4.1.1.1 concludes that the Proposed Action and the action-based alternatives would not adversely affect ground water levels or deplete ground water resources outside of the Tule Desert hydrographic area. Nevertheless, the EIS considers the cumulative regional demand for ground water from the interrelated projects identified in Section 4.18.2. Specifically, Table 4-17 presents the demand for ground water for both the interrelated projects and the Toquop Energy project Proposed Action. The total future demand from the interrelated projects is estimated to be approximately 119,327 afy, and the total demand for the Proposed Action is 7,000 afy.

4.18.4.2.2 Alternatives 1, 2, and 3. As with the Proposed Action, no cumulative impacts would be associated with Alternatives 1, 2, or 3.

4.18.4.3 Biological Resources

4.18.4.3.1 Threatened, Endangered, and Sensitive Species

Proposed Action. Potential cumulative impacts on desert tortoises from other proposed activities in the vicinity of the project consist of the effects of the nine interrelated projects described in *Section 4.18.2*, which include five other power projects, three land development projects, and one natural gas pipeline project. All five of the currently proposed power plants would impact desert tortoise habitat if constructed. The proposed Kern River Expansion gas pipeline project would also disturb desert tortoise habitat in the project area and region. Given that pipeline construction in the project area is currently scheduled for winter months, little or no increase in tortoise mortalities would result from construction activity. An ongoing potential exists for added incremental impacts from all projects that could have long-term effects. The improvement of existing roads and the construction of new roads could lead to increased human activities. Increased public access potentially increases tortoise mortality resulting from shooting, the number of tortoises collected for pets, and the number of tortoises run over by vehicles. Also, increased access elevates the potential for the public to release diseased tortoises into the wild.

The sale and build-out of the Lincoln County Land Act property, the Mesquite Land Act property, and the Coyote Springs Development Project could add to direct and indirect impacts on desert tortoise in Lincoln County and Clark County, which would include additional loss and fragmentation of desert tortoise habitat. However, these impacts would be reduced by implementation of the *Southeastern Lincoln County Multi-Species Habitat Conservation Plan* (HCP) currently under development and by the *Clark County Multiple Species HCP* (Clark County, 2000). Other sensitive species would also benefit from these HCPs. In addition, the USFWS prepared a Biological Opinion for development of the Apex Heavy Use Industrial Park where several of the power plants would be located that allows full development of that property. It is anticipated that the permitting process for the proposed project would have been completed before completion and implementation of the Lincoln County HCP; therefore, the proposed project would not be subject to any additional provisions of this HCP.

A detailed analysis of cumulative impacts of federal actions on the desert tortoise in southern Nevada is provided in the proposed *Caliente Management Framework Plan and Amendment* and the *Final Environmental Impact Statement for the Management of Desert Tortoise Habitat* (BLM, 1999). Of the large interrelated projects considered in this analysis approximately 2,000 acres would be affected by the Kern River Expansion Project, approximately 24,000 acres would be affected by the Lincoln County Land Act and Mesquite Land Act, approximately 42,800 acres would be affected by the Coyote Springs Development Project, and an estimated 700 acres would be disturbed in the long term by the five power projects. As described below, the Proposed Action would disturb 449 acres (182 acres net new disturbance). Collectively, the Proposed Action (449 acres) and interrelated projects would affect an estimated 69,900 acres.

The increased demand for development within the Mojave Desert ecosystem

spawned by the current national energy needs contribute to the cumulative loss of habitat for the desert tortoise as well as other sensitive species. To reduce the impacts of these actions on a cumulative level, the BLM Las Vegas and Ely Field Offices have developed restoration standards with the intention of reducing impacts over time by promoting faster recovery of disturbed areas. The restoration plan incorporates the level of disturbance anticipated and the biological sensitivity of the habitat to determine the actions required for each project. The plan includes pre-construction site assessment, detailed restoration procedures, a 5-year post-implementation monitoring program, and minimum success criteria. The Proposed Action will conform to the BLM's restoration plan, which will be developed on a project specific level as part of the Plan of Development (POD). As assurances for this long-term monitoring process, the BLM will require a bond to be posted by the right-of-way holder for the entire monitoring period.

Alternatives 1, 2, and 3. Cumulative direct and indirect impacts to desert tortoises resulting from the proposed Toquop Project and the nine interrelated projects would be similar to those described for the Proposed Action, differing only by the amount of habitat disturbed in the Toquop area under each alternative. Compared to the Proposed Action (449 acres temporarily disturbed, 182 acres permanently disturbed), nearly the same amount of total desert tortoise habitat would be disturbed under Alternative 1 (451 acres temporary, 182 acres permanent), more habitat would be disturbed under Alternative 2 (581 acres temporary, 237 acres permanent), and less habitat would be disturbed under Alternative 3 (417 acres temporary, 150 acres permanent). The Proposed Action and each action alternative would each temporarily disturb 222 acres of desert tortoise designated critical habitat and permanently disturb 61 acres of designated desert tortoise critical habitat in the Toquop area.

4.18.4.3.2 Vegetation and Noxious Weeds

Proposed Action. Cumulative impacts on vegetation would result from the combined effects of the nine interrelated projects (power plants, land acts and development, gas pipeline) and the proposed Toquop Project. Acres potentially affected would be the same as described in the preceding discussion of cumulative impacts on desert tortoise. Acres disturbed by the Proposed Action would comprise a very small portion of the total acres affected by the interrelated projects.

The types of direct and indirect cumulative impacts on vegetation would be similar to the types of direct and indirect effects on vegetation expected in the Toquop area. Direct impacts would result from construction activities on all of the interrelated projects, and some indirect impacts would result from increased public access and maintenance activities associated with all of the projects. Vegetation impacts would result from direct removal and fragmentation of habitat, degradation caused by soil compaction, and increased erosion. A potential would exist for added incremental impacts that could have long-term effects. Increased human activity associated with each of the interrelated projects and the proposed project would also impact vegetation in continually disturbed areas. The improvement of existing roads and construction of new roads could lead to increased human activities and potential ongoing

disturbance to vegetation. Improved access to the various project areas, especially related to the land acts and developments, may encourage greater OHV use and related impacts on vegetation. These impacts may be long-term because of the extensive length of time required to restore disturbed areas and vegetation in arid and semi-arid environments. The potential for the introduction and spread of noxious weeds via vehicles and soil disturbances also would increase as a result of the interrelated projects.

All of the interrelated projects would involve mitigation measures designed to avoid or reduce impacts on vegetation. Examples include measures to minimize the potential for long-term erosion, increase the stabilization of site conditions, and control the introduction and spread of noxious weeds. Measures to minimize impacts and restore vegetation disturbed by the proposed Toquop Project would be implemented as part of the BLM's habitat restoration plan that was discussed in the preceding section on desert tortoise cumulative impacts. The cumulative benefits of all these mitigation measures would be to minimize the magnitude, extent, and duration of cumulative impacts from the interrelated projects.

Alternatives 1, 2, and 3. Cumulative direct and indirect impacts on vegetation for Alternatives 1, 2, and 3 would be similar to those described for the Proposed Action. The only differences would be in the amount of habitat temporarily and permanently disturbed in the Toquop area under each alternative (see previous discussion of desert tortoise for acres disturbed). Cumulative impacts would be slightly greater under Alternative 2, while cumulative impacts for Alternatives 1 and 3 are expected to be the same as those of the Proposed Action.

4.18.4.3.3 Wildlife and Fisheries Resources

Proposed Action. Cumulative direct and indirect impacts on wildlife and their habitat, as well as associated mitigation measures, would be similar to the kinds of cumulative impacts and mitigation measures described in the preceding text for desert tortoise (a threatened wildlife species) and vegetation (wildlife habitat). Direct impacts would result from construction activities that cause a loss, degradation, and/or fragmentation of wildlife habitat, and some indirect impacts would result from increased public access and maintenance activities associated with all of the interrelated projects. The improvement of existing roads and construction of new roads could lead to increased human activities and potential ongoing, long-term disturbance to wildlife and their habitat. Increased human activity associated with each of the interrelated projects and the proposed project would impact wildlife in continually disturbed areas, potentially increasing mortality to some wildlife from vandalism. Improved access to the various project areas, especially related to the land acts and developments, may encourage greater OHV use and cause related impacts on wildlife. There would be no cumulative impacts on fisheries resources as a result of the proposed Toquop Project.

