DOE/EIS - 0322

Sundance Energy Project
Final Environmental Impact Statement

Western Area Power Administration

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DOE/EIS - 0322

COVER SHEET

Title: Sundance Energy Project, Pinal County, AZ, Final Environmental Impact Statement

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ABSTRACT

Sundance Energy LLC (Sundance) has applied to the Western Area Power Administration (Western) to interconnect a planned generator facility to Western's transmission system in the vicinity of Coolidge, Arizona. Western's proposed action is to enter into an interconnection and construction agreement with Sundance for the requested interconnection. The proposed interconnection would integrate the power generated by the Sundance Energy Project (Project) into the regional transmission grid and would allow Sundance to supply its power to the competitive electric wholesale market.

The proposed Project would be built on private lands southwest of Coolidge. The proposed Project would be a Apeaking power plant project@ which means it would provide energy when it is needed during peak demand periods in the region. The proposed Project would also be a Amerchant plant@ which means it is not owned by a utility and there is currently no long-term commitment or obligation by any utility to purchase the energy generated by the power plant.

Western, as a major transmission system owner, must generally provide access to its transmission system when requested by an eligible organization per existing policies, regulations and laws. The proposed Project would consist of the construction and operation of a generating facility; construction of a 14-mile pipeline to supply natural gas to the proposed Facility; a new 230-kV bay at an existing substation; a new double-circuit 230-kV transmission line; a new single-circuit 230-kV transmission line; an upgrade of a 115-kV line to 230-kV specifications; and an upgrade of an existing substation. Three alternatives would consist of different locations of the 230-kV transmission lines and would not involve upgrading the 115-kV line or the existing substation. The environmentally preferred alternative is Alternative 3, the power line routing that is furthest west.

CHANGES SINCE THE ISSUANCE OF THE SUNDANCE ENERGY PROJECT DRAFT EIS

The Sundance Energy Project Draft Environmental Impacts Statement (DEIS) was issued on March 23, 2001. A public hearing was held in Coolidge, Arizona on April 12, 2001. The comment period ended on May 7, 2001. Comments from 15 individual commentors were received on issues associated with the proposed Sundance Energy Project (Project). These comments were considered and where appropriate changes to the Draft EIS were made. The comments and responses to the comments were collated into a Comment Response Document. The Comment Response Document is included in this Final EIS as Appendix C.

The changes to the analyses and discussion presented in the DEIS were minor and confined to the reassessment of air quality, and additional information concerning water and cultural resources (see below). In these circumstances the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA) (40 CFR Parts 1500.4 and 1503.4) call for "attaching and circulating only changes to the draft environmental impact statement, rather than rewriting and circulating the entire statement." Therefore, this Final EIS is not a reprint of the Draft EIS. This Final EIS includes the amended sections of the Draft EIS and the Comment Response Document, Appendix C. In addition, the amended analyses and new information was carried forward into the Summary and cumulative impact sections that are also included in this Final EIS.

Shortly after the issuance of the DEIS, the Pinal County Air Quality Control District completed its review of the Sundance Air Permit Application. The Pinal County Air Quality District Control Director determined that the Selective Catalytic Reduction (SCR) method of controlling air emissions, specifically NO_x emissions, would be required of the proposed Facility. As a result, the predicted NO_x emissions would be decreased by 80% from those originally predicted. The air quality impacts from the proposed Project have been revised to include the new SCR air control method (see Section 4.2, Air Quality).

In the DEIS and the original Air Permit Application to Pinal County Air Quality Control District, Sundance proposed two optional operations configurations. The proposed Facility would either install and operate 12 General Electric LM6000 combustion turbines, or six LM6000 combustion turbines and two General Electric 7FA combustion turbines. Through the air permitting process, Sundance has decided to operate the proposed Facility with the 12 LM6000 combustion turbines. The new air analysis in the amended Section 4.2 only discusses the potential impacts from this configuration.

The DEIS identified three alternative transmission line routes for the interconnection to the Western's transmission lines. The environmentally preferred alternative is Alternative 3, the route furthest to the west.

SUMMARY

Sundance Energy LLC (Sundance) has applied to the Western Area Power Administration (Western) to interconnect a planned generator facility to Western's transmission system in the vicinity of Coolidge, Arizona in Pinal County, southwest of Phoenix. Western's proposed action is to enter into an interconnection and construction agreement with Sundance for the requested interconnection. The proposed interconnection would integrate the power generated by the project into the regional transmission grid and would allow Sundance to supply its power to the competitive electric wholesale market. Western's formal process for determining the availability of transmission capacity for the proposed interconnection is in its preliminary stages. The evaluation of environmental impacts in this EIS is one of these preliminary steps. At this point, it is foreseen that there is enough potential capacity to continue the formal determination process.

Sundance proposes to construct and operate the Sundance Energy Project (Project), a natural gas-fired, simple cycle power plant on private lands southwest of Coolidge. The proposed Project would consist of a nominal 600 megawatt (MW) natural gas fired, simple cycle peaking generating facility and associated infrastructure, newly constructed and upgraded transmission lines, a pipeline to supply additional natural gas, a water supply well, and access roads. Under the No Action Alternative, Western would reject the Sundance application to interconnect to Western's transmission system, and the proposed facility, transmission lines, and pipeline would not be built. Sundance may appeal Western's decision to the Federal Energy Regulatory Commission

This Environmental Impact Statement (EIS) was prepared in accordance with Section 102(2) of the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. 4332, Council of Environmental Quality regulations, and U.S. Department of Energy (DOE) NEPA Implementing Procedures (10 CFR 1021). Western is the lead Federal agency, as defined by 40 CFR 1501.5.

Western will use the information provided in this EIS to support Federal decisions for the proposed Project. Western will decide whether to enter into an interconnection and construction agreement with Sundance and, if approved, the best way to interconnect the proposed Project into the Western transmission system to provide the needed transmission services.

UNDERLYING PURPOSE AND NEED FOR AGENCY ACTION

Sundance is responding to the need to provide additional supply of electricity to the Phoenix metropolitan area and surrounding region during peak demand periods. Reserve margins (generation supply - peak load) have decreased considerably in the region over the past decade. Sundance has a need to make a profit selling its power in the regional wholesale market. Based on these needs, Sundance purposes include siting the proposed Project near existing gas and water supplies, and transportation facilities near the Coolidge Substation, thus interconnecting with the Phoenix 230-kV loop, and away from densely populated residential areas. Sundance purposes also include benefiting Pinal County by increasing the reliability of the local electrical system and using land available at marketable rates.

PURPOSE AND NEED FOR AGENCY ACTION

Western, as a major transmission system owner, must generally provide access to its transmission system when it is requested by an eligible organization per existing policies, regulations and laws. Sundance applied to interconnect its proposed power plant with Western=s transmission line system in the vicinity of Coolidge.

The purposes of the Proposed Action include:

- To meet the requirements of Western=s Open Access Transmission Service Tariff, which is intended to meet the intent Federal Energy Regulatory Commission of (FERC) Order No. 888 in providing non-discriminatory transmission access.

- To provide transmission service and capacity for the proposed Project without degrading service to existing customers.

- To ensure transmission system reliability is maintained.

- To cause the minimum practical adverse environmental effects, consistent with sound land management practices.

Although the Federal action is to decide whether to allow Sundance to interconnect to Western's transmission system, the construction and operation of the proposed Project is a directly connected action. Therefore, this document evaluates the proposed Project as well as the interconnection.

SCOPING

The Notice of Intent to prepare an EIS for the proposed Project was published in the *Federal Register* on September 1, 2000. Comments received on issues to be evaluated in the Sundance Energy Project EIS included: the need for the proposed Project; proposed Project alternatives; public role in decision making; effects on the rural character of the area; routing and height of new transmission lines; and effects on the biological, cultural, water, and visual resources, as well as on air quality and noise. These issues are included in the analyses and discussions presented in this EIS. In addition, consultations have been initiated with Federal, state, and local resource management and regulatory agencies as well as interested tribal governments.

PUBLIC COMMENT PROCESS

The Notice of Availability for the Draft Sundance Energy Project EIS was published in the Federal Register on March 23, 2001. A public hearing was held in Coolidge, AZ on the evening of April 12, 2001, where verbal and written comments were collected. Other comments were submitted by mail. The comment period ran through May 7, 2001. A total of 15 commentors made comments on the DEIS and related issues.

These comments were considered and where appropriate, changes to the Draft EIS were made. The comments and responses to the comments were collated into a Comment Response Document, Appendix C. The Comment Response Document, Appendix C, is included in this Final EIS. Table C-1 shows a breakdown of the comments by issue category.

PROPOSED ACTION AND ALTERNATIVES

The proposed Project would consist of the construction and operation of a generating facility (Facility); construction of a 14-mile pipeline to supply natural gas to the proposed Facility; a new 230-kV bay at an existing substation; a new double-circuit 230-kV transmission line; a new single-circuit 230-kV transmission line; an upgrade of a 115-kV line to 230-kV specifications; and an upgrade of an existing substation. Three alternatives would consist of different locations for the 230-kV transmission lines.

NO ACTION ALTERNATIVE

Under the No Action Alternative, Western would not allow Sundance to interconnect with Western's transmission system. Without the ability to interconnect to Western's transmission lines, the proposed Project would not be feasible and would not be built. Sundance may appeal Western's decision to the Federal Energy Regulatory Commission. Upon hearing the appeal FERC may or may not reverse Western's decision.

IMPACTS

Resource areas evaluated for potential impacts include land use, air quality, noise, infrastructure, water resources, geology and soils, biological resources, cultural resources, visual resources, transportation, socioeconomics, and environmental justice. Table S-1 summarizes the environmental consequences of the Proposed Action and alternatives. The most significant resource area impact of the Proposed Action would be visual resources. The proposed Facility's 60- and/or 100-foot tall stacks and 120 foot transmission pole structures would have a strong linear, vertical form that would contrast with the surrounding flat, horizontal landscape. The visual quality impacts of the vertical structures would be minor because the structures would be seen by a relatively small number of residents and travelers. No significant or long-term impacts are expected in other resource areas. Short-term effects would be primarily related to construction activities and would, for the most part, return to normal after construction has been completed.

The Proposed Action would have positive effects on some resource areas including the following:

- The local economy would experience a small boost over the life of the project due to payroll earnings and construction expenditures.

- The assessed value of the Property would increase and result in a substantial increase in property revenues to the local taxing district.

Table S-1
Environmental Consequences

Affected Environment	Proposed Action	No Action	Alternative
LAND USE	**Facilities** No long-term impacts to land uses. Minimal impacts related to siting, construction, and operation of the proposed Facility. Short-term impacts would include increased daytime noise and dust during construction. An access road would be constructed on the Property. No disruption to land uses from access road construction. Overall recreation activities would not be significantly affected. Paving a segment of Randolph Road would negatively impact horseback riding along the road, but other unimproved roads in the area could offer enjoyment of equestrian activities. **Pipelines** No permanent disturbance to croplands. Construction on agricultural land would cause temporary loss of crops on the construction right-of-way (ROW) (about 124 acres). A year=s loss of crops could occur along the ROW. Crop yields may be reduced for one to two years following construction. Temporary construction disturbance of about 36 acres of vacant land, 9 acres of industrial land, and 1.2 acres of urban/residential land. Short-term effects would include noise, dust, and traffic detours during construction. Access would be from existing local, county, and state roads. Proposed natural gas line would be compatible with future land use planning. **Transmission Lines** No impacts to existing land status and land uses. Permanent ROW would be affected by the removal of about five acres of vegetation during the installation of tower structures related to ED2 Line upgrades and 0.5 acres between the proposed Facility and Signal Substation. No long-term impacts are expected to other land uses within or adjacent to the new line from the proposed Facility to the Liberty-Coolidge Line. The location of the transmission lines would not change,	No impacts to existing land uses in the area.	**Alternative 1** The amount of land disturbed would be 11.2 acres along the ROW. All other impacts would be similar to impacts for the Proposed Action. **Alternative 2** The same as Alternative 1. **Alternative 3** About 6.8 acres of cropland and 7.2 acres of native vegetation on State Trust land would be disturbed during the installation of structures related to this alternative.