Cumulative impacts on wildlife and habitat would be reduced by implementation of many of the same mitigation measures and BLM restoration plans as described for the desert tortoise and vegetation. In addition, cumulative impacts would be reduced or avoided by implementation of the *Southeastern Lincoln County Multi-Species Habitat*

Conservation Plan currently under development and the *Clark County Multiple Species HCP*. All wildlife species would benefit from implementation of these HCPs.

Alternatives 1, 2, and 3. Cumulative direct and indirect impacts on wildlife and wildlife habitat for Alternatives 1, 2, and 3 would be similar to those described for the Proposed Action. The only differences would be in the amount of habitat temporarily and permanently disturbed in the Toquop area under each alternative (see previous discussion of desert tortoise for acres disturbed). Cumulative impacts would be slightly greater under Alternative 2. Cumulative impacts for Alternatives 1 and 3 are expected be the same as those described for the Proposed Action.

4.18.4.3.4 Wetlands/Riparian Zones, Floodplains, and Waters of the United States

Proposed Action. Minor impacts have previously occurred on the ephemeral washes within and adjacent to the existing access road, powerline right-of-way, and Kern River Gas Pipeline right-of-way. These minor impacts are associated with the construction of the roadway, the powerlines, and the gas pipeline. Some cumulative effects on ephemeral washes may occur from the current expansion of the Kern River Gas Pipeline. These are expected to be minor because the expansion will add only 20 feet to the existing pipeline right-of-way. Standard construction and operating procedures and best management practices of both the Toquop Energy Project and the Kern River Gas Pipeline Expansion will further minimize impacts to ephemeral washes.

Alternatives 1, 2, and 3. Cumulative impacts for Alternatives 1, 2, and 3 would be the same as those described for the Proposed Action.

4.18.4.4 Air Quality and Noise

4.18.4.4.1 Air Quality

Proposed Action

The analysis of cumulative air quality impacts is inherently different than other cumulative analyses in that the geographic extent of impacts is typically larger for air quality than for other issues. This air quality cumulative analysis therefore considers air emissions from additional sources beyond the interrelated projects listed above.

Construction. Because emissions from construction activities are frequently near-ground releases, the impacts would only occur over a limited geographic area in the immediate vicinity of the proposed facility. Construction of the Kern River Pipeline expansion would occur in the project area and create near-ground releases. It is expected that construction of the expansion will be complete or nearly complete as construction of the Toquop Energy Project begins. Cumulative effects during construction will be limited.

Operation. In order to assess potential cumulative impacts on air quality, two evaluation approaches were employed, PSD Increment Evaluation and NAAQS Evaluation. These are two of the primary tools used to evaluate cumulative air quality impacts in New Source Review air permitting, and thus were used in this evaluation. The PSD Increment Evaluation is used to estimate the degradation of air quality caused by construction of man-made sources of air pollution after certain

baseline dates. The NAAQS Evaluation is used to estimate the total impacts of all natural and anthropogenic sources of air pollution on air quality as compared to pollutant concentrations at which human health or the environment could be impacted.

For both the PSD Increment and NAAQS Evaluations, emissions from all permitted sources identified in the region by applicable regulatory agencies were quantified, and emission estimates for the interrelated projects listed above were prepared based on available data. Then sources with little or no chance of cumulatively contributing to total impacts in the vicinity of Toquop were screened out, based on criteria described further below.

PSD Increment Evaluation. Under the Clean Air Act (CAA), significant deterioration of local air quality is not allowed, regardless of existing air quality and whether this deterioration would cause a violation of ambient air quality standards. This potential deterioration is estimated through the PSD Increment Evaluation.

Table 4-18 presents the surrounding facilities that were considered for inclusion in the PSD increment analysis. This list was developed based on correspondence with NDEP BAQ, Clark County Health Department, Arizona Department of Environmental Quality, and the Utah Department of Environmental Quality, and includes identified emissions sources in all airsheds where the Proposed Action is predicted to have an impact of greater than modeling significance levels (commonly referred to as the significant impact level, or SIL) for all or portions of the airshed. Reasonably foreseeable actions were also included, based on information available from NEPA documentation for other interrelated projects. A total of 27 other facilities were considered in the PSD increment analysis.

The distance of the sources from the Proposed Action range from 41 to 130 km. Some of the sources were eliminated from the analysis because they were located outside of the PSD significant impact area. This area was defined based on modeled ambient impacts of the Toquop facility; facilities located outside of the area have little chance of appreciably affecting ambient air quality in the location where the Toquop facility cause impacts greater than the SIL.

Other sources were eliminated because of low emission rates. Even if located within areas where the Toquop facility could have impact greater than the SIL, facilities with low emission rates are unlikely to add appreciably to cumulative total impacts. A common evaluation tool used in the PSD program, the “20D” formula, was used for this screening. Specifically, for each pollutant, the surrounding source must have emissions (in tons per year) greater than 20 times the difference of distance between the surrounding source and the permitted source minus the radius of impact for the permitted source. In this manner, the analysis is simplified by eliminating sources that have minimal chance of creating measurable ambient impacts in the same vicinity as the permitted source.

Because the PSD increment is intended to allow evaluation of deterioration of air quality versus baseline conditions, it only includes sources that were permitted or constructed after certain baseline dates. Sources constructed prior to these baseline dates are not included in the increment analysis.

TABLE 4-18
Regional Increment Consuming Sources

Source	Location			Emissions (tons/year)			Within SIA			Required for Analysis Per "20D" Formula		
	County	State	UTMs* (km)	PM10	SO_2	NO_x	PM10	SO_2	NO_x	PM10	SO_2	NO_x
Permitted Sources												
Chemical Lime Company	Clark	NV	687.4 E 4,025.4 N	229.1	1115.5	20.2	No	No	No	No	No	No
Las Vegas Paving	Clark	NV	687.4 E 4,025.5 N	47.7	77.2	2.2	No	No	No	No	No	No
Granite Construction	Clark	NV	687.4 E 4,025.8 N	0.9	N/A	37.5	No	No	No	No	No	No
Georgia Pacific	Clark	NV	686.8 E 4,023.9 N	268.1	1.6	49.7	No	No	No	No	No	No
Harry Allen	Clark	NV	688.2 E 4,033.3 N	130.7	36.2	300.7	No	No	No	No	No	No
Nevada Cogeneration Associates	Clark	NV	690.9 N 4,029.2 N	65.7		132.8	No	No	No	No	No	No
Duke	Clark	NV	686.4 4,028.5	495.3	83.6	505.4	No	No	No	No	No	No
Mirant Las Vegas	Clark	NV	682.9 E 4,032.1 N	223.0	18.6	379.6	No	No	No	No	No	No
Reliant Energy Arrow Canyon	Clark	NV	690.8 E 4,029.3 N	179.5	N/A	189.1	No	No	No	No	No	No
Apex Waste Management Center	Clark	NV	690.0 E 4,026.1 N	1034.8	0.0	0.0	No	No	No	No	No	No
Highway 36	Clark	NV	697.0 E 4,039.5 N	14.7	0.0	0.0	N/A	N/A	Yes	No	No	No
Royal Cement	Clark	NV	722.2 E 4,058.5 N	1456.9	N/A	1456.9	N/A	N/A	Yes	No	No	Yes
Simplot Silica Products	Clark	NV	729.2 E 4,044.4 N	N/A	N/A	66.0	N/A	N/A	Yes	No	No	No
Leavitt Read Mix	Clark	NV	728.4 E 4,047.0 N	N/A	N/A	69.5	N/A	N/A	Yes	No	No	No

TABLE 4-18
Regional Increment Consuming Sources

Source	Location			Emissions (tons/year)			Within SIA			Required for Analysis Per "20D" Formula		
	County	State	UTMs* (km)	PM10	SO_2	NO_x	PM10	SO_2	NO_x	PM10	SO_2	NO_x
Reid Gardner	Clark	NV	711.3 E 4,059.3 N	N/A	N/A	2562.0	N/A	N/A	Yes	No	No	Yes
Bear River Contractors	Washington	UT	N/A	4.9	0.3	3.8	Yes	Yes	Yes	No	No	No
Interstate Rock Products	Washington	UT	N/A	9.2	0.3	3.9	Yes	Yes	Yes	No	No	No
Western Rock Products Corporation	Washington	UT	N/A	2.3	1.6	17.0	Yes	Yes	Yes	No	No	No
St. George City Power	Washington	UT	N/A	1.8	1.6	24.9	Yes	Yes	Yes	No	No	No
Genpak Corporation	Iron	UT	N/A	0.1	0.0	0.3	Yes	Yes	Yes	No	No	No
O'Sullivan Industries Incorporated	Iron	UT	N/A	2.1	0.0	0.8	Yes	Yes	Yes	No	No	No
Western Rock Products Corporation	Western Rock Products Corporation	UT	N/A	6.3	5.0	24.7	Yes	Yes	Yes	No	No	No
United Rock Products	Clark	NV	692.8 E 4,030.1 N	666.8	N/A	N/A	Yes	No	No	No	No	No
Great Start Cement	Clark	NV	692.3 E 4,030.7 N	347.5	N/A	N/A	Yes	No	No	No	No	No
Pinnacle West Silverhawk	Clark	NV	682.9 E 4031.1 N	195.1	38.9	272.7	No	No	No	No	No	No
Reasonably Foreseeable Actions												
Calpine Moapa	Clark	NV	N/A	193.0	17.4	352.1	Yes	Yes	Yes	No	No	No
PG&E	Clark	NV	713.4 E 4,062.8 N	417.1	333.7	200.2	Yes	Yes	Yes	Yes	No	No

*Universal Transverse Mercator.