Table S-1
Environmental Consequences

Affected Environment	Proposed Action	No Action	Alternative
LAND USE (continued)	therefore, there would be minimal impacts to crop dusting in the area. Short-term effects to residential areas related to construction and operation would include noise, dust, and traffic detours,; obstruction of traffic at road crossings; and maintenance activities including the physical intrusion of crew and equipment on private lands. No impacts to recreational uses.		
AIR QUALITY	**Facilities** Minimal air impacts due to construction and operation of the proposed Facility. Configuration 1 would result in the maximum impact. Maximum annual NO_x and 24-hour PM_{10} concentrations are predicted to occur on the high terrain to the west and northwest of the proposed Facility on the eastern ridges of the Sacaton Mountains. The proposed Facility would be a major PSD source for NO_x and CO. For Configuration 1, the PSD Class II increment consumption in significance area of proposed Facility would be 6 percent of NO_2 PSD Class II increment of 25 Fg/m^3. For Configuration 2, the PSD Class II increment consumption in significance area of proposed Facility would be 11.56 percent of NO_2 PSD Class II increment. Visibility is predicted to decrease five percent one day in the Class I airshed, Superstition Wilderness, in December and March. Acid deposition impacts are predicted at two Class I airsheds, Superstition Wilderness and Saguaro West National Park. **Pipelines** Fugitive dust emission impacts are expected from construction activities along the ROW. Impacts are comparable to current agricultural activities in the area. **Transmission Lines** Fugitive dust emission impacts are expected from construction activities.	No impacts to air quality in the area.	**Alternative 1** The same as the Proposed Action. **Alternative 2** The same as the Proposed Action. **Alternative 3** The same as the Proposed Action.

Table S-1
Environmental Consequences

Affected Environment	Proposed Action	No Action	Alternative
AIR QUALITY (continued)	Impacts are comparable to current agricultural activities in the area.		
NOISE	**Facilities** The proposed Facility noise levels for the proposed configurations are not expected to exceed 55 dBA. Residences nearest to the 55 dBA noise level could experience increase noise of about 10 dBA above assumed rural background noise level. No blasting is expected during construction. **Pipelines** Noise levels above background (40-45 dBA) during construction. Construction noise would be at one-mile intervals of pipeline construction along the ROW. **Transmission Lines** Noise levels elevated above background during construction. Long-term corona audible noise from transmission lines but this noise is usually lost in background noise beyond the transmission ROW.	No impacts to noise emissions in the area.	**Alternative 1** The same as the Proposed Action. **Alternative 2** The same as the Proposed Action. **Alternative 3** The same as the Proposed Action.
INFRASTRUCTURE/ WASTE MANAGEMENT	**Facilities** *Electric and Magnetic Field (EMF) Effects* EMF effects are associated with transmission lines. Effects negligible associated with changes to Coolidge and Signal substations. *Infrastructure* No substantial impacts to local area power supplies or natural gas supply. *Waste Management* Potential contamination hazard from the storage and use of fuel, lubricants, and other fluids during construction of plant and access road. No significant effects to municipal solid waste facilities related to the generation of solid waste. **Pipelines** *EMF Effects* Potential for induced currents in pipelines from Western's high voltage lines.	No impacts to infrastructure and waste management.	**Alternative 1** The same as the Proposed Action. **Alternative 2** The same as the Proposed Action. **Alternative 3** The same as the Proposed Action.

Table S-1
Environmental Consequences

Affected Environment	Proposed Action	No Action	Alternative
INFRASTRUCTURE/ WASTE MANAGEMENT (continued)	*Infrastructure* Natural gas pipeline to only service the proposed Facility. Gas company could potentially decide to extend the pipeline to the northwest, which could increase availability of natural gas in the region. *Waste Management* Potential contamination hazard from the storage and use of fuel, lubricants, and other fluids during construction. Impacts would be minimized by the restriction of refueling activities from dry washes and by requiring immediate cleanup of spills and leaks. **Transmission Lines** *EMF Effects* No significant potential for corona effects and field effects. Magnetic field would be similar to that of common household appliances. Health effects would be similar to those for existing lines. *Infrastructure* No substantial impacts to local power supplies are anticipated. Power requirements expected to be equivalent to an agricultural warehouse or processing plant. *Waste Management* Potential contamination hazard from the storage and use of fuel, lubricants, and other fluids during construction. Impacts would be minimized by the restriction of refueling activities from dry washes and by requiring immediate cleanup of spills and leaks.		

Table S-1
Environmental Consequences

Affected Environment	Proposed Action	No Action	Alternative
WATER RESOURCES	**Facilities** *Surface Water Quantity* No impacts expected from the use of CAP water to other users. The proposed Facility usage expected to help defray operation and maintenance costs of CAP system. *Surface Water Quality* No impacts expected from the extraction of CAP water. Potential contamination from storage and use of fuels, lubricants, fluids, and chemicals during construction and operation. Minimal impacts to drainage patterns are anticipated. *Groundwater Quantity* Minimal impacts to other users are anticipated from groundwater usage. Groundwater pumping is expected to have minimal impact on the Pinal AMA aquifer. No subsidence is anticipated from groundwater pumping. *Groundwater Quality* No impact is expected from construction and operation of the proposed Facility. Potential impacts from potential spills or leaks of fuel, lubricants, fluids, and chemicals during proposed Facility operation. Effluent water quality would be similar to quality of backup water wells. No impacts from use of effluent water for agriculture. No impacts anticipated from blending water prior to agricultural use. **Pipeline** *Surface Water Quantity* Increased runoff is anticipated related to storms and large flow events in disturbed areas. *Surface Water Quality* Potential impacts associated with construction and hydrostatic testing. Potential for increased erosion, sedimentation, turbidity, release of chemical and nutrient pollutants; and	No impacts to surface water or groundwater in the area.	**Alternative 1** The same as the Proposed Action. **Alternative 2** The same as the Proposed Action. **Alternative 3** The same as the Proposed Action.

Table S-1
Environmental Consequences

Affected Environment	Proposed Action	No Action	Alternative
WATER RESOURCES (continued)	introduction of chemical contamination from fuels and lubricants. No impacts are expected from the use of effluent water for agriculture. *Groundwater Quantity* No impacts are anticipated to groundwater quantity. *Groundwater Quality* Potential impacts from potential spills or leaks of fuel, lubricants, and fluids construction activities. **Transmission Lines** *Surface Water Quantity* No impacts to surface water resources are anticipated related to construction along transmission lines in the area. *Surface Water Quality* Potential impacts from increased sedimentation and turbidity during construction. Potential impacts from accidental spills of fuel, lubricants, and fluids during construction. *Groundwater Quality & Quantity* No groundwater resources would be impacted.		
GEOLOGY AND SOILS	**Facilities** *Geology* Minimal impacts from slope failure and soil erosion. No impacts to sand and gravel availability. Seismic risk is low to moderate. Quick alluvial deposits should be relatively stable. *Soils* Soil erosion impacts are expected to be minor due to minimal rainfall and slopes of less than one percent. **Pipelines** *Geology* Minimal impacts from slope failure. Seismic risk is low to moderate; quick alluvial deposits should be relatively stable.	No impacts to geology and soils in area.	**Alternative 1** The same as the Proposed Action, except about 11.2 acres would be disturbed. **Alternative 2** The same as the Proposed Action. **Alternative 3** The same as the Proposed Action, except that an additional 14 acres would be disturbed.

Table S-1
Environmental Consequences

Affected Environment	Proposed Action	No Action	Alternative
GEOLOGY AND SOILS (continued)	Potential for flash flooding in narrow washes along ROW. *Soils* About 124 acres of prime farmland soils would be disturbed which would alter soil structure and impact productivity. **Transmission Lines** *Geology* Minimal impact on future sand and gravel extraction within the ROW. Minimal risk of rockfalls and landslides. Seismic risk is low to moderate; quick alluvial deposits should be relatively stable. *Soils* About 6.6 acres of prime farmland soils would be disturbed which would alter soil structure and temporarily impact productivity. Minimal impacts from slope failure and soil erosion.		
BIOLOGICAL RESOURCES	**Facilities** *Vegetation and Wildlife* Potential impacts to vegetation and wildlife. Potential loss and/or disturbance of 50 acres of sparsely vegetated native habitats during construction. Potential loss of food, cover, habitats, and/or breeding sites for some species. *Special Status Species* No adverse impacts are anticipated to special status species in Pinal County. **Pipelines** *Vegetation and Wildlife* Potential impacts to vegetation due to the loss and/or disturbance to native plant communities; disturbance of about 124 acres of croplands and loss of 36 acres of sparse native vegetation. *Special Status Species* Potential adverse effects for species known to occur in Pinal County. About 110 acres of mountain plover habitat would be temporarily disturbed. Minimal impact expected due to loss of habitat.	No impacts to biological resources in the area.	**Alternative 1** *Vegetation and Wildlife* Croplands would be eliminated in areas where tower structures would be installed. Croplands would be eliminated in small areas during installation of new structures to reroute the Coolidge-ED2 Line. ***S**pecial Status Species* No impacts would occur. **Alternative 2** Impacts are the same as those in Alternative 1. **Alternative 3** Temporary loss of 7.2 acres of native vegetation. Minimal impacts to wildlife habitat. No impacts to special status species.

Table S-1
Environmental Consequences

Affected Environment	Proposed Action	No Action	Alternative
BIOLOGICAL RESOURCES (continued)	**Transmission Lines** *Vegetation and Wildlife* No impacts due to the construction of the four-mile transmission line. *Special Status Species* No impacts would occur.		
CULTURAL RESOURCES	**Facilities** No significant historic properties were found in the proposed Site during previous cultural surveys. Prehistoric artifact scatter was recorded outside the area of potential effect. **Pipelines** Past investigations indicate a low potential for significant historic or prehistoric sites. Previous inventories would be reviewed before construction. Potential disturbances not covered by previous investigations would be inventoried before construction. **Transmission Lines** Inventories have not been completed in the proposed affected area. Inventories would be completed before construction begins. Past inventories in general area indicate a high likelihood for sites along north end of the Signal-Coolidge upgrade. The Signal Switchyard appears less likely to contain significant historic properties.	No impacts to cultural resources in the area.	**Alternative 1** Similar potential to the Proposed Action with the exception of rerouting. Disturbances caused by rerouting the Coolidge-Signal Line from section 19 to the Coolidge Substation and replacement of structures located near areas with a high potential for the presence of potential significant historic and prehistoric resources. These potentially affected areas would be inventoried before construction begins. **Alternative 2** The impacts are the same as Alternative 1. **Alternative 3** The impacts are the same as Alternative 1.
VISUAL RESOURCES	**Facilities** Impacts to visual landscape from the addition of buildings, exhaust stacks, and night lighting when viewed from sensitive viewpoints, travel routes, recreation areas, and residences. **Pipelines** Short-term impacts due to construction and operation of gas pipeline. Short-term impacts due to vegetation removal in the ROW until vegetation has been reestablished in disturbed areas. No impacts to croplands after the ROW has been replanted with crops. **Transmission Lines** Short-term impacts during construction while using local roads. Significant long-term impacts to the landscape from the	No impacts to viewshed in the area.	**Alternative 1** The new one-half mile line constructed between Coolidge-ED2 and Coolidge-Signal lines, and the associated structures would be more visible in the foreground by visitors to Casa Grande National Monument. The structures would not be visible to Casa Grande National Monument at a distance of 2.5 miles. **Alternative 2** The impacts are the same as Alternative 1.

Table S-1
Environmental Consequences

Affected Environment	Proposed Action	No Action	Alternative
VISUAL RESOURCES (continued)	installation of pole structures when viewed from sensitive viewpoints and in scenic landscapes. New transmission pole structures from the construction of the new 4.2 and 1.5 mile lines between the proposed Facility and the Signal Substation would be visible to a small number of residents and travelers on nearby county roads. Structures would be visible to a small number of residents and travelers. The nearest locations that a significant number of people would be able to view the structures associated with the construction of the line between Signal Substation and the interconnect with the Liberty-Coolidge Line would be 1.5 miles away in Coolidge and Casa Grande National Monument. No impacts from the upgrade of the line between the interconnection and Coolidge Substation. Transmission line structures would not be visible to visitors at Casa Grande National Monument at a distance of 2.5 miles.		**Alternative 3** The impacts are the same as Alternative 1.
TRANSPORTATION	**Facilities** Access road would be entirely within the Property. Short-term traffic impacts from construction activities and construction traffic are expected at the junction of Randolph Road and the access road. Short-term traffic delays may occur in Coolidge due to the large vehicles delivering equipment. **Pipelines** Short-term construction related traffic impacts at highway crossings. **Transmission Lines** Access to ROW would be from Tweedy Road. Access to existing ROW expected to cause temporary traffic impacts from construction-related traffic stops and lane closures. Access to new ROW would be from existing county roads.	No impacts to traffic and roadways in the area.	**Alternative 1** Traffic related impacts are similar to the Proposed Action minus traffic related to the construction of lines between the proposed Facility and Signal Substation and the Coolidge-ED2 upgrade. **Alternatives 2** Traffic impacts would be the same as Alternative 1. **Alternative 3** Traffic impacts would be similar to Alternative 1 with one exception. Since the new 230-kV lines would not be constructed along Tweedy Road, temporary traffic disruptions along Tweedy Road would not occur.

Table S-1
Environmental Consequences

Affected Environment	Proposed Action	No Action	Alternative
SOCIOECONOMICS	**Facilities** Local labor market and economy may be affected. Direct employment of labor related to facility construction and operation. Indirect labor effects related to services provided by support industries. Local economy would be affected by direct project spending and induced economic effects. Minimal effects to public utilities, services, and schools in Coolidge and Phoenix. **Pipelines** Pipeline construction expected to have minimal impact on the economy. Payroll and construction expenditures and property taxes are expected to benefit Pinal County. **Transmission Lines** Construction and operation is expected to have minimal impacts to local economy. Minimal impacts on local emergency services expected. Local area and regional systems are expected to benefit from the increased supply and reliability of power.	No impacts to the local labor market, economy or housing.	**Alternative 1** The same as the Proposed Action. **Alternative 2** The same as the Proposed Action. **Alternative 3** The same as the Proposed Action.
ENVIRONMENTAL JUSTICE	**Facilities** No impacts to environmental justice from construction and operation of the facility. **Pipelines** No impacts to environmental justice from construction and operation of pipelines. **Transmission Lines** No impacts to environmental justice from construction and operation of transmission lines.	No impacts to environmental justice.	**Alternative 1** The same as the Proposed Action. **Alternative 2** The same as the Proposed Action. **Alternative 3** The same as the Proposed Action.

3.8 CULTURAL RESOURCES

The current Coolidge Substation, which augmented and replaced the original Coolidge Substation, was initially completed in 1950 as an element of the Davis Dam Project. The new substation was expanded multiple times after 1950, and it became one of the most important power facilities in Arizona in terms of interconnection of the transmission system. However, major alterations were made to the substation beginning in 1964, including the replacement of most of the original equipment. Coolidge Substation is therefore unlikely to retain sufficient integrity of original construction to qualify for eligibility for the National Register of Historic Places (NRHP).

The Coolidge-ED2 transmission line was built in 1950 as an element of the Davis Dam Project. The Coolidge-Signal Line, which runs parallel to the Coolidge-ED2 Line in the proposed Project vicinity, was constructed in 1964 as an element of the Parker Davis Project. Both lines are standard wood pole H-frame transmission lines and deliver power to the ED2 Substation primarily for water pumping and residential purposes. Neither line appears to have particular historical or technological significance that might qualify the line for eligibility for the NRHP.

Signal Substation was completed by the Bureau of Reclamation in 1965 as an element of the Parker Davis Project. The substation was constructed with standard commercial components including 115-kV and 12.47-kV transformers and switching structures. The Liberty-Coolidge 230-kV transmission line was completed by Western in 1987. Signal Substation and the Liberty-Coolidge Line do not appear to have the exceptional significance require for NRHP eligibility of properties that are less than 50 years old.

3.8.1 Facilities

The proposed Facility is on an alluvial plain south of the Gila River at an average elevation of about 1,420 feet above MSL, located at the northwest portion of the Property. The proposed Facility and much of the western end of the Property are previously cultivated land that has been partially reclaimed by native vegetation. Near the center of the western half of the Property is an excavation that appears to have been a borrow pit, and subsequently has been used as a dump for structural debris. The remainder of the Property (roughly three-quarters) is currently in use as cotton and alfalfa fields. Historically, this has been a sparsely settled agricultural area dominated by cotton cultivation, and prehistoric use of the area was likely to have been sparse as well.

A records search at the Arizona State Museum indicated that two archaeological surveys have been conducted within a one-mile radius of the Property (Greystone 2000e). Archaeological survey of the proposed Site recorded only one prehistoric site that is recommended as not eligible for inclusion in the National Register of Historic Places (NRHP) (Slawson 1999). The Class I archaeological survey indicated there are other sites within a mile of the proposed Project (Greystone 2000e, Northland 2001, Slawson 1999). Low-density artifact scatters and isolated occurrences with no associated features were reported. None of the historic or prehistoric materials that may be considered eligible for inclusion in the NRHP are within or close to the proposed Facility (Greystone 2000e).

The proposed Project is within the traditional territories of several tribal groups, and there are Native American communities in the vicinity that maintain aspects of their traditional cultures. In September 2000, the applicant contacted the Gila River Indian Community and the Ak-Chin Indian Community to inform them about the proposed Project. The contact letter also indicated that Western would contact the communities and that Sundance would be interested in tribal participation in archaeological surveys. Sundance has not received any response from the communities. Western has contacted the tribal governments of seven Native American communities that are likely to have traditional concerns in the area to notify them of the proposed Project and solicit any concerns they may have about potential impacts. The Ak-Chin Indian Community, the Gila River Indian Community, the Hopi Tribe, the Pascua Yaqui Tribe, the Salt River Pima-Maricopa Indian Community, the San Carlos Apache Tribe, and the Tohono O'odham Nation have each been consulted by Western on this project.

The Gila River Indian Community, the Tohono O'odham Nation, the Hopi, and the San Carlos Apache have indicated to Western that they have concerns about the proposed Project. Both the Ak Chin and Salt River Pima-Maricopa Indian Communities defer to the Gila River Indian Community in this consultation; the Pascua Yaqui have not yet responded. A representative of the Hopi commented that the entire area around the Gila River is a "middle place" in Hopi legends and is an area of concern to the Hopi people. Archaeological sites are often viewed as proof of oral traditions by the Hopi, and they traditionally interpret archaeological sites as evidence of the Hopis' *Covenant of Natwani*. Because of the importance of archaeological remains to Hopi culture and religion, the Hopi wish to be informed about any disturbances to archaeological materials on the proposed Project. Traditional cultural information is confidential and sensitive, and many tribal representatives are reluctant to divulge information about traditional localities. A lack of response to tribal notification should not be interpreted as a lack of concern or an indication that there are no sensitive localities within the proposed Project area.

An issue of concern to all groups is the possibility of disturbing previously undiscovered human remains. Procedures for consultation with tribal groups regarding unavoidable or unanticipated disturbance of human remains and funerary objects are specified in amendments to the Arizona Antiquities Act (A.R.S. part 41-844). Another issue of potential concern is disturbance of localities or natural features named in traditional stories. Some of these localities also serve as shrine or ritual sites and are currently still in use.

The Casa Grande Ruins are a Traditional Cultural Property to the Hopi, the Gila River Indian Community, the Tohono O'odham Nation and the Ak-Chin Indian Community. The proposed Facility would have no direct impact on these ruins and would not visually intrude on the Property (see Visual Resources, Section 4.9.1.1). The Gila River Indian Community considers other less well known archaeological sites and petroglyph sites in the region as Traditional Cultural Properties, especially those in the Santan and Sacaton Hills. Concern regarding impacts to visibility and use of these areas were expressed and Sundance has addressed these through changes in the proposed Project emissions (see Air Quality, Section 4.2). The proposed Facility will have no direct impact on these Properties.

3.8.2 Pipelines

The proposed pipeline runs from the proposed Facility southwestward about 14 miles and parallel to the El Paso Line 2025 and the El Paso Line 1600 to an interconnect with El Paso Lines 1100 and 1103. The proposed pipeline would pass between the modern towns of Eloy and Casa Grande about two miles southeast of Casa Grande near the north end of the Casa Grande Mountains. Most of the land crossed by this pipeline corridor is under cultivation or has been cultivated at some time in the past. The final three miles from Interstate 8 to the interconnection are largely reclaimed by native vegetation.

The site and inventory cards at the Arizona State Museum were checked and records indicate that eight previous investigations have been conducted within one mile of the proposed pipeline route, and four cultural resource sites have been recorded. Based on the results of the investigations, few significant cultural sites are likely to be found in the proposed Project area (Greystone 2000e). However, 27 irrigation ditches occur within the Project area and their historical significance has yet to be determined. The All American Pipeline was previously surveyed and mitigated for archaeological resources (Ackerly et al. 1989), and has been subject to further archaeological investigation when it was transferred to El Paso Energy Corporation and renamed the Line 2000 (Northland 2000).

3.8.3 Transmission Lines

3.8.3.1 Proposed Action

The proposed new transmission line is along a county road and field margins in the alluvial plain south of the Gila River.

Record searches at the Arizona State Museum for this area indicate that six previous investigations have taken place in the proposed Project vicinity, and that 16 sites have been recorded outside the Casa Grande National Monument. The boundaries of the National Monument encompass the recorded areas for at least 30 separate site numbers. In Class III archaeological surveys of the proposed Signal-Coolidge transmission line and the three proposed alternatives, six previously recorded archaeological sites were identified in areas of potential impact as well as nine newly-identified archaeological sites (Northland 2001). Of these fifteen potentially impacted sites, three sites (AZ AA:2:200, AA:2:30, and U:14:108) are prehistoric habitation or limited activity sites recommended to be eligible for inclusion in the NRHP. Three are prehistoric limited activity sites recommended as potentially eligible for inclusion in the NRHP, and two are historic concrete-lined canal sites believed to be potentially eligible. The remaining seven sites are all historic or modern and are believed to be ineligible for inclusion in the NRHP. Four are historic or modern trash heaps, one is a historic or modern habitation, and two are historic roads that have been improved in the modern era such that they have little historic integrity preserved (Northland 2001). In addition, the proposed transmission line route crosses two large prehistoric (Hohokam) canal systems, the Pinkley Canal and the Casa Grande Canal (Midvale 1963, Northland 2001). Linear dark soil stains were observed during

archaeological survey, and it is recommended that these areas, as well as the areas of previously documented prehistoric canals, be avoided during transmission line construction (Northland 2001).