The modeling of the Toquop facility itself demonstrated Toquop carbon monoxide (CO) impacts to be less than PSD modeling significance levels. Because CO was so far below the allowable PSD increment, cumulative modeling of CO impacts was not performed.

As shown in Table 4-18, most of the sources were screened out either because they were located at distances from the Proposed Action that exceeded the SIA or because emissions from those sources were less than the results of the "20D" formula. Only the Reid Gardner power plant, the Royal Cement plant, and the proposed PG&E power plant had emissions of sufficient magnitude and proximity to be included in the analysis. Note that some portions of the Reid Gardner plant were constructed prior to the major source baseline data; therefore, only portions of the Reid Gardner plant are included in the increment analysis whereas the entire plant is considered in the NAAQS analysis described below.

Of specific interest in this analysis, the Duke (Moapa Energy Facility), Mirant (Apex Generating Station), and Pinnacle West (Silverhawk Power Station) projects are located outside of the Toquop SIA. The Calpine (Moapa / Paiute Energy Center) project is located within the SIA, but was screened out on low emission rates based on the "20D" formula. The PG&E (Meadow Valley Generating Plant) project is located within the SIA, but was screened out on low emission rates based on the "20D" formula for all pollutants except PM10. The PG&E PM10 emissions were considered in the modeling analysis, but did not alter the highest reasonable but conservative increment consumption results.

Table 4-19 presents the results of the increment analysis. Predicted cumulative impacts for all pollutants, resulting from the Proposed Action plus surrounding sources, were less than the allowable PSD increment.

National Ambient Air Quality Standards Evaluation. The NAAQS analysis includes all nearby emissions sources, whether or not they were constructed before baseline dates. It includes background pollutant concentrations.

The evaluation procedure is similar to that of the increment analysis. The first primary difference is that all known emission sources, whether constructed after PSD major or minor source baseline dates or not, are considered in the analysis. As with the increment analysis, some sources can be screened out based on the "20D" formula of distance and emission rate. The other primary difference is that natural background concentrations are also to be considered.

Table 4-20 presents the sources included in the NAAQS analysis for the Proposed Action. This list was developed based on correspondence with NDEP BAQ, Clark County Health Department, Arizona Department of Environmental Quality, and the Utah Department of Environmental Quality. All sources except for the Reid Gardner power plant, Royal Cement, and the proposed PG&E power plant were screened out based on distance or emission rates. The proposed Beaver Dam combined cycle power plant project near Littlefield, Arizona was also identified as a reasonably foreseeable action based on its listing on the California Energy Commission web site; however, because no information was available on the

TABLE 4-19
Increment Analysis for Predicted Cumulative Impacts for the Proposed Action, Alternative 1, Alternative 2, and Alternative 3

Pollutant	Averaging Period	Maximum Predicted Cumulative Impacts[a, b] (mg/m^3)	Toquop Energy Project Impact at Location of Maximum Impact[b] (ISC dispersion model)	PSD Class II Increment (mg/m^3)
Nitrogen dioxide (NO_2)	Annual	21.24	0.1	25
Carbon monoxide (CO)	8-hour	N/A	N/A	N/A
	1-hour	N/A	N/A	N/A
Sulfur dioxide (SO_2)	Annual	2.47	2.47	20
	24-hour	9.96	9.96	91
	3-hour	22.77	22.77	512
PM10	Annual	5.43	5.43	17
	24-hour	21.8	21.8	30

[a]Maximum predicted impacts reflect combined impacts from proposed facility and emission inventory sources.
[b]Alternative 2 and 3 impacts not specifically quantified. However, for reasons discussed in text, cumulative impacts on increment for Alternative 2 could possibly exceed those presented here, but cumulative impact for Alternative 3 is anticipated to be within 1 percent of values presented here.

magnitude of air emissions, it was not included in this analysis.

Of specific interest in this analysis, the Duke (Moapa Energy Facility), Mirant (Apex Generating Station), and Pinnacle West (Silverhawk Power Station) projects are located outside of the Toquop SIA. The Calpine (Moapa/Paiute Energy Center) project is located within the SIA, but was screened out on low emission rates based on the "20D" formula. The PG&E (Meadow Valley Generating Plant) project is located within the SIA, but was screened out on low emission rates based on the "20D" formula for all pollutants except PM10. The PG&E PM10 emissions were considered in the modeling analysis, and did increase the maximum predicted NAAQS impacts over those reported in the PSD permit application; the results provided in Table 4-21 include predicted impacts from the PG&E project.

Because of the remote location of the plant site for the Proposed Action, and the lack of major metropolitan areas in the vicinity, NDEP recommended that the background concentrations of NO_x and SO_2 be assumed as zero for the PSD permit analysis. Consistent with NDEP's recommendation, this analysis assumes that background concentrations for these pollutants will be small compared to the localized impacts of the Toquop project. Thus, it is assumed that any ambient concentrations of NO_x or SO_2 in the area would be from the Proposed Action or other emission sources already included in the NAAQS analysis.

For PM10, NDEP BAQ estimates background concentration to be 10.2 $\mu g/m^3$ for a 24-hour averaging period and 9 $\mu g/m^3$ for an annual averaging period. No ambient air monitors exist in the area; these values were estimated by NDEP BAQ based on data from other sites with similar climate and soils, and represent PM10 caused by windblown dust in a hot and arid region.

TABLE 4-20
NAAQS Regional Sources

Source	Location			Emissions (tons/year)			Within SIA			Required for Analysis Per "20D" Formula		
	County	State	UTMs* (Km)	PM10	SO_2	NO_x	PM10	SO_2	NO_x	PM10	SO_2	NO_x
Permitted Sources												
Chemical Lime Company	Clark	NV	687.4 E 4,025.4 N	2451.7	1661.3	1874.0	No	No	No	No	No	No
Las Vegas Paving	Clark	NV	687.4 E 4,025.5 N	0.9	77.2	2.2	No	No	No	No	No	No
Granite Construction	Clark	NV	687.4 E 4,025.8 N	47.7		37.5	No	No	No	No	No	No
Georgia Pacific	Clark	NV	686.8 E 4,023.9 N	268.1	1.6	49.7	No	No	No	No	No	No
Harry Allen	Clark	NV	688.2 E 4,033.3 N	130.7	1.0	300.7	No	No	No	No	No	No
Nevada Cogeneration Associates	Clark	NV	690.9 N 4,029.2 N	1.9		132.8	No	No	No	No	No	No
Duke	Clark	NV	686.4 4,028.5	495.3	83.6	505.4	No	No	No	No	No	No
Mirant Las Vegas	Clark	NV	682.9 E 4,032.1 N	223.0	18.6	379.6	No	No	No	No	No	No
Reliant Energy Arrow Canyon	Clark	NV	690.8 E 4,029.3 N	179.5		189.1	No	No	No	No	No	No
Apex Waste Management Center	Clark	NV	690.0 E 4,026.1 N	1034.8	0.0	0.0	No	No	No	No	No	No
Highway 36	Clark	NV	697.0 E 4,039.5 N	14.7	0.0	0.0	Yes	No	No	No	No	No
Royal Cement	Clark	NV	722.2 E 4,058.5 N	N/A	N/A	2004.4	Yes	Yes	Yes	No	No	Yes
Simplot Silica Products	Clark	NV	729.2 E 4,044.4 N	N/A	N/A	219.0	Yes	Yes	Yes	No	No	No