The Proposed Action would potentially affect sites AZ AA:2:30 and U:14:108 which are both recommended as eligible for inclusion in the NRHP. In addition, the Proposed Action may impact potentially eligible sites: AZ AA:2:203 and AA:2:204 (both prehistoric limited activity sites) and AA:2:130 (Pima Lateral Canal, a historic concrete-lined canal). The Proposed Action may also affect the ineligible historic sites AA:2:127 (Betchel Road) and AA:6:63 (State Route 87).

3.8.3.2 Alternatives 1, 2 and 3

The affected environment of Alternatives 1, 2 and 3 is much the same as that described for the Proposed Action, but somewhat different archaeological sites will be impacted by the various alternatives.

Alternative 1 and Alternative 2 will both potentially affect sites AZ AA:2:30 and U:14:108 which are recommended as eligibile for inclusion in the NRHP. In addition, Alternatives 1 and 2 will potentially impact AA:2:130 which is the potentially NRHP-eligible Pima Lateral historic concrete-lined canal. Alternative 1 and 2 may also affect the ineligible historic sites AA:2:127 (Betchel Road) and AA:6:63 (State Route 87).

Alternative 3 will potentially affect more archaeological sites than the other Alternatives or the Proposed Route. The Alternative 3 Route will potentially affect sites AZ AA:2:200, AA:2:30 and U:14:108 which are all prehistoric sites recommended as eligible for inclusion in the NRHP. In addition, Alternative 3 may impact these potentially eligible sites: AZ AA:2:201, AA:2:129 and AA:2:130 (one prehistoric limited activity site, and two concrete-lined historic canals, the Pima Lateral and the Southside Canal). Alternative 3 may also affect the ineligible historic sites AZ AA:2:207, AA:2:208, AA:2:209, AA:2:210, AA:2:127 (Betchel Road), AA:6:63 (State Route 87) and Field Site 3 (Northland 2001).

4.2 AIR QUALITY

The air quality resource impact analysis consists of evaluating the impacts of criteria and hazardous air pollutant concentrations resulting from construction and operation of the Proposed Action. This is accomplished by using the EPA-recommended ISCST and CALMET/CALPUFF dispersion models to estimate pollutant concentrations and visibility impacts at receptors located within the area of potential effect.

The area of potential effect resulting from construction and operation of the Proposed Action for criteria and hazardous air pollutant concentrations is about 10 kilometers. The area of potential effect for visibility and/or acid deposition impacts includes the designated Class I airsheds at the Superstition Wilderness located about 57 kilometers north-northeast of the site and at the West Saguaro Park located about 75 kilometers south-southeast.

The air quality section discusses the impacts of the construction and operation of the Proposed Action and alternatives on air quality in the area of potential effects. Comparing modeled air pollutant concentrations with Federal and/or Arizona State air quality standards adopted to protect human health and public welfare quantitatively assesses potential air quality effects.

The determination as to whether an impact is significant with respect to criteria and hazardous air pollutant concentrations is determined by adding the maximum modeled air pollutant concentration to the background air pollutant concentration for the respective pollutant. The resulting total is then compared to the Federal and/or Arizona State air quality standard. Pollutant concentrations above the standards are considered significant. Significant impact concentrations for Prevention of Significant Deterioration (PSD) are quantitatively assessed by comparing the Class II increment with modeled pollutant concentrations in the significance area. Consumption of the increment is considered a significant impact. Impacts of air quality related values (AQRV) are evaluated for Class I airsheds located within 100 kilometers of the Proposed Action. A five percent change in extinction (e.g. reduction of visibility) is considered a significant impact.

4.2.1 Facilities

In the DEIS and the original Air Permit Application to Pinal County Air Quality Control District, Sundance Energy reserved the flexibility to either install or operate 12 General Electric LM6000 combustion turbines, or six LM6000 combustion turbines and two General Electric 7FA combustion turbines. A decision has been made to operate the Facility with the 12 LM6000 combustion turbines. The updated site plan diagram is shown in Figure 2-1.

The combustion fuel would be natural gas resulting in emissions of the following criteria pollutants: particulate matter less than 10 microns in diameter (PM_{10}), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), and Volatile Organic Compounds (VOC); and several hazardous air pollutants. Emissions of nitrous oxides (NO_x) result from the combustion process. The regulated pollutant, NO_2, is a portion of the total NO_x emitted. The emissions prepared for the proposed Facility calculate the portion of NO_x emissions that are NO_2. Therefore, references to NO_x actually indicate NO_2.

The ultimate result of the BACT determination by the Pinal County Air Quality District Control Director was that NO_x BACT for the General Electric LM6000 SPRINT combustion turbine is 5.0 parts per million dry volume at 15 percent oxygen (5.0 ppmvd @ 15% O_2). As a result, the NO_x predicted emissions have decreased 80 percent. The addition of the SCR also requires a higher stack. Sundance Energy's new stack height would be 85 feet above grade.

4.2.1.1 Criteria Pollutants

Under the Clean Air Act of 1970 (42 U.S.C. 7401) the EPA has set the National Ambient Air Quality Standards (NAAQS) for several criteria pollutants to protect human health and welfare (40 CFR 50). These criteria pollutants include PM_{10}, SO_2, CO, NO_2, lead (Pb), and ozone (O_3). Primary standards are adopted to protect human health. Secondary standards are adopted to protect public welfare. Arizona has adopted the federal NAAQS as indicated in Table 4-1. Enforcement of these standards is the responsibility of the Pinal County Air Quality Control District (PCAQCD).

Table 4-1
Arizona State and Federal Air Quality Standards

Pollutant	Averaging Time	Primary Standard ppm / µg/m^3	Secondary Standard ppm / µg/m^3
Nitrogen Dioxide (NO_2)	Annual	0.05 / 100	0.05 / 100
Particulate Matter (PM_{10})	24-Hour	NA / 150	NA / 150
	Annual	NA / 50	NA / 50
Carbon Monoxide (CO)	1-Hour	35 / 40,000	--
	8-Hour	9 / 10,000	--
Sulfur Dioxide (SO_2)	Annual	0.03 / 80	--
	24-hour	0.14 / 365	--
	3-hour	--	0.5 / 1,300
Ozone (O_3)	1-Hour	0.12 / 235	0.12 / 235
Lead (Pb)	Calendar Quarter	NA / 1.5	NA / 1.5
Formaldehyde(1)	1-Hour	NA / 20	--
	24-Hour	NA / 12	--
	Annual	NA / 0.08	--

Source: Arizona Department of Environmental Quality (ADEQ)
NA – Not Applicable
(1) Formaldehyde standards are Arizona Air Quality Guidelines and are used for reference, and not regulatory purposes.

Air Quality Dispersion Modeling. The Industrial Source Complex Short Term (ISCST356) dispersion model, dated 98356 (December 20, 1998) was used to predict pollutant concentrations from emissions from the proposed Facility. This model was selected as the most appropriate model to perform the air dispersion modeling analysis from continuous sources because it is designed to support the EPA regulatory modeling program and is capable of handling multiple sources, including different source types. The model estimates pollutant concentrations at receptor locations that in turn are compared with Federal and State regulatory standards to determine compliance.

The model requires turbine emission data, source parameters describing the turbine exhaust, a receptor grid identifying the locations at which the model calculates pollutant concentrations, meteorological data including surface and upper air data, and EPA regulatory default options to calculate conservative pollutant concentrations.

The proposed Facility would be a major source for nitrogen oxides (NO_x) and CO. A new source is major if it has the potential to emit any regulated pollutant in amounts equal to or exceeding 250 tons per year. PM_{10} annual emissions would be above Prevention of Significant Deterioration (PSD) significance levels, so PM_{10} also was included in the air quality analysis. SO_2 emissions would be below PSD significance levels, therefore an air quality analysis is not required for SO_2 (Greystone 2000d).

Emissions. Criteria pollutant emissions from the Sundance Energy Facility consist of startup, shutdown, and steady-state operations. For the purposes of the annual emission analysis, the following operational parameters would occur:

1,000 startup and shutdown sequences

6,500 hours at 100 percent load.

The following sections quantify the estimated annual emissions that would occur under this operational scenario.

Startup Emissions

The General Electric LM6000 SPRINT combustion turbine is capable of a rapid startup sequence to quickly respond to market demands for electrical power generation. However, the warm-up time for the SCR adds considerably to the startup time. According to the data provided by General Electric, the startup time from synchronized idle to base load is four minutes. Emissions from synchronization to full load are:

NO_x: 2.34 lbs / 4 minutes

CO: 0.27 lbs / 4 minutes

VOC: 0.07 lbs / 4 minutes

Emissions from initial fire to synchronization, a period of two minutes, are estimated to be 10 percent of the emissions from synchronization to full. Therefore, the total startup sequence emissions (without an SCR) are as follows:

NOx: (2.34 lbs * 1.1) = 2.57 lbs for 6 minutes

CO: (0.27 lbs * 1.1) = 0.297 lbs for 6 minutes

VOC: (0.07 lbs * 1.1) = 0.077 lbs for 6 minutes

At this point, the turbine is operating at its design capacity, and emissions are controlled by water injection to 25 ppmvd NO_x. An additional phase in the startup sequence is then required for the

temperature of the SCR catalyst bed to increase to an operational range. During this phase, lasting approximately 24 minutes, ammonia cannot be injected upstream of the catalyst bed because the ammonia would not react with NO_x, but would react with trace sulfur quantities to form ammonium salts. This chemical reaction can permanently and irreversibly damage the reactivity of the SCR catalyst. Therefore, during this 24-minute period, NO_x and other emissions reflect control by water injection.

The LM6000 emissions vary with ambient temperature when operating at 100 percent load. At 25 ppm NO_x emissions range from 37.1 lbs/hr at 115°F, 40.1 lbs/hr at 59°F, and 41.2 lbs/hr at 20°F. CO emissions range from 30.0 lbs/hr at 115°F, 72.8 lbs/hr at 59°F, to 131.8 lbs/hr at 20°F. VOC emissions range from 4.0 lbs/hr at 115°F, 4.3 lbs/hr at 59°F, to 4.5 lbs/hr at 20°F. Therefore, total startup emissions are calculated as follows:

NO_x: 2.57 lbs (for 6 minutes) + 24 minutes at 40.1 lbs/hr = 2.57 + 16.04 = 18.61 lbs

CO: 0.297 lbs for 6 minutes + 24 minutes at 72.8 lbs/hr = 0.297 + 29.12 = 29.42 lbs

VOC: 0.077 lbs for 6 minutes + 24 minutes at 4.3 lbs/hr = .0077 + 1.72 = 1.80 lbs

Shutdown Emissions

The shutdown sequence would involve turning off the ammonia flow, and then starting the shutdown sequence. Therefore, the time will be six minutes and the total emissions would be equal to the first phase of the startup sequence as follows:

NO_x: 2.57 lbs for 6 minutes

CO: 0.297 lbs for 6 minutes

VOC: 0.07 lbs for 6 minutes

Combined Startup, Shutdown, and 100% Load Emissions

Since a startup/shutdown sequence could occur at any time during the year, the average emissions, i.e., those emissions at the mid-range temperature, are used in this analysis. The most conservative hourly emissions could occur if a startup and shutdown occurred within the same hour. Since the startup sequence would last 30 minutes and the shutdown sequence would last six minutes, 24 minutes would remain for the turbine to operate at 100 percent load. Therefore, the total emissions for any hour of operation in which a GE LM6000 startup/shutdown occurs would be:

NOx: 18.61 lbs [Startup] + 2.57 lbs [Shutdown] + (0.4 hrs * 8.0 lbs/hr) [100% Load] = 24.38 lbs

CO: 29.42 lbs [Startup] + 0.297 lbs [Shutdown] + (0.4 hrs * 72.8 lbs/hr) [100% Load] = 58.84 lbs

VOC: 1.80 lb [Startup] + 0.07 [Shutdown] + (0.4 hrs * 4.3 lbs/hr) [100% Load] = 3.59 lbs

Estimated Facility Emissions

The hourly emissions at 100 percent load are the highest during cold temperatures and the lowest during hot temperatures. The estimated annual emissions are based on the emission factors at 100 percent load and at an ambient temperature 59ºF, near the mean annual temperature of 69ºF recorded at the Casa Grande National Monument, approximately four miles north of the proposed Sundance Energy facility. The annual emissions are based on the mean temperature because the facility may operate at any time during the year. For short-term modeling the higher hourly emission rates at the lower ambient temperature for CO were evaluated.