TABLE 4-20
NAAQS Regional Sources

Source	Location			Emissions (tons/year)			Within SIA			Required for Analysis Per "20D" Formula		
	County	State	UTMs* (Km)	PM10	SO_2	NO_x	PM10	SO_2	NO_x	PM10	SO_2	NO_x
Leavitt Read Mix	Clark	NV	728.4 E 4,047.0 N	N/A	N/A	222.5	Yes	Yes	Yes	No	No	No
Reid Gardner	Clark	NV	711.3 E 4,059.3 N	533.3	12587.3	18538.5	Yes	Yes	Yes	Yes	Yes	Yes
Bear River Contractors	Washington	UT	N/A	4.9	0.3	3.8	Yes	Yes	Yes	No	No	No
Interstate Rock Products	Washington	UT	N/A	9.2	0.3	3.9	Yes	Yes	Yes	No	No	No
Western Rock Products Corporation	Washington	UT	N/A	2.3	1.6	17.0	Yes	Yes	Yes	No	No	No
St. George City Power	Washington	UT	N/A	1.8	1.6	24.9	Yes	Yes	Yes	No	No	No
Genpak Corporation	Iron	UT	N/A				Yes	Yes	Yes	No	No	No
O'Sullivan Industries Incorporated	Iron	UT	N/A	2.1	0.0	0.8	Yes	Yes	Yes	No	No	No
Western Rock Products Corporation	Iron	UT	N/A	6.3	5.0	24.7	Yes	Yes	Yes	No	No	No
United Rock Products	Clark	NV	692.8 E 4,030.1 N	666.8	N/A	N/A	Yes	No	No	No	No	No
Great Start Cement	Clark	NV	692.3 E 4,030.7 N	347.5	N/A	N/A	Yes	No	No	No	No	No
Pinnacle West Sliverhawk	Clark	NV	682.9 E 4031.1 N	195.1	38.9	272.7	No	No	No	No	No	No
Reasonably Foreseeable Actions												
Calpine Moapa	Clark	NV	N/A	193.0	17.4	352.1	Yes	Yes	Yes	No	No	No
PG&E	Clark	NV	713.4 E 4,062.8 N	0.0	0.0	0.0	Yes	Yes	Yes	Yes	No	No

*Universal Transverse Mercator.

TABLE 4-21
NAAQS Analysis for Predicted Cumulative Impacts for the Proposed Action, Alternative 1, Alternative 2, and Alternative 3

Pollutant	Averaging Period	Maximum Predicted Cumulative Impacts[a, b] ($\mu g/m^3$)	Toquop Energy Project Impact at Location of Maximum Impact[b] ($\mu g/m^3$)	Background ($\mu g/m^3$)	Maximum Predicted Impact with Background[b]	NAAQS
Nitrogen dioxide (NO_2)	Annual	93.03	0.09	0	93.03	100
Carbon monoxide (CO)	8-hour	N/A[c]	N/A[c]	0	N/A	10
	1-hour	N/A[c]	N/A[c]	0	N/A	40
Sulfur dioxide (SO_2)	Annual	54.09	0.041	0	54.09	80
	24-hour	216.36	0.164	0	216.36	365
	3-hour	486.81	0.369	0	486.81	1,300
PM10	Annual	14.8	0.084	9	23.8	50
	24-hour	59.1	0.344	10.2	69.3	150

[a] Maximum predicted impacts reflect combined impacts from proposed facility and emission inventory sources.
[b] Alternative 2 and Alternative 3 impacts not specifically quantified. However, for reasons discussed in text, only trivial differences in cumulative impacts are anticipated for both Alternative 2 and Alternative 3 versus values presented here.
[c] Cumulative CO impacts not analyzed, as all Toquop CO impacts were less than modeling significance levels.

The modeling of the Toquop facility itself demonstrated Toquop CO impacts to be less than PSD modeling significance levels. Because CO was so far below the allowable NAAQS, cumulative modeling of CO impacts was not performed.

Table 4-21 presents the results of the NAAQS analysis. The estimated total ambient impact of the Proposed Action and all other emission sources in the vicinity, combined with background concentrations, are presented and compared to the NAAQS. For all three pollutants, under all averaging times, the reasonable but conservative impact is shown to be less than the NAAQS.

For each pollutant, the Proposed Action contribution to impacts for the receptors with the highest estimated impacts would be less than 1 percent of the total. Furthermore, the maximum estimated impact caused by the Proposed Action alone would be a small fraction of the maximum estimated cumulative impact.

It should be noted that, based on lack of complete data, relatively conservative assumptions were used for dispersion modeling of the surrounding sources. Data on stack parameters and pollutant emission rates were available from NDEP and Clark County, but complete data needed for accurate analysis of building downwash as affected by building dimensions were not available. Furthermore, the surrounding sources were modeled using the same hypothetical, worst-case meteorological data set as used for the Proposed Action, although actual meteorological data may have been available for the vicinity of the

sources. The analysis presented is, therefore, conservative and most likely overestimates ambient impacts.

Land Act and Residential Development Evaluation. Cumulative impact of the air emissions from the Toquop Power Project and the residential development associated with the Lincoln County Land Act, Mesquite Land Act, or Coyote Springs Development Project are not expected to create adverse consequences for human health or the environment. Neither the Toquop project nor residential communities created by the land acts or the development project are expected to individually create adverse consequences. Based on location and prevailing winds it is unlikely that Toquop and any of the development projects could create ambient impacts in the same area at the same time.

Information required to quantitatively estimate impacts of the land acts or the Coyote Springs Development Project is not available, and any estimate of cumulative impacts would be highly speculative. However, emissions from space heating of residences constructed in these areas are expected to be very small, because of the warm climate. Anticipated emissions would be created primarily by automobile traffic from commuters and by construction-related dust and diesel exhaust. Ambient impacts of these emissions are anticipated to be far below the National Ambient Air Quality Standards.

As graphically illustrated in the air permit application for the project, the results of the reasonable but conservative air dispersion modeling of the Toquop project predicted that the highest ambient impacts, while relatively minor, would occur in the elevated terrain west (East Mormon Mountains) and north (Jumbled Mountain) of the facility. The Lincoln County Land Act and Mesquite Land Act are located southeast, at distances of 5 to 12 miles, of the facility. Therefore, the only time that emissions related to the land acts could appreciably impact ambient conditions is during periods of southeast winds. In the Toquop area, southeast winds are infrequent and are of low velocity. The Coyote Springs Development Project would be located approximately 50 miles west of Toquop and 32 miles west of the East Mormon Mountains, and, furthermore, is topographically separated from the East Mormon Mountains by the Mormon Mountains. Based on the number of vehicles expected to result from the land acts, it is extremely unlikely that either criteria pollutant or hazardous air pollutant emissions from the automobile traffic or residential construction would result in measurable impacts in the elevated terrain west and north of the Toquop facility.

Alternative 1. All cumulative impacts from Alternative 1 plus surrounding facilities would be equal in all respects to the cumulative impacts resulting from the Proposed Action plus surrounding facilities.

Alternative 2

Construction. All cumulative impacts from Alternative 2 plus surrounding facilities during the construction phase would be the same as the cumulative impacts resulting from the Proposed Action plus surrounding facilities.

Operation

PSD Increment Evaluation. Most of the sources included in the increment analysis for the Proposed Action were in the Apex Valley or Moapa areas; the plant site for

Alternative 2 would be approximately 11 miles farther away than the Proposed Action from most of these sources.

For SO_2 and PM10, the Proposed Action impacts at the receptor demonstrating the maximum increment consumption were equal to the total increment consumption (that is, at the point of the modeled maximum increment consumption, the contribution from the surrounding sources was nearly zero; thus the Proposed Action was the sole cause of the increment consumption at that point). Given the further distance from the Apex and Moapa areas to both the Alternative 2 plant site and Jumbled Mountain, it is highly unlikely that any of the listed sources could increase PM10 or SO_2 impact to increment consumption. As discussed above, it is assumed that the maximum PM10 and SO_2 impacts from Alternative 2 would be equal to or greater than those for the Proposed Action. The worst-case calculated 24-hour impact for PM10 from Alternative 2 would be 73 percent of the allowable PSD increment. Given the possible higher impacts from Alternative 2, it is possible that Alternative 2 would cause a violation the 24-hour PM10 PSD increment.

For NO_x, the highest predicted impact from the Proposed Action was 12.6 $\mu g/m^3$. The highest calculated increment consumption was 21.2 $\mu g/m^3$; the Proposed Action impact at this receptor was insignificant (0.1 $\mu g/m^3$). The allowable PSD increment for annual NO_x is 25 $\mu g/m^3$. Given the large NO_x emissions of the Reid Gardner project, it is unlikely that the Reid Gardner project would be eliminated for Alternative 2 based on the "20D" formula described for the Proposed Action. Therefore, it is assumed that the location of the receptor of highest modeled impact would still be the same, unless the Alternative 2 impacts on Jumbled Mountain would exceed 21 $\mu g/m^3$, and that the Alternative 2 contribution at that point would still be minimal. It is highly unlikely that the modeled increment consumption would be less than 21 $\mu g/m^3$. However, in the case of a modeled high impact on Jumbled Mountain it is possible that increment consumption could be higher for Alternative 2 than for the Proposed Action, and that the allowable increment would then be exceeded.

Again, the only two reasonably foreseeable actions potentially impacting air quality in the vicinity of Alternative 2 for which data are available are the Calpine Moapa and PG&E NEG projects. Both would be located farther from Alternative 2 than the Proposed Action. It is, therefore, assumed that neither project would affect the predicted worst-case increment consumption.

NAAQS Evaluation. Most of the sources included in the NAAQS analysis for the Proposed Action were in the Apex Valley or Moapa areas, so the plant site for Alternative 2 would be approximately 11 miles farther away than the Proposed Action from most of these sources. It is assumed, therefore, that, as with the Proposed Action, all but the Reid Gardner project would be found to be insignificant in an NAAQS analysis of Alternative 2.

For the worst-case impacts predicted under the Proposed Action analysis, the Proposed Action contribution to the worst case for each pollutant and each averaging time is less than 1 percent of the total. Furthermore, the worst-case impact of the Proposed Action at any other location would also be a small fraction of the NAAQS for all pollutants.

For example, for annual NO_x, the worst-case cumulative impact of the Proposed Action plus all other sources in the vicinity was estimated to be 93.0 $\mu g/m^3$. This predicted impact occurred at a receptor in the Moapa vicinity and was based primarily on Reid Gardner emissions. The Proposed Action contribution at that receptor was 0.09 $\mu g/m^3$, or 0.1 percent of the total. The predicted worst-case impact of the Proposed Action at any other location was 12.6 $\mu g/m^3$; this location was between the proposed source location and the East Mormon Mountains.

For Alternative 2, therefore, it is highly unlikely that a NAAQS evaluation would predict any impact different from that for the Proposed Action. The Proposed Action contributions to the total were small, and by relocating the plant site farther away from the sources that created the impact, it is anticipated that the change to the worst-case impact would be trivial. Most likely, all predicted impacts would remain below the NAAQS, and the worst-case impacts would not change by more than a few percent.

Again, the only two reasonable foreseeable actions that could affect the NAAQS analysis for Alternative 2 for which data are available are the Calpine Moapa and PG&E NEG projects. Both projects would be farther from Alternative 2 than the Proposed Action. As with the Proposed Action cumulative analysis, the inclusion of these projects would not affect an Alternative 2 NAAQS analysis for NO_x or SO_2, and would add a small contribution to a PM10 NAAQS analysis. It is therefore assumed that the predicted cumulative worst-case impacts of Alternative 2, all sources in the vicinity with emission permits or submitted permit applications, plus all reasonably foreseeable actions, added to natural background concentrations, would be well below the allowable standards for all pollutants.

Alternative 3. Except for the possible trivial differences in near-field impacts created by Alternative 3 itself, all cumulative impacts from Alternative 3 plus surrounding facilities would be the same as the cumulative impacts resulting from the Proposed Action plus surrounding facilities.

4.18.4.4.2 Noise

Proposed Action. The Kern River 2003 Expansion Project (see *Section 4.18.2, Description of Interrelated Projects*), which would cross the Toquop parcel and is expected to be constructed in November 2002 through January 2003 in the project area, would be the closest to the Toquop Project, both geographically and in time. However, the construction periods of the Kern Project and the Proposed Action would be relatively short-term and would not overlap. In addition, there are no sensitive receptors near the southern Toquop parcel. Therefore, the two projects would result in no cumulative impacts on ambient noise levels.

Because no impacts on ambient noise levels are expected from implementation of the Proposed Action in the Toquop area, the project would not contribute to a cumulative noise impact in the Toquop area. Because no impact on ambient noise levels would occur at the Pah Rah parcel, the Proposed Action would not contribute to a cumulative noise impact in that area.

Alternatives 1, 2, and 3. Because no impacts on ambient noise levels are expected from implementation of Alternatives 1 and 2 (water-cooled facility) or Alternative 3 (air-cooled

facility) in the Toquop area, these alternatives would not contribute to a cumulative noise impact in the Toquop area. Because no impact on ambient noise levels would occur at the Pah Rah parcel, these alternatives would not contribute to a cumulative noise impact in that area.

4.18.4.5 Visual Resources

4.18.4.5.1 Proposed Action.

Cumulative impacts on visual resources could occur where project facilities or construction activities occupy the same field of view as other built facilities and further degrade the view. A cumulative impact also could occur if a viewer's perception is that the general visual quality of an area is diminished by the presence of structures or construction effects (such as disturbed vegetation), even if the new structures are not within the same field of view as the existing structures.

For the Toquop area, the proposed power plant (aboveground features only) and other future developments described in *Section 4.18.2, Description of Interrelated Projects*, would alter the landscape character of the project site and regional landscape. Specifically, the Kern River 2003 Expansion Project, which would cross the Toquop parcel and is expected to be constructed in November 2002 through January 2003 in the project area, would be the closest to the Toquop Project, both geographically and in time. The EIS/EIR for the Kern Project identified mitigation for impacts on visual resources. The identified mitigation would reduce impacts to less-than-significant levels. Although the landscape would be altered with these future developments, implementation of the Proposed Action and the other projects would not result in cumulative impacts on visual resources in the Toquop area. This is because views of the southern project site from the surrounding area are limited, views from I-15 are obstructed, no sensitive receptors are in the immediate vicinity, and the adjacent lands are not high-use recreation areas.

None of the other projects identified in *Section 4.18.2, Description of Interrelated Projects*, would result in cumulative impacts with the Proposed Action.

For the Pah Rah area, because no development would occur at the Pah Rah parcel from implementing the Proposed Action, the Proposed Action would not contribute to cumulative impacts on visual resources in that area.

4.18.4.5.2 Alternative 1. Cumulative impacts for Alternative 1 would be similar to those described for the Proposed Action. An easterly water pipeline alignment associated with this alternative (as opposed to a westerly alignment with the Proposed Action) would not result in a substantive difference in the contribution to cumulative visual impacts by this alternative, when compared to the Proposed Action. This is because the pipeline is an underground project feature, resulting in short-term impacts to the landscape occurring during the project construction period, and minimal, if any, long-term changes to the landscape expected.

For the Pah Rah area, because no development would occur at the Pah Rah parcel from implementing Alternative 1, it would not contribute to cumulative impacts on visual resources in that area.

4.18.4.5.3 Alternative 2. Landscape alterations associated with Alternative 2 would be similar in type, but of greater magnitude, than those described for the Proposed Action. This is because this

alternative involves development of the power plant at the northern site rather than the southern site (as was the case for the Proposed Action). That plant site location requires other necessary changes to the landscape including a longer access road than was needed for the Proposed Action, an easterly gas pipeline alignment (not needed for the Proposed Action), and an easterly overhead electrical transmission line alignment (also not needed for the Proposed Action). A water pipeline (that was needed for the Proposed Action) would not be needed as part of this alternative.

Although the landscape would be altered by implementation of Alternative 2 in combination with the Kern River 2003 Expansion Project, their implementation would not result in cumulative impacts on visual resources in the Toquop area. This is because views of the northern project site from the surrounding area are limited, views from I-15 are obstructed, no sensitive receptors are in the immediate vicinity, and the adjacent lands are not high-use recreation areas.

For the Pah Rah area, because no development would occur at the Pah Rah parcel from implementing Alternative 2, it would not contribute to cumulative impacts on visual resources in that area.

4.18.4.5.4 Alternative 3. The differences in Alternative 3 design, when compared to the Proposed Action design, would result in landscape changes that are similar to, but not the same as the Proposed Action. The primary differences in landscape changes with this alternative, when compared with the Proposed Action, are the air-cooled condensers because they are the power plant feature having the greatest mass. Partially offsetting that greater visual change (due to the larger structures) are the fewer number of wells that would be required and the smaller evaporation and equalization ponds that would be needed for this alternative.

Although this alternative design is different from that of the Proposed Action and Alternatives 1 and 2, its overall visual impact to the landscape from its physical presence would be similar to that of the Proposed Action.