The PM_{10} emissions represent the "filterable" or "front-half" and the "condensable" or "back-half" PM_{10}. The DEIS and original Air Permit Application listed the estimated PM_{10} emissions as only the "front-half" filterable PM_{10} in accordance with the existing regulatory guidance in Arizona. Subsequently, the State of Arizona Department of Environmental Quality furnished guidance that PM_{10} should contain the total PM_{10}, i.e., the combination of "front-half" filterable and "back-half" condensables. A review of existing literature and emissions documentation shows that the most recently published AP-42, Section 3.1, and Emission Factors for Stationary Gas turbines (EPA 2000), PM_{10} (front-half and back-half) emission factor is 6.76 lbs/MMscf. LM6000 turbine performance data indicates an annual average high heating value of 434 MMBtu/hr. At 999 MMBtu/MMscf, the average fuel usage would be 0.434 MMscf/hr. Therefore, total particulate emissions using the EPA AP-42 emission factor are predicted to be 2.93 lbs/hr. Since this factor has not been measured for each and every type and size of combustion turbine, plus the inherent ranges of measured data, conservative estimate of total PM_{10} is to at least double this emission factor. Sundance Energy is therefore submitting 7.0 lbs/hr as a good-faith estimate of total PM_{10} emissions.

Table 4-2 verifies the expected emissions rates both in terms of lbs/hr and ppmvd @ 15% O_2.

Table 4-3 summarizes the estimated annual emissions based on the following:

- emission rates at the annual average temperature
- 6,500 hours at 100% load
- 1,000 hours when a startup and shutdown occurs

Table 4-2
Sundance Energy Estimated Hourly Emissions

	115°F 10%Relative Humidity		59°F 40% Relative Humidity		20°F 60% Relative Humidity	
Pollutant	lbs/hr	ppmvd@15% O_2	lbs/hr	ppmvd@15% O_2	lbs/hr	ppmvd@15% O_2
NO_x	7.4	5.0	8.0	5.0	8.2	5.0
CO	24.8	28.2	72.8	76.4	131.8	134.6
PM_{10}	7.0	NA	7.0	NA	7.0	NA
VOC	4.0	8.0	4.3	8.0	4.5	8.1
SO_2	0.8	NA	0.9	NA	0.9	NA

Table 4-3
Sundance Energy Estimated Annual Emissions
12 GE LM6000 Sprint Combustion Turbines
With Selective Catalytic Reduction

NO_x		**CO**		**PM_{10}**		**SO_2**		**VOC**	
Average Hourly Emissions per unit	**Annual Total (12 units)**	**Average Hourly Emissions per unit**	**Annual Total (12 units)**	**Average Hourly Emissions per unit**	**Annual Total (12 units)**	**Average Hourly Emissions per unit**	**Annual Total (12 units)**	**Average Hourly Emissions per unit**	**Annual Total (12 units)**
lbs/hr	**tons/yr**	**lbs/hr**	**tons/yr**	**lbs/hr**	**tons/yr**	**lbs/hr**	**tons/yr**	**lbs/hr**	**tons/yr**
Operating 6,500 Hours per Year at 100% Load									
8.02	312.78	72.8	2839.2	7.0	273.0	0.9	35.1	4.3	167.7
1,000 Hours per Year at 100% Load Including a Startup/Shutdown									
24.38	146.28	58.84	353.04	10.0	42.0	0.9	5.4	3.59	21.54
Annual Total	**459**		**3192**		**313**		**40**		**189**

Maximum emission rates for each of the regulatory averaging periods (1-hour, 8-hour, 24-hour, and annual) are used as input into the ISCST dispersion model to perform the dispersion analysis. The resultant maximum emission rates are shown in Table 4-4.

Source Parameters. Source parameters define the physical attributes of the exhaust from each turbine. Table 4-5 presents the source parameters used in the ISCST dispersion model.

Receptor Grid. The receptors are the locations at which the ISCST model calculates concentrations for each of the pollutants. A receptor grid at 25-meter spacing was placed around the perimeter of the proposed Site. Beyond the proposed Site boundary, additional receptors were located at 100-meter intervals out to three kilometers beyond the proposed Site boundary and at 200-meter intervals from three to 10 kilometers. Extra receptors were located in the high terrain area west to northwest of the proposed Site at 200-meter intervals.

Table 4-4
Sundance Energy Dispersion Modeling Emission Rates

Pollutant	Averaging Period	Emission Rate for each LM6000 (grams/second)
NO_x	Annual	1.101
	1-Hour	16.98
CO	8-Hour	16.98
	24-Hour	0.883
PM_{10}	Annual	0.756

Table 4-5
Sundance Energy Stack and Exhaust Modeling Parameters

Stack Parameter	LM6000 SPRINT
Stack height (meters)	25.9
Stack diameter (meters)	3.20
Exit velocity (meter/second)	34.5
Gas temperature (°Kelvin)	728

Meteorological Data. Permit regulations require the use of one year of onsite meteorological data or five years of validated data considered representative of the project location. One year of onsite data were not available, and, therefore, National Weather Service (NWS) data from Tucson, Arizona are used for model inputs. Five full years of EPA validated data was obtained for Tucson along with the upper air data from Tucson for the same period. Although Tucson is about 50 miles from the proposed Facility, the Tucson data are considered the best available and most accurate data to fully characterize the atmospheric parameters that control the dispersion of pollutants from a stationary source such as the proposed Facility.

The PCAQCD requested an evaluation of two additional sources of other wind data. The Arizona Meteorological Network (AZMET) is part of the Extension Biometeorology Program, which is a service of the University of Arizona Cooperative Extension within the College of Agriculture, collects data 3.5 miles north-northwest of the proposed Facility. Although the Coolidge AZMET data contained nearly continuous data, it was rejected for regulatory purposes. EPA regulations dictate that the wind data must be collected at a 33 feet height to partially avoid the effects of the surface features on the wind velocity and to approximate an elevation near the top of the exhaust stack where the pollutants are exhausted to the atmosphere. However, the AZMET wind data are collected at a height of 10 feet for agricultural purposes and therefore is not acceptable for PSD permitting purposes because the wind is not recorded at a height of 10 feet above the ground. The other data source was a one-year period from July 1999 to July 2000 collected at the Casa Grande Municipal Airport. Although the data are accurately collected and validated by the

PCAQCD, it is not as valid as the five-year Tucson data for the following reasons. First, the monitoring location is 15 miles west of the proposed Facility and therefore cannot be considered as onsite data. Since the PSD rules indicate that five years of data should be used, the Casa Grande data cannot be used for this PSD permit because only one year of data is available.

The ISCST model was run using the five years of meteorological data as input to estimate pollutant concentrations at receptor grid locations. The maximum concentration for each of the regulatory averaging periods is used as a conservative estimate of the pollutant concentrations from the proposed Facility.

Model Assumptions. The ISCST model assumptions are the EPA regulatory default options as follows:

- Stack tip downwash
- Final plume rise
- Buoyancy induced dispersion
- Calm processing
- Default wind profile exponents (rural) = 0.07, 0.07, 0.10, 0.15, 0.35, 0.55
- Default vertical temperature gradients = 0.0, 0.0, 0.0, 0.0, 0.02, 0.035
- Anemometer height = 10 meters

In addition, building wake effects were included in the modeling parameters in order to account for the influence of structures and buildings on the turbine exhaust plume.

ISCST Model Results. The results of the analysis are shown in Table 4-6 for each of the five years of meteorological data. The maximum annual and 24-hour impacts are predicted to occur on the high terrain northwest of the Facility on the eastern ridge of the Socaton Mountains. Modeled concentrations on Coolidge, as well as other surrounding areas generally at the same elevation as the proposed Facility, are predicted to be generally at levels less than one percent of all applicable ambient air quality standards.

Table 4-7 presents the maximum pollutant concentrations from the proposed Facility emissions as well as the maximum concentrations from monitoring locations in the surrounding community, labeled as background concentrations. The monitoring data are the best available source of criteria pollutant concentrations representing background conditions although dominated by traffic sources not present at the proposed Facility. In addition, the maximum predicted pollutant concentrations from the proposed Facility do not occur at the locations of the monitoring locations, thereby presenting a very conservative estimate of total criteria pollutant concentrations. The maximum percent of a regulatory standard is 81.1 percent for the combined proposed Facility and background concentrations for PM_{10} for the annual averaging period. This result is dominated by background concentrations measured at the monitoring station in Coolidge and not from concentrations predicted from proposed Facility emissions. In fact, the predicted Facility concentrations are less than two percent of the total annual PM_{10} concentrations.

Table 4-6
Sundance Energy Predicted Air Quality Impact

Pollutant	Averaging Period	Year of Meteorological Data				
		1987	1988	1989	1990	1991
NO_2	Annual	1.40	1.07	0.91	1.06	1.09
CO	1 hour	525	373	373	373	372
	8 hour	200	181	170	179	180
PM10	24 hour	3.86	4.74	3.30	3.65	3.26
	Annual	0.93	0.72	0.61	0.70	0.73

Table 4-7
Sundance Energy Predicted Maximum Air Quality Impacts
12 LM6000 CTs

Pollutant	Averaging Period	Ambient Standard ($\mu g/m^3$)	Maximum Facility Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	Percent of Ambient Air Quality Standard
NO_2	Annual	100	1.40	58.5	59.9	59.9
CO	1 hour	40,000	525	1,710	2,235	5.6
	8 hour	10,000	200	1,482	1,682	16.8
PM_{10}	24 hour	150	4.74	83.6	88.34	58.9
	Annual	50	0.93	39.6	40.53	81.1

Hazardous Air Pollutants. Hazardous Air Pollutants (HAPS) were calculated using the AP-42 document Emission Factors for Stationary Sources, Volume I (AP-42), April 2000 (EPA 2000). Emission factors for stationary gas turbines are found in Section 3.1, Stationary gas Turbines, at the following EPA Internet site: www.epa.gov/ttn/chief/ap42/ch03/final/c03s01/c03s01.pdf. With the exception of formaldehyde, all AP-42 emission factors for HAPS from stationary gas turbines were used.

HAPS emissions were originally calculated using the California Air Resource Board California Air Toxics Emissions Factor Database (CATEP). However, subsequent research into this database revealed that emission factors for formaldehyde were 8 to 10 years old. Furthermore, no source data could be obtained from the California Air Resource Board that verified the type or size of the turbines tested, or the operational scenario. Therefore, PPL Global researched other emissions factors.

As part of the issuance of the new Section 3.1 in AP-42, the document "Emission Factor Documentation for AP-42, Section 3.1, Stationary Gas Turbines" was also issued in April, 2000. As part of the document, the author leads the reader to the database that contains all the

applicable data that was used to determine emission factors. This Access database can be downloaded from the EPA CHIEF site at www.epa.gov//ttn/chief/ap42/ch03/related/c03s01.html.