Although the landscape would be altered by implementation of Alternative 3 in combination with the Kern River 2003 Expansion Project, their implementation would not result in cumulative impacts on visual resources in the Toquop area. This is because views of the southern project site from the surrounding area are limited, views from I-15 are obstructed, no sensitive receptors are in the immediate vicinity, and the adjacent lands are not high-use recreation areas.

Because no development would occur at the Pah Rah parcel from implementing this alternative, there would be no effect on visual resources.

4.18.4.6 Wilderness Study Areas, Areas of Critical Environmental Concern, and Wild and Scenic Rivers

4.18.4.6.1 Proposed Action. Implementation of the Proposed Action would not contribute to cumulative impacts on Wilderness Areas, WSAs, or Wild and Scenic Rivers in the Lincoln County (Toquop parcel) or Washoe County (Pah Rah parcel) areas because no project features would be located in those areas.

Other than the 222 acres disturbed during construction of the access road passing through the Mormon Mesa ACEC

(65 acres net new impact following reclamation), there would be no other known effects on ACECs from the Toquop Energy Project or the nine interrelated projects (except for the Kern River Gas Pipeline) (see *Section 4.18.2, Description of Interrelated Projects*). The potential for cumulative effects on ACECs from other power plants appears to be very low to absent.

The Mormon Mesa ACEC would also be affected by the proposed crossing of the Kern River Expansion Project. The Kern Project is the closest project to the Toquop Project, both geographically and in time.

The EIS/EIR for the Kern Project indicated that the proposed pipeline would be located adjacent to the existing Kern pipeline within a designated utility corridor for the entire crossing of the ACEC and that impacts would be less than significant.

The Pah Rah parcel is not within a designated ACEC. Therefore, that project element (the land exchange) would not contribute to cumulative impacts on ACECs in the Washoe County area.

4.18.4.6.2 Alternatives 1, 2, and 3.

Cumulative impacts for Alternatives 1, 2, and 3 would be the same as those described for the Proposed Action.

4.18.4.7 Cultural and Historical Resources and Native American Religious Concerns

4.18.4.7.1 Proposed Action.

Cumulative impacts would be minimal for historic properties in the Proposed Action, both in combination with other neighboring projects (see *Section 4.18.2, Description of Interrelated Projects*) or over the 42-year estimated life span of the power plant. Review of previous cultural resources projects and records for a roughly 340-square-mile area encompassing the Proposed Action and alternatives (1-mile radius) was conducted to provide a research and cultural historical context for the project. While numerous surveys for linear projects have been conducted in this area, few resulted in cultural resources finds. Site counts are higher in the neighboring East Mormon Mountains, and extensive and regionally important archaeological remains are located in proximity to the Virgin River; however, sites in the project vicinity are infrequent and do not contain data sufficient to inform regionally important research questions about prehistoric or historical lifeways. The region in general possesses low cultural resources value. No future activities related to the Proposed Action, particularly increased vehicular and human traffic, would have cumulative effects on important cultural resources, although sites ineligible for the NRHP may be destroyed.

BLM has received various information from Indian tribes related to the Proposed Action. Some have expressed no concerns for the project, others have expressed concern for preservation of archaeological resources, and some have expressed concern for a property of traditional cultural and religious importance known as the Salt Song Trail. BLM has requested more specific information as to a location of the trail and project-related effects on religious practitioners, but has received no additional data. Hence, no analysis of cumulative impacts is possible. At least one tribe has expressed to BLM that this trail does not extend into the area of Proposed Action.

There are no project-related effects on the Pah Rah parcel, and thus, no cumulative effects.

4.18.4.7.2 Alternatives 1, 2, and 3.

Cumulative impacts for Alternatives 1, 2, and 3 would be the same as those described for the Proposed Action.

4.18.4.8 Socioeconomics

4.18.4.8.1 Proposed Action. Both the Proposed Action and the nine interrelated projects planned in the Clark/Lincoln County region identified in *Section 4.18.2, Description of Interrelated Projects* would generate short-term and long-term employment, income, and tax base opportunities. These projects would also result in additional demand on police protection, fire protection, and emergency medical services.

Depending on the number of laborers required, the construction time frames of these projects, and the types of skills required by the laborers to construct these projects, it is possible that development in the Clark/Lincoln County area may require importing labor from outside the two-county area if a shortage of skilled laborers occurs. If laborers (construction or operation) are imported from outside the two-county area and they relocate to the Clark/Lincoln County area, then housing and associated infrastructure would be required for those workers and their families.

Employment opportunities for the workers (construction laborers and operations staff) would positively contribute to their personal earnings and to the revenues of the two counties. In addition, as more land is developed, more tax revenues would be generated for the Clark/Lincoln County area.

Because each project would likely generate construction jobs that would be temporary, the combined projects would not likely cause a change in the long-term unemployment rate of the region. However, additional employment opportunities in the Clark and Lincoln County areas are a benefit to the individuals employed and to the local economy, even if only for a short-term period.

Therefore, the Proposed Action, when combined with the other projects planned in the Clark/Lincoln County area, would contribute to cumulative socioeconomic impacts (both beneficial and adverse) in the two-county region. It should be noted, however, that the project's incremental addition to these cumulative impacts is minimal.

Because the proposed land exchange in the Pah Rah area would not result in impacts on Washoe County population, employment, unemployment, earnings and income, tax receipts, housing, and community infrastructure, it would not contribute to cumulative social and economic impacts in Washoe County.

4.18.4.8.2 Alternative 1. Alternative 1, when combined with the other planned projects in the two-county region, would contribute to cumulative socioeconomic impacts in the Clark/Lincoln County area, the same as those described for the Proposed Action. In addition, the contribution to cumulative impacts on the economy and community infrastructure from implementation of Alternative 1 would be the same as those described for the Proposed Action.

Because the proposed land exchange in the Pah Rah area would not result in impacts on Washoe County population, employment, unemployment, earnings and

income, tax receipts, housing, and community infrastructure, it would not contribute to cumulative social and economic impacts in Washoe County.

4.18.4.8.3 Alternative 2. Alternative 2, when combined with the other planned projects in the two-county region, would contribute to cumulative socioeconomic impacts in the Clark/Lincoln County area, similar to what was described for the Proposed Action. In addition, the contribution to cumulative impacts on the economy and community infrastructure from implementation of Alternative 2 would be similar to that described for the Proposed Action. Construction costs would be approximately 6 percent higher.

Because the proposed land exchange in the Pah Rah area would not result in impacts on Washoe County population, employment, unemployment, earnings and income, tax receipts, housing, and community infrastructure, it would not contribute to cumulative social and economic impacts in Washoe County.

4.18.4.8.4 Alternative 3. Alternative 3, when combined with the other planned projects in the two-county region, would contribute to cumulative socioeconomic impacts in the Clark/Lincoln County area, similar to those described for the Proposed Action. In addition, the contribution to cumulative impacts on the economy and community infrastructure from implementation of Alternative 3 would be similar to that described for the Proposed Action. Construction costs would be approximately 3 percent higher.

Because the proposed land exchange in the Pah Rah area would not result in impacts on Washoe County population, employment, unemployment, earnings and income, tax receipts, housing, and community infrastructure, it would not contribute to cumulative social and economic impacts in Washoe County.

4.18.4.9 Transportation

4.18.4.9.1 Proposed Action. As growth occurs in the southern Nevada region, additional vehicle trips will be generated along major freeways and local roadways. This project was assessed in light of other interrelated projects identified in *Section 4.18.2, Description of Interrelated Projects.*

The Kern River 2003 Expansion Project, which would cross the Toquop parcel and is expected to be constructed in November 2002 through January 2003 in the project area, would be the closest to the Toquop Project geographically but it would not overlap in time. The EIS/EIR for the Kern Project identified traffic congestion and roadside parking hazards as potential impacts during that project's construction. The transportation impacts were mitigated by measures that included requiring construction workers to be transported to the project site via buses provided by the contractor. The EIS/EIR indicated that the mitigation would reduce the impacts to less-than-significant levels.

There is no potential for a cumulative temporary impact on traffic flow at the East Mesa Interchange offramp during the projects' construction periods because the Kern Project and the Proposed Action would not be constructed concurrently. Construction of the Proposed Action is anticipated to begin between mid-2003 and the end of 2004, so no overlap between these two projects would occur.

As discussed above, the increased traffic from construction of the Proposed Action would be temporary and the increased

traffic from project operation would be very minor. Therefore, implementation of the Proposed Action would not contribute to cumulative impacts on traffic on I-15.

4.18.4.10 Alternatives 1, 2, and 3

There would be no cumulative impacts for Alternatives 1, 2, and 3 for the same reasons as described for the Proposed Action.