An inspection of this database shows that the formaldehyde emission factor was derived from the testing of 22 turbines (see attached output from database). A more detailed investigation of the data shows that seven of these turbines were General Electric LM aero derivative turbines. Of these seven turbines, only two apply to the Sundance Energy project. Both turbines were LM2500 turbines with water injection generating 20 to 29 MW of power. One turbine had SCR in addition to water injection. The formaldehyde emission factor is reported as 9.87×10^{-05} lb/MMBtu for the turbine with water injection. The emission factor for the turbine with both water injection and SCR was 2.50×10^{-05} lb/MMBtu. Therefore, it can be reasoned that the only available emission factor for aeroderivitive turbines is the maximum of these two factors, or 9.87×10^{-05} lb/MMBtu.

This formaldehyde emission factor is therefore used to calculate annual formaldehyde from the Sundance Energy Facility operating 7,500 hours per year. Based on this actual measured emission factor, the annual Sundance Energy formaldehyde emissions are calculated as follows:

Factor = 9.87×10^{-05} lb/MMBtu

Turbine high heating value (HHV) at annual average temperature = 434 MMBtu/hr

Hourly emissions = Factor * HHV = $9.87 \times 10^{-05} * 434 =$ 0.0428 lb/hr

Annual emissions = (0.0428 lbs/hr * 12 turbines * 7500 hr) / 2000 = 1.93 tons/yr

The Sundance Energy Facility estimated annual HAPS emissions are shown in Table 4-8.

The State of Arizona has established "ambient air quality guidelines" to list ambient concentrations of hazardous air pollutants that would be considerably potentially unhealthy. These guidelines are compared to the maximum predicted ambient concentrations from the Sundance Energy Facility. As shown in Table 4-9, most ambient concentrations are less than one percent of all applicable guidelines. The annual formaldehyde at 7.25 percent of the guideline is the only HAP over one percent of the guideline value.

The SCR process uses an aqueous ammonia solution, less than 20% ammonia and more than 80% water, for NO_x control. Annual ammonia emissions can be quantified by a comparison to the exhaust concentration and molecular weight of NO_x. Ammonia will be emitted at a maximum rate of approximately 10 ppm of the exhaust stream, and NO_x will be emitted at 5 ppm for an annual total of 459 tons. Therefore, the annual ammonia emissions are calculated as:

(Molecular weight NH_3 [17]) / Molecular weight NO_2 [46]) *

(10 ppm NH_3 / 5 ppm NO_2) * 459 tons/year = 339 tons/year ammonia

Table 4-8
Sundance Energy Hazardous Air Pollutants

Substance	CAS	Turbine Emission Rate (lbs/MMBtu) [1]	Hourly Emissions per Turbine (lbs) [1]	Annual Facility Emissions (tons) [2]
1,3-Butadiene	106-99-0	$4.3x10^{-7}$	0.0002	0.01
Acetaldehyde	75-07-0	$4.0x10^{-5}$	0.0174	0.78
Acrolein	107-02-8	$6.4x10^{-6}$	0.0028	0.12
Benzene	71-43-2	$1.2x10^{-5}$	0.0052	0.23
Formaldehyde	50-00-0	$9.87x10^{-5}$	0.0438	1.93
Naphthalene	91-20-3	$1.3x10^{-6}$	0.003056	0.03
Propylene Oxide	75-56-9	$2.9x10^{-5}$	0.01256	0.57
Toluene	108-88-3	$1.3x10^{-4}$	0.0564	2.54
Xylene (Total)	1330-20-7	$6.4x10^{-5}$	0.0278	1.25
Total				**7.46**

[1] One LM6000 turbine at 100% load : 434 MMBtu/hr annual average high heating value
[2] 12 LM6000 turbines at 100% load for 7500 hours

Ammonia Ambient Health Risk

The presumptively safe Arizona Department of Health Standards (ADHS) "Ambient Air Quality Guideline" ("AQGL") for ammonia is 140 $\mu g/m^3$ based on a 1-hour exposure. Those AQGL values do not constitute an enforceable limitation, but rather reflect exposure levels that ADHS has declared to be presumptively "safe."

To determine the maximum 1-hour ambient air concentration of ammonia, a comparison is made to the 1-hour modeling of CO for the Sundance Energy since ambient impacts using the same modeling configuration are directly proportional to the emission rate. The maximum 1-hour CO impact was 525 $\mu g/m^3$ with a 1-hour maximum emission rate of 16.987 grams/second from each of the 12 turbines. Based on an annual ammonia emission rate of 339 tons, the 1-hour emission rate would be 0.814 grams/sec for each of the 12 turbines. Therefore, the maximum ground level ammonia ambient concentration would be:

$$(16.987 / 0.814) * 525 = 25.1\ \mu g/m^3$$

The maximum one-hour exposure would be 25.1 $\mu g/m^3$, or 17.9 percent of the exposure level that ADHS has determined to be presumptively “safe”. Since the predicted maximum 1-hour concentration is well below the established health guideline, it can be concluded that ambient ammonia concentrations would not present a hazard to the public health.

Table 4-9
Sundance Energy Predicted HAPS Ambient Impacts

HAP	Averaging Period	AAAG (mg/m^3)	Sundance Predicted Concentration (mg/m^3)	Sundance Percent of AAAG
1,3-Butadiene	1-hour	7.2	0.00073	0.01014
	24-hour	1.9	0.000126	0.006663
	Annual	0.67	0.0000253	0.00378
Acetaldehyde	1-hour	2300	0.0677	0.00294
	24-hour	1400	0.0117	0.00084
	Annual	0.5	0.00235	0.47000
Acrolein	1-hour	6.7	0.0108	0.16119
	24-hour	2.0	0.00187	0.09350
Benzene	1-hour	630	0.0203	0.00322
	24-hour	51	0.00351	0.00688
	Annual	0.14	0.000705	0.50357
Formaldehyde	1-hour	20	0.167	0.83500
	24-hour	12	0.0289	0.24083
	Annual	0.08	0.0058	7.25000
Naphthalene	1-hour	630	0.00220	0.00035
	24-hour	400	0.000381	0.00010
Propylene Oxide	1-hour	1500	0.0491	0.00327
	24-hour	400	0.00849	0.00212
	Annual	2.0	0.00171	0.08550
Toluene	1-hour	4700	0.219	0.00466
	24-hour	3000	0.0381	0.00127
Xylene	1-hour	5500	0.1083	0.00197
	24-hour	3500	0.0187	0.00053

PSD Analysis. The proposed Facility would be a major PSD source for NO_x and CO. A new source is major if it has the potential to emit any regulated pollutant in amounts equal to or exceeding 250 tons per year. The proposed Facility therefore would be subject to the Federal New Source Performance Standards for stationary gas turbines (40CFR Part 60 Subpart GG). Emissions of particulates (PM_{10}) and volatile organic compounds (VOCs) also exceed the PSD significance level and require a PSD review. Table 4-10 presents the PSD significant concentrations for criteria pollutants.

The PCAQCD Code of Regulations Section 2-5-190 states that: "For new major sources and major modifications located in, and which would establish the minor source baseline date, Pinal County, the baseline area shall be the Central Arizona Intrastate Air Quality Control Region, as designated by the Administrator at 40 CFR 81.271 (7/1/93) and comprising Pinal and Gila counties, at least insofar as any portion of that region is designated as attainment or unclassifiable for the pollutant for which the minor source baseline date is established." The baseline area shall also extend to any other air quality control region located in Arizona in which such a source, establishing a minor source baseline date in Pinal County, would have an air quality impact equal to or greater than one microgram per cubic meter (µg/m^3) (annual average) of the pollutant for which the minor source baseline date is established.

Table 4-10
PSD Air Quality Significant Concentrations

Pollutant	Averaging Time	Class II Increment ($\mu g/m^3$)	Significant Impact Concentration ($\mu g/m^3$)	Monitoring de Minimus ($\mu g/m^3$)
NO_2	Annual	25	1	14
CO	1-Hour	NA	2,000	NA
	8-Hour	NA	500	575
PM_{10}	24-Hour	30	5	10
	Annual	17	1	NA

NA – Not Applicable

The proposed Facility NO_x air quality impact area, greater than one $\mu g/m^3$, is a small area on the higher terrain to the west and northwest of the proposed Facility. The NO_2 major source baseline date is established as February 8, 1988.

All significant stationary minor sources of NO_x within 50 kilometers of the Project were analyzed to determine the existing ambient air quality in the area where the proposed Facility impacts exceeded the NO_x significant level of one $\mu g/m^3$. Permit records and emission inventories were obtained from the PCAQCD to determine significant NO_x sources within 50 kilometers of the proposed Facility. All stationary sources with annual NO_x emissions in excess of 10 tons per year were considered to potentially affect the NO_2 increment consumption and were included in the analysis. Table 4-11 lists the sources evaluated in the PSD Class II increment analysis. This is a very conservative approach to an increment consumption analysis because all sources, regardless of whether they began operating before the NO_2 baseline was triggered, were considered in the analysis.

These sources were included with the proposed Facility emissions using the ISCST dispersion model with the 1987 meteorology, for which impacts were the greatest. The results of the analysis indicated that the maximum impact from all sources is predicted to increase to 1.47 $\mu g/m^3$, or 0.07 $\mu g/m^3$ higher than the 1.40 $\mu g/m^3$ modeled for the Sundance Facility only. Therefore, the PSD Class II increment consumption would be 1.47 $\mu g/m^3$, or 5.9 percent of the available increment of 25 $\mu g/m^3$.

Table 4-11
NO_x Sources Evaluated for PSD Class II Increment Consumption Analysis

Source	Location		Elevation (m)	Emissions (gm/sec)	Stack Height (m)	Exhaust Temperature (K)	Exhaust Velocity (m/sec)	Stack Inside Diameter (m)	Distance from Sundance Energy (km)
	UTM E	UTM N							
Abbott Laboratories	426156	3639754	424	0.631	18.3	411	10.7	0.91	19.1
El Paso Casa Grande Compressor Station	400516	3643869	410	6.561	18.3	576	30.7	1.8	44.3
Hexcel Corporation	426715	3638086	421	0.503	5.2	422	3.6	0.43	18.9
Mayville Metal Products	427393	3638297	422	0.484	18.3	411	10.7	0.91	18.2
Recot	425823	3640434	425	0.469	15.2	548	10.9	1.07	19.3
Salt River Sand and Rock	455561	3654945	435	1.468	3.1	795	59.4	0.13	15.6
United Metro	425083	3635752	417	0.432	7.0	400	57.2	0.15	21.2
Owens Corning Corporation	442169	3614302	487	0.616	18.3	411	10.7	0.91	29.4
Reliant Energy	426246	3640691	416	5.4	48.8	351	15.9	5.94	18.8
US West Casa Grande	442962	3696495	457	1.828	7.3	700	36.3	0.31	52.9

Source: Greystone 2000d.

Air Quality Related Values. For PSD sources, potential impacts to air quality and air quality related values must be evaluated if a proposed source is located within 100 kilometers of a designated Class I airshed. Two Class I airsheds are located within 100 kilometers of the proposed Facility. The closest boundary of the U.S. Forest Service Superstition Wilderness is about 57 kilometers north-northeast. The closest boundary of the National Park Service West Saguaro Park is located about 75 kilometers south-southeast. Modeling using the CALMET/CALPUFF dispersion model was performed to predict visibility and deposition impacts at the two Class I areas near the proposed Facility (Greystone 2000d).

Ambient Air Impacts. PSD regulations require an evaluation of a proposed Facility's potential impact on Class I areas. The ISCST356 dispersion model was run using the five years of Tucson data to evaluate NO_x and PM_{10} ambient air concentrations at the U.S. Forest Service Superstition Wilderness and the Saguaro West National Park. The concentrations are then compared to the PSD Class I increments to determine whether significant air quality deterioration would be

predicted to occur. As shown in Table 4-12, the ambient concentration of NO_x and PM_{10} would be less than three percent of allowable increases.