4.19 Unavoidable Adverse Impacts

Unavoidable adverse impacts are residual impacts after implementation of mitigation measures. Those unavoidable adverse impacts associated with the Toquop Energy Project and the Pah Rah/Toquop land exchange that would remain after mitigation are summarized in the following text.

4.19.1 Soils and Geology

Some biological soil crusts occur at the southern and possibly the northern power plant sites, along the western and eastern water pipeline corridors, and along the utility corridor. Some may be lost because of project construction.

4.19.2 Surface Water Hydrology

No unavoidable adverse impacts on surface water hydrology or quality would occur.

4.19.3 Ground Water Resources

The Proposed Action and Alternatives 1, 2, and 3 would result in localized temporary ground water level declines and ground water consumption in the Tule Desert Hydrographic Region.

4.19.4 Biological Resources

The Proposed Action and Alternatives 1, 2, and 3 would disturb desert tortoise habitat, habitat for other wildlife, and vegetative cover. Disturbed habitat would total 449 acres under the Proposed Action, 451 acres under Alternative 1, 581 acres under Alternative 2, and 417 acres under Alternative 3. On average, these acreages are estimated to provide habitat for 8 desert tortoises under the Proposed Action and Alternative 1, 10 desert tortoises under Alternative 2,and 7 desert tortoises under Alternative 3. Following reclamation, net new long-term disturbances would total 182 acres under the Proposed Action and Alternative 1, 237 acres under Alternative 2, and 150 acres under Alternative 3. On average, these acreages are estimated to provide habitat for three desert tortoises under the Proposed Action, Alternative 1, and Alternative 3, and four desert tortoises, under Alternative 2. Some residual unavoidable adverse effects on wildlife would potentially occur—including mortalities of unprotected reptile and small mammal species and habitat destruction during construction activities. No unavoidable adverse impacts on wetlands/riparian zones, floodplains, ephemeral washes, fisheries resources, or wild horses and burros would occur.

4.19.5 Air Quality and Noise

No unavoidable adverse impacts on air quality and noise would occur.

4.19.6 Visual Resources

Unavoidable adverse impacts would include the presence of construction vehicles, equipment, personnel, and activities, and associated fugitive dust

emissions during construction. Constructed project features would comply with the BLM's designated VRM Class III and Class IV of the Toquop area.

4.19.7 Recreation Resources

No unavoidable adverse impacts on recreation resources would occur.

4.19.8 Land Use, Prime or Unique Farmlands, and Rangelands

Under Alternative 2, the northern Toquop parcel would remove 640 acres of rangeland from the Garden Springs Allotment that is currently being managed for livestock use. This could result in a reduction of permitted grazing use of 46 AUMs.

4.19.9 Wilderness Study Areas, Areas of Critical Environmental Concern, and Wild and Scenic Rivers

A net construction disturbance of 222 acres of habitat within the Mormon Mesa ACEC (a desert tortoise Special Management Area) from staging, widening, straightening, and paving the 14.4-mile-long access road from I-15 to the southern Toquop parcel would occur. Following reclamation, the net new long-term disturbance would be 65 acres.

4.19.10 Wastes, Hazardous and Solid

No unavoidable adverse impacts from hazardous or solid wastes would occur.

4.19.11 Cultural and Historical Resources and Native American Religious Concerns

No known direct unavoidable adverse impacts on cultural or historical resources would occur. Potential indirect unavoidable adverse impacts on these resources could result from increased human activity in the area and possibly increased OHV use.

4.19.12 Indian Trust Assets

No unavoidable adverse impacts on Indian Trust assets would occur.

4.19.13 Environmental Justice

No unavoidable adverse impacts on minority or low-income populations would occur.

4.19.14 Paleontological Resources

No unavoidable adverse impacts on paleontological resources would occur.

4.19.15 Socioeconomics

No unavoidable adverse impacts on economic variables or community infrastructure in the Clark/Lincoln County area would result from project construction or operation.

4.19.16 Transportation

Unavoidable adverse impacts on transportation would include traffic increases on I-15 and at the East Mesa Interchange during project construction.

4.20 Relationship Between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

4.20.1 Introduction

For purposes of this discussion, "short-term" is defined as the approximate 2-year period during project construction and shortly thereafter during initial project operation. "Long-term" is defined as the entire operational life of the Proposed Action, Alternative 1, Alternative 2, or Alternative 3 which is estimated to be approximately 40 years. After this time the Toquop Energy Project would be decommissioned. Implementation of the Proposed Action, Alternative 1, Alternative 2, or Alternative 3 would necessitate uses of the environment whose effects would be apparent during project construction and operation, and which would result in both beneficial and adverse effects on long-term productivity.

Potential impacts associated with implementation of the Proposed Action, Alternative 1, Alternative 2, or Alternative 3 are discussed in *Sections 4.1* through *4.17* of this document. *Section 4.18* discusses cumulative impacts associated with the Proposed Action, Alternative 1, Alternative 2, or Alternative 3 when combined with proposed and/or anticipated projects. Unavoidable adverse impacts resulting from project construction and operation that would remain after implementation of mitigation measures are described in *Section 4.19* of this document. Many of the potential impacts described in *Sections 4.1* through *4.17* are either temporary in nature, not substantial in magnitude, or they would be mitigated to prevent the occurrence of unavoidable adverse effects. These use-related effects are briefly summarized in the following text, as are the effects on long-term productivity.

4.20.2 Short-Term Uses

Most impacts on environmental resources would initially result from construction activities and be temporary in duration, but others would persist for the operational life of the project. The range of these effects includes:

- Use of local soils, disturbance and some loss of biological soil crusts, and commitment of habitat during project construction and operation
- Increased erosion potential until disturbed areas are reclaimed
- Use of ground water during project construction and operation
- Disturbance and/or loss of habitat and/or vegetative cover used by desert tortoises, other species of wildlife, wild horses, recreationists, and livestock

Lands that would be disturbed and/or included in construction rights-of-way total approximately 449 acres under the Proposed Action, 451 acres under Alternative 1, 581 acres under Alternative 2, and 417 acres under Alternative 3. All of these lands are classified as desert tortoise habitat and, on average, would provide habitat for approximately 8 desert tortoises under the Proposed Action and Alternative 1 10 desert tortoises under Alternative 2, and 7 desert tortoises under Alternative 3. Following reclamation, net new long-term

disturbances would total 182 acres under the Proposed Action and Alternative 1 (habitat for 3 desert tortoises), 237 acres under Alternative 2 (habitat for 4 desert tortoises), and 150 acres under Alternative 3 (habitat for 3 desert tortoises). A net construction disturbance of 222 acres would result from access road improvement within the Mormon Mesa ACEC, which is a desert tortoise Special Management Area. Following reclamation, the net new long-term disturbance would be 65 acres.

Up to 7,000 acre-feet per year of ground water from the Tule Desert wellfield would be necessary to operate the Toquop Energy Project under the Proposed Action, Alternative 1, or Alternative 2. Up to 170 acre-feet per year of ground water would be necessary to operate the air-cooled power plant under Alternative 3.

Additional effects would result from short-term uses of the environment. Effects on air quality would primarily be short-term and localized, resulting from construction activities that create fugitive dust and vehicle and equipment engine emissions. Project construction and operation activities would impact the area's visual resources and ambient noise levels, but not substantially and not at levels that would affect recreationists' use and enjoyment of the project area or adjacent lands. Any cultural resources encountered during construction activities could be degraded or destroyed, unless they are fully mitigated as described in this document. Local and regional economies would benefit from the construction and operation of the proposed Toquop Energy Project, especially in Lincoln County because of increases in tax receipts resulting from the proposed project. No long-term adverse effects would result from transportation-related activities. There would be no effects on geologic features, paleontological resources, Indian trust assets, environmental justice, or hazardous and solid wastes.

4.20.3 Maintenance and Enhancement of Long-Term Productivity

Long-term productivity related to the Proposed Action, Alternative 1, Alternative 2, or Alternative 3 includes long-term increases in the regional supply of reliable, electrical power at competitive costs for use by consumers to help meet shortages in the western United States. On a more local level, this includes an increased availability of electrical power for the State of Nevada and the Las Vegas area. The Proposed Action, Alternative 1, Alternative 2, or Alternative 3 would help meet short-term and long-term power requirements of existing regional population areas, both for residential and commercial/industrial uses. The direct and indirect economic benefits of project construction and operation and of increased power production would support or contribute directly to the long-term economic growth, both locally and regionally, and particularly in Lincoln County.

Long-term productivity also would be enhanced through the Pah Rah/Toquop land exchange. The Proposed Action, Alternative 1, Alternative 2, or Alternative 3 would provide the BLM a mechanism for acquiring a desirable parcel of private land in the Pah Rah Range in northwestern Nevada. The proposed land exchange would facilitate public land management by the BLM by creating contiguous tracts of land adjoining the Pah Rah parcel. Conversion to private ownership of a similarly valued section of

public land in Lincoln County on which the power plant would be located, and the construction of associated project facilities including the wellfield and linear infrastructure, would result in increased long-term power production. This land exchange would require short-term uses of the environment and affect the long-term productivity of several resources as summarized in *Section 4.20.2*.

4.21 Irreversible and Irretrievable Commitments of Resources

An irreversible commitment of resources occurs if the commitment cannot be changed once made. An irretrievable commitment of resources occurs when resources are used, consumed, destroyed, or degraded during project construction, operation, and maintenance and cannot be reused or recovered for the life of the project or beyond. Table 4-22 summarizes irreversible and irretrievable commitments of resources for the Proposed Action, Alternative 1, Alternative 2, or Alternative 3. Determinations of whether or not there would be irreversible and irretrievable

TABLE 4-22
Irreversible and Irretrievable Commitments of Resources

Resource	Irreversible Impacts?	Irretrievable Impacts?*	Nature of Impact
Soils	Yes	Yes	See *construction materials and fuels* below
Geology	No	No	
Surface water	No	No	
Ground water	Yes	Yes	Used in construction, plant processes, and cooling operations
Threatened, endangered, and sensitive species	No	Project Life Span	Some harassment and/or loss of special status species and habitat
Vegetation and noxious weeds	No	Project Life Span	Disturbance and/or loss of vegetation and habitat
Wild horses and burros	No	No	
Wildlife and fisheries	No	Project Life Span	Some harassment and/or loss of wildlife species and habitat
Wetlands/riparian zones, floodplains, and waters of the United States	No	No	
Air quality	No	Project Life Span	Some minor degradation of air quality during construction and operation
Noise	No	Project Life Span	Noise exceeds ambient levels during construction and operation at a relatively minor level
Visual resources	No	Project Life Span	Relatively minor viewshed intrusion

TABLE 4-22
Irreversible and Irretrievable Commitments of Resources

Resource	Irreversible Impacts?	Irretrievable Impacts?*	Nature of Impact
Recreation resources	No	Project Life Span	Construction and operation areas unavailable for recreation to an minimal degree
Land use	No	Project Life Span	Loss of rangeland at the northern Toquop parcel would be compensated for financially
Wilderness Study Areas and Areas of Critical Environmental Concern	No	Project Life Span	Improved access road would pass through an ACEC
Hazardous and solid wastes	No	No	
Cultural resources	Yes	Yes	Potential disturbance if sites are inadvertently discovered during construction; destruction of known archaeological resources—none of which are eligible for the NRHP (except for one each under Alternatives 1 and 2) nor have they been identified to BLM by Native Americans as properties of traditional cultural or religious importance.
Indian Trust Assets	No	No	
Environmental justice	No	No	
Paleontological resources	No	No	
Socioeconomics	No	Project Life Span	Increased regional and local employment and revenues during construction and operation
Transportation	No	No	
Construction materials and fuels			
Sands and gravels	Yes	Yes	
Ground water	Yes	Yes	
Steel	Yes	Project Life Span	
Aluminum	Yes	Project Life Span	
Concrete	Yes	Yes	
Chemicals	Yes	Yes	
Wood	Yes	Project Life Span	
Natural gas	Yes	Yes	

*"Project Life Span" indicates an irretrievable impact would extend through project construction and operation. "Yes" indicates impact duration would be forever.

commitments of environmental resources were based on discussions of direct and indirect project effects in *Sections 4.1* through *4.17* of this document and discussions of cumulative project effects in *Section 4.18*. As summarized in *Section 4.19*, very few of those effects would result in adverse impacts on environmental resources.

4.22 Energy Requirements and Conservation Potential

Energy requirements under the Proposed Action, Alternative 1, Alternative 2, and Alternative 3 for project construction, operation, and maintenance activities would include the use of the following:

- Petroleum products (diesel, gasoline, oil, and grease)
- Various building, operations, and maintenance materials such as aggregate from borrow areas, water from the Tule Desert wellfield, steel, aluminum, concrete, and wood

Other energy requirements would include the use of natural gas from the Kern River Gas Pipeline for fueling the power plant's combustion turbine generators, and the use of various chemicals for treating power plant condensate and circulating water. These basic energy requirements cannot be determined specifically for each alternative because of the variability of potential actions. Except for ground water requirements during plant operation, the Proposed Action, Alternative 1, and Alternative 3 would be expected to have the lowest and similar energy requirements. Alternative 2 would potentially have the greatest energy requirements because of the construction of the electric transmission and natural gas lines and the extension of the access road into the northern power plant site. For these reasons, the conservation potential (except for ground water requirements) would be greater under the Proposed Action, Alternative 1, and Alternative 3 than under Alternative 2. The potential for ground water conservation would be substantially greater under Alternative 3 than under the Proposed Action, Alternative 1, or Alternative 2. The No Action Alternative would have no project-related energy requirements.

4.23 Monitoring

The monitoring programs described below are included as part of this project.

4.23.1 Toquop Land Disposal to the Caliente MFP Amendment

Monitoring and evaluation would be conducted at 5-year intervals for the Caliente MFP. These data would be used to determine the effectiveness of the plan amendment in achieving the desired results; to ensure that Best Management Practices (BMPs), Standard Operating Procedures (SOPs) and mitigation measures are satisfactory; and to ascertain whether changes have occurred in related plans of other federal, state, or local governments. Any information gained would be incorporated into future planning, including other amendments or revisions to the Caliente MFP.

4.23.2 Ground Water

A ground water monitoring plan will be developed as part of the wellfield design. This plan, which will incorporate the monitoring components of the agreement between Lincoln County/Vidler Water Company and the National Park Service,

will assess changes in water levels downgradient from the production wells. Its purpose is to determine the extent of any ground water cones of depression that could result from operation of the production wells. In addition, the Tule Desert well, which is the only existing well in the Tule Desert, will be monitored to assess any changes in ground water levels.

The ground water levels in the Tule Desert will be monitored and any major decline in ground water level in the Tule Desert downgradient of the wellfield will be assessed with respect to its potential consequences to ground water conditions in the Virgin River Valley.

At least one monitoring well will be installed south of the southernmost production well. The amount of disturbed area associated with this well will be approximately 1 acre. Ground water monitoring will also occur within the wellfield, with monitoring wells installed within the appropriate vicinity of the production wells to assess trends in water level change. The monitoring wells associated with the wellfield are not anticipated to add to the area of disturbed land already accounted for in assessing the number and location of the production wells.

4.23.3 Evaporation Pond

A leak detection system at the evaporation pond will be installed and operated in accordance with the requirements and guideline established by the Nevada Division of Environmental Protection, Bureau of Water Pollution Control. The effectiveness of the leak detection system will be monitored.

A monitoring plan also will be developed to monitor and document water quality and the degree of use by waterfowl of the evaporation pond, and to assess the timing of installation and effectiveness of protective measures.

4.23.4 Air Quality

Continuous Emission Monitoring Systems (CEMS) will be installed for each combustion turbine/duct burner stack to measure NOx and O_2 concentrations and fuel flow rate, and to record the concentration and mass flow rate of NOx. Either parametric monitoring will be used to verify that the turbines are operating in a range where good combustion practice would be assured, or CEMS will be used to monitor emissions of CO and other pollutants. Periodic sampling of fuel, in accordance with a custom fuel monitoring schedule as approved by NDEP, will be used to monitor SO_2 emissions from the combustion turbines and duct burners.

In addition initial compliance testing will be required for NOx, SO_2, CO, PM10, and VOCs. This will be performed by collecting and analyzing actual stack gas samples for the purpose of verification of full load emission rates versus permitted levels. For NOx, these data will also be used to verify accuracy of the CEMS, and testing at multiple turbine load conditions will be required for NOx.

4.23.5 Reclamation

A plan will be developed to monitor the success of reclamation and revegetation required by desert tortoise habitat and general reclamation commitments made in *Appendixes A and B.*

4.23.6 Stormwater

Monitoring and maintenance of the stormwater elements at the Toquop Power Plant site will be conducted to ensure long-term effectiveness of the management system.

4.23.7 Cultural Resources

Monitoring of potential impacts to cultural resources during construction will be conducted in accordance with the Programmatic Agreement (*Appendix C*).