Table 4-12
Sundance Energy Predicted Maximum Air Quality Impacts at Superstition Wilderness and Saguaro West National Park

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)	Class I Increment ($\mu g/m^3$)	Percent of Class I Increment	Exceeds Class I Increment
NO_2	Annual	0.032	2.5	1.3	NO
PM_{10}	24 hour	0.237	8.0	3.0	NO
	Annual	0.022	4.0	0.6	NO

Visibility. As a result of the decrease in NO_x emissions, the inclusion of total PM_{10} rather than filterable front-half, the quantification of startup and shutdown emissions, and the changed stack height, a reanalysis of potential impacts to Class I areas was completed.

The Class I analysis using the CALPUFF/CALMET dispersion model requires input emission rates based upon the maximum emissions expected in a 24-hour period. To calculate the maximum 24-hour emissions, it is assumed that three startup/shutdown sequences could occur in a 24-hour period.

Since the PM_{10} and SO_2 emissions are identical for startups, shutdown, and steady-state operation, the 24 hours emissions from each LM6000 turbines are simply the hourly rate of 7.0 lbs/hr for PM_{10} and 0.9 lbs/hr for SO_2.

NO_x emissions are calculated in the following manner:

Three hours with a startup/shutdown and 24 minutes 100% load.

NOx: 18.61 lbs [Startup] + 2.57 lbs [Shutdown] + (0.4 hrs * 8.0 lbs/hr) [100% Load] = 24.38 lbs;

Remaining 21 hours at 100% load at 8.0 lbs/hr annual average:

24-hour total = (24.38 lbs/hr * 3 hrs) + (8.0 lbs/hr * 21 hours) = 241.14 lbs/24 hours = 10.05 lbs/hr = 1.267 gm/sec for each turbine or 15.204 gm/sec for 12 turbines.

PM_{10} = 7.0 lbs/hr = 0.882 gm/sec = 10.584 gm/sec for 12 turbines.

SO_2 = 0.9 lbs/hr = 0.114 gm/sec = 1.368 gm/sec for 12 turbines.

The results of the analysis, shown in Table 4-13, demonstrate that the maximum visibility reduction is predicted to be below 5.0 percent. Therefore, according to the procedures developed by the Federal Land Managers (Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report, December 2000), the Sundance Energy Facility will not have an adverse effect on visibility in the Class I areas nearby.

Table 4-13
Visibility Impacts at Class I Areas
Near Sundance Energy

	Maximum 24-Hour Visibility Reduction (%)	
Month	**Superstition Wilderness**	**Saguaro West National Park**
January	2.24	3.13
February	2.62	1.19
March	2.85	0.93
April	1.24	0.32
May	1.06	0.13
June	0.80	0.40
July	1.16	0.12
August	1.67	0.32
September	0.92	0.35
October	0.98	0.30
November	2.36	0.45
December	3.58	2.94

The Pinal County Air Quality Control District requested an additional analysis of potential visibility effects at the BLM Class II airshed Table Top Wilderness. This analysis was completed using the CALPUFF dispersion model in the screening mode. Per FLAG directions, five years of Tucson data were used. The results of the visibility impact analysis are shown in Table 4-14.

Table 4-14
Visibility Impacts at BLM Class II Table Top Wilderness

Modeled Year	**Number 24-Hour Periods When Visibility Reduction Predicted to Exceed 5 Percent**	**Maximum Percentage of Visibility Reduction (%)**
1984	15	7.70
1985	19	7.93
1986	21	7.82
1987	28	8.00
1988	18	8.38

Casa Grande National Monument Impacts. At the request of the National Park Service for both the Sundance Energy PSD/Title V permit application and the Sundance Energy Environmental Impact Statement process, an Air Quality Related Values (AQRV) analysis was performed for the Casa Grande National Monument in Coolidge, approximately four miles north of the Sundance Energy proposed Facility. The analysis was performed using the same CALPUFF/CALMET procedures described for the mandatory PSD AQRV analysis for the Class I Superstition Wilderness and the Saguaro West National Park.

The results of the analysis, shown in Table 4-15, demonstrate that the maximum visibility reduction is predicted to be 7.7 percent for one 24-hour period in February for the full year modeling analysis. Although one 24-period in February exceeded five percent, the next highest 24-hour visibility reduction in February was 2.75 percent. Therefore, according to the procedures developed by the Federal Land Managers (Federal Land Managers' Air Quality

Related Values Workgroup (FLAG) Phase I Report, December 2000), the Sundance Energy Facility will not have an adverse effect on visibility at the Casa Grande National Monument.

Table 4-15
Visibility Impacts at Casa Grande National Monument

Month	Maximum 24-Hour Visibility Reduction (%)
January	2.81
February	7.73 – next highest 2.75
March	3.98
April	3.88
May	4.05
June	2.43
July	1.66
August	2.02
September	3.11
October	1.73
November	2.66
December	3.69

Acid Deposition. Table 4-16 presents the predicted acid deposition (as elemental nitrogen and sulfur) at the two Class I areas. These impacts are related to the dry and wet deposition of nitric acid, NO_3, NO_x, SO_2, and SO_4. In general, wet deposition at the Superstition Wilderness was slightly greater than dry deposition, while at Saguaro West National Park dry deposition was slightly greater than wet deposition (Greystone 2000d).

Table 4-16
Acid Deposition Impacts at Class I Areas

	Superstition Wilderness		Saguaro West National Park	
Month	Average 24-Hour Nitrogen Deposition (kg/hectare/24 hours)	Average 24-Hour Sulfur Deposition (kg/hectare/24 hours)	Average 24-Hour Nitrogen Deposition (kg/hectare/24 hours)	Average 24-Hour Sulfur Deposition (kg/hectare/24 hours)
January	4.47×10^{-4}	3.32×10^{-5}	3.57×10^{-5}	1.50×10^{-6}
February	6.51×10^{-4}	2.66×10^{-5}	3.25×10^{-5}	1.31×10^{-6}
March	9.73×10^{-4}	2.26×10^{-5}	9.16×10^{-5}	3.19×10^{-6}
April	6.13×10^{-4}	1.74×10^{-5}	1.11×10^{-4}	2.80×10^{-6}
May	3.64×10^{-4}	1.09×10^{-5}	3.70×10^{-5}	9.63×10^{-7}
June	3.12×10^{-4}	8.85×10^{-6}	1.79×10^{-4}	4.00×10^{-6}
July	6.51×10^{-4}	2.97×10^{-5}	1.89×10^{-4}	1.90×10^{-5}
August	1.92×10^{-4}	6.41×10^{-5}	1.74×10^{-4}	1.21×10^{-5}
September	4.16×10^{-3}	1.00×10^{-4}	2.81×10^{-4}	2.13×10^{-5}
October	3.94×10^{-4}	1.37×10^{-5}	3.26×10^{-5}	1.14×10^{-6}
November	1.00×10^{-3}	2.13×10^{-5}	7.73×10^{-5}	2.05×10^{-6}
December	5.94×10^{-4}	2.23×10^{-5}	4.28×10^{-5}	3.61×10^{-6}
Annual Monthly Maximum	4.16×10^{-3}	1.00×10^{-4}	2.81×10^{-4}	2.13×10^{-5}

Source: Greystone 2000d.

In addition to a visibility analysis, acid deposition (wet and dry) of sulfur and nitrogen was also calculated at the Casa Grande National Monument using the procedures described in the aforementioned FLAG document. The results of the analysis are shown in Table 4-17.

Table 4-17
Deposition at Casa Grande National Monument

	Maximum 24-Hour Deposition (kilograms/hectare)	
Month	**Nitrogen**	**Sulfur**
January	0.00723	0.00059
February	0.00413	0.00040
March	0.00227	0.00029
April	0.00131	0.00025
May	0.00117	0.00014
June	0.00364	0.00024
July	0.00253	0.00028
August	0.00300	0.00041
September	0.00537	0.00042
October	0.00031	0.00005
November	0.00284	0.00022
December	0.00169	0.00013

Conclusion. Air quality impacts from construction or operation of the proposed Facility would be minimal with respect to criteria and hazardous air pollutants, adding only a small incremental contribution to existing air quality. The average 24-hour PM_{10} increment resulting from facility operation would be 3.16 percent of the regulatory standard, representing the maximum criteria air pollutant contribution from the facility as a percent of the standard. The maximum one-hour exposure of ammonia would be approximately 18 percent of the exposure level that ADHS has determined to be presumptively "safe". The average annual formaldehyde concentration, as measured against Arizona Air Quality Guidelines, would be 7.25 percent of the hazardous pollutant guideline. The maximum PSD Class II increment consumption in the significance area would be 5.9 percent of the NO_2 PSD Class II increment, therefore consuming a minimal portion of the increment. Visibility impacts in the Class I airsheds would be less than five percent.

4.2.2 Pipelines

Fugitive dust emissions would result from construction along the pipeline ROW. Emissions during construction would be associated with land clearing, drilling, excavation, and earth moving. Dust emissions often vary substantially from day to day, depending on the level of activity, the specific operation, and the prevailing meteorological conditions. A large portion of the fugitive dust emissions would result from construction equipment traffic along the ROW. Construction along the ROW would result in dust emissions that may have a temporary adverse impact on the local air quality. These impacts are comparable to the current agricultural activity ongoing in the area.

4.2.3 Transmission Lines

Fugitive dust emissions would result from construction along the transmission line ROW. Emissions during construction would be associated with land clearing, drilling, excavation, and earth moving. Dust emissions often vary substantially from day to day, depending on the level of activity, the specific operation, and the prevailing meteorological conditions. A large portion of the fugitive dust emissions would result from construction equipment traffic along the ROW. Construction along the ROW would result in dust emissions that may have a temporary adverse impact on the local air quality. These impacts are comparable to the current agricultural activity ongoing in the area. As part of the mitigation of transmission line construction impacts, all construction vehicle movement outside the ROW would be restricted to predesignated access, contractor-acquired access or public roads. All requirements of those entities having jurisdiction over air quality matters would be adhered to and any permits need for construction activities would be obtained.

Table 4-17
CAP Water Quality and Predicted Wastewater Quality

	Calcium	Chloride	Copper	Iron	Magnesium	Manganese	Sulfate	TDS
Maximum	74.2	82.0	<0.01	0.11	28.2	0.03	252	560
Predicted Maximum for Wastewater Pond[1]	371.0	410.0	<0.05	0.55	141.0	0.15	1260	2800
Predicted Water Quality in Blended Wastewater[2]	272.1	300.7	<0.04	0.40	103.4	0.11	924.0	2053.3
Groundwater[3]	NA[4]	735	NA	NA	72.0	NA	669	2752
Secondary Drinking Water Maximum Contaminant Levels[5]	None	250	1.0	0.3	None	0.05	250	500

[1] Assumes all constituents from inflow CAP are in 20% volume of RO outflow
[2] Blended water quality based on 2 parts RO water + 1 part CAP water
[3] DEIS, Table 3-4
[4] Not Analyzed
[5] 40 CFR 143.3

4.8 CULTURAL RESOURCES

This section discusses the potential effects of the construction and operation of the proposed Project and alternatives on cultural resources at the proposed Site, transmission lines, and pipeline as well as the surrounding areas. Potential impacts were assessed by evaluating existing cultural resource studies, as well as conducting an additional archaeological survey of previously un-surveyed land for the proposed transmission lines (Northland 2001). Specifically, proposed Site file searches were completed at appropriate institutions (e.g., Arizona State Museum, Arizona State Historic Preservation Office, and Bureau of Land Management) to determine the potential for cultural resources occurring within the proposed Project area. No cultural properties eligible or potentially eligible for inclusion on the NRHP were identified within the proposed Facility area. Western has consulted with seven interested Tribes regarding both the proposed Facility and transmission line routes (see Section 3.8). Prior to any construction, Western would also consult with the State Historic Preservation Office, Advisory Council, and Arizona State Museum to make sure all cultural resources in the proposed Project area are handled appropriately.

Construction of the proposed Site, the transmission lines, and the pipeline (including ROWs and access roads) has the potential to adversely impact cultural resources (prehistoric, historic or modern) or result in their discovery. Avoidance of any known or newly discovered cultural resources is the recommended primary means of mitigation. However, if avoidance is not possible it would be necessary to develop and implement data recovery plans in order to mitigate potential adverse effects. Two large prehistoric (Hohokam) canal systems, the Pinkley Canal and the Casa Grande Canal, as well as numerous historic water delivery systems would be crossed by the proposed transmission lines. Further investigation of the historical significance and the exact locations of these facilities would be determined before construction begins.

Western is required to comply with the following Executive Orders, Executive Order 13007: Protection and Accommodation of Access to Indian Sacred Sites, and Executive Order 13084: Consultation and Coordination With Indian Tribal Governments, in addition to the statutes and regulations listed in Table 5-1 in the Sundance Energy Project DEIS.

4.8.1 Facilities

The proposed Site was surveyed for cultural resources in 1985, 1999 and 2001, and no significant historic properties were found (Greystone 2000e, Slawson 1999).

4.8.2 Pipelines

The proposed pipeline corridor parallels an existing El Paso pipeline and crosses through arid plains away from major rivers. Modern agriculture in this area is maintained by irrigation systems. Any inventories of the existing pipeline ROW would be reviewed, and any areas of potential disturbance that have not been adequately covered by previous investigations would be inventoried prior to construction. Judging from the results of past investigations in the general area, there is a low potential for significant historic or prehistoric sites along the corridor (Greystone 2000e). However, 27 irrigation ditches would be crossed by the proposed pipeline,

and the historical significance of each ditch would need to be determined prior to construction. Plans to avoid adversely impacting any feature determined to be of historical significance would need to be explicitly stated. Mitigation may include detailed historical documentation including date of construction, historical association [person, canal system] and photodocumentation.

The proposed Project would tie into El Paso Natural Gas Company's 2000 Line after it has been converted from oil to a natural gas line pipeline. The El Paso 2000 Line was formerly owned by the All American Pipeline Corporation and was surveyed and mitigated for archaeological impacts on its construction in the 1980s (Ackerly et al. 1989; Northland 2000).

4.8.3 Transmission Lines

The construction of the proposed transmission line also has the potential to impact cultural resources, including significant prehistoric and historic canals, as well as prehistoric habitation and limited activity sites. If possible, transmission line support poles and towers should be place to avoid any known cultural resources. Construction may result in the discovery of previously unidentified cultural resources. If a discovery is made, work at the site of the discovery should stop until it can be evaluated by a professional cultural resource specialist who should then make recommendations regarding the disposition of the discovery. Those recommendations could include avoidance, removal (in the case of human burials), or further investigation (data recovery). All archaeological sites determined significant in consultation with the SHPO and interested tribes would be avoided. If they cannot be avoided, a mitigation plan would be developed in consultation with the SHPO and interested tribes.

4.8.3.1 Proposed Action

An intensive cultural resource inventory has not yet been completed for the proposed transmission lines and associated facilities or for the proposed transmission line upgrades (Northland 2001). The actual areas of disturbance involved in transmission line upgrades are limited in extent and it should be feasible to avoid or limit impact to identified historic or prehistoric properties. The new transmission lines and Signal Substation would likely entail more ground disturbance, but are located in areas containing fewer significant historic properties (Greystone 2000e, Northland 2001). Monitoring of transmission line construction by a trained cultural resource specialist is necessary to avoid impacts to archaeological sites. The Proposed Action could potentially affect sites AZ AA:2:30 and U:14:108 which are both recommended as eligible for inclusion in the NRHP. In addition, the Proposed Action may impact potentially eligible sites: AZ AA:2:203 and AA:2:204 (both prehistoric limited activity sites) and AA:2:130 (Pima Lateral Canal, a historic concrete-lined canal). There is a high potential for the presence of significant prehistoric canals where the Proposed Action passes nearest to Casa Grande Ruins National Monument (Northland 2001). All archaeological sites determined significant in consultation with the SHPO and interested tribes would be avoided. If they cannot be avoided, a mitigation plan would be developed in consultation with the SHPO and interested tribes.

4.8.3.2 Alternative 1

In terms of known cultural resources, Alternative 1 does not differ appreciably from the Proposed Action. Adding a third 230-kV line to the north from the proposed Site may slightly alter the extent of disturbance in some areas, but would not alter where that disturbance may occur. The differences in Alternative 1 in Section 19 are not in an area of currently known historic properties and the anticipated effects are comparable to the Proposed Action. However, Alternative 1 includes a re-routing of the existing Coolidge-Signal 115-kV line from this point in Section 19 to the Coolidge Substation and replacement of existing wooden H-frame structures with double-circuit tubular steel pole structures. The areas of disturbance are near the Gila River and the Casa Grande Ruins National Monument, where there is a high potential for the presence of potentially significant historic and prehistoric cultural resources. There is a high potential for the presence of significant prehistoric canals where Alternative 1 passes nearest to Casa Grande Ruins National Monument (Northland 2001).

Alternative 1 would potentially affect sites AZ AA:2:30 and U:14:108 which are recommended as eligible for inclusion in the NRHP and AA:2:130 which is the potentially NRHP-eligible Pima Lateral historic concrete-lined canal. Alternative 1 may also affect the ineligible historic sites AA:2:127 (Betchel Road) and AA:6:63 (State Route 87) (Northland 2001). All archaeological sites determined significant in consultation with the SHPO and interested tribes would be avoided. If they cannot be avoided, a treatment plan would be developed in consultation with the SHPO and interested tribes.

4.8.3.3 Alternative 2

In terms of potential effects to known or undocumented cultural resources, Alternative 2 is essentially the same as Alternative 1. Both alternatives are estimated to increase surface disturbance by about 34 acres more than the Proposed Action, but this estimate does not include disturbance that can impact cultural resources, such as temporary access, and staging and storage areas. There is a high potential for the presence of significant prehistoric canals where Alternative 2 passes nearest to Casa Grande Ruins National Monument (Northland 2001).

Alternative 2 would potentially affect sites AZ AA:2:30 and U:14:108 which are recommended as eligibile for inclusion in the NRHP and AA:2:130 which is the potentially NRHP-eligible Pima Lateral historic concrete-lined canal. Alternative 2 may also affect the ineligible historic sites AA:2:127 (Betchel Road) and AA:6:63 (State Route 87) (Northland 2001). All archaeological sites determined significant in consultation with the SHPO and interested tribes would be avoided. If they cannot be avoided, a mitigation plan would be developed in consultation with the SHPO and interested tribes.

4.8.3.4 Alternative 3

Shortly after the issuance of the Sundance Energy Project DEIS, Alternative 3 was identified as the preferred routing. Subsequently, pedestrian survey for cultural resources was initiated. Alternative 3 would re-route the existing Coolidge-Signal 115-kV line from this point in Section 19 to the Coolidge Substation and replace existing wooden H-frame structures with double-

circuit tubular steel pole structures. The areas of disturbance are near the Gila River and the Casa Grande Ruins National Monument, where there is a high potential for the presence of potentially significant historic and prehistoric cultural resources. All areas of potential direct or indirect effect would be inventoried for cultural resources, including significant prehistoric canal systems (Northland 2001).

The Alternative 3 Route would potentially affect sites AZ AA:2:200, AA:2:30 and U:14:108 which are all prehistoric sites recommended as eligible for inclusion in the NRHP and potentially eligible sites: AZ AA:2:201, AA:2:129 and AA:2:130 (one prehistoric limited activity site, and two concrete-lined historic canals, the Pima Lateral and the Southside Canal). Alternative 3 may also affect the ineligible historic sites AZ AA:2:207, AA:2:208, AA:2:209, AA:2:210, AA:2:127 (Betchel Road), AA:6:63 (State Route 87) and Field Site 3 (Northland 2001) (Northland 2001). All archaeological sites determined significant in consultation with the SHPO and interested tribes would be avoided. If they cannot be avoided, a mitigation plan would be developed in consultation with the SHPO and interested tribes.

4.13 CUMULATIVE IMPACTS

This section describes the potential cumulative impacts of the Proposed Action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The section includes the methods of analysis and a summary of the cumulative impacts by resource area.

4.13.1 Introduction

The Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of the NEPA define cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" [40 Code of Federal Regulations (CFR) Part 1508.7]. The regulations further explain that "cumulative effects can result from individually minor but collectively significant actions taking place over a period of time." The cumulative effects analysis presented in this EIS are based on the potential effects of construction and operation of the proposed Project and the interconnection to Western's transmission system when added to common issues and their effects in the ROIs for each resource resulting from past, present, and reasonably foreseeable future actions.

4.13.2 Methods of Analysis

The cumulative effects were assessed by combining three elements: anticipated activities by Sundance, anticipated activities by Western, and other anticipated projects and activities (primarily in Pinal County). Anticipated proposed Project activities are summarized from the detailed discussions in Chapters 1 through 4. There are no plans to upgrade the Coolidge-Rogers Line in Western's current Ten-Year Plan. However, during negotiations on renewing the lease for the Coolidge-Rogers transmission line across the Gila River Indian Reservation, the potential for upgrades to the line was discussed. In addition, a potential upgrade to the Coolidge-Rogers Line was mentioned, during the scoping meeting for the proposed Project.

It has been determined that an upgrade to the Coolidge-Rogers Line is not needed at this time to provide transmission capacity for the proposed Project. Since the potential upgrade has been the subject of public discussion, the cumulative impacts of an upgrade to the Coolidge-Rogers Line are included below. If, in the future, the upgrade of the 230-kV Coolidge-Rogers Line is again proposed, the proposal would be evaluated through the NEPA compliance process.

Actions by others in the region include the construction and operation of the Reliant Energy Power Plant and the conversion of the former All American pipeline from oil to natural gas. Since construction of the Reliant Energy Power Plant has already begun, the project impacts were included in as part of the Affected Environment evaluated in Chapter 3 of this EIS.

Two other power stations could soon be operating in Pinal County. The Desert Basin Generating Station in Casa Grande, Arizona, is a 563 megawatt natural gas-fired merchant power plant that is scheduled to be producing by the summer of 2001. The Toltec Power Station is a proposed 2,000-megawatt, natural-gas-fired power plant in southern Pinal County. The Toltec Power Station is scheduled to begin generating by the beginning of 2007.

According to the California Energy Commission, there are 18 power plant proposed for southern central Arizona (Maricopa and Pinal counties). Not all of these proposed facilities may be built. The environmental information gathering process for these facilities is mostly in the beginning stages. While these power stations would be required to meet all environmental standards and regulations, the large number of power stations in the two county area could have significant impacts to air quality and water use.

Two of the landowners in the vicinity of the proposed Project area have informed Western of their intentions to develop their land from agricultural use into housing subdivisions. One of the landowners has begun the zoning change process with the Pinal County Board of Supervisors.

4.13.3 Cumulative Impacts by Resource Area

A summary of the cumulative impacts of the Proposed Action and alternatives is shown in Table 4-19.

4.14 UNAVOIDABLE ADVERSE IMPACTS

The construction and operation of the Proposed Action or any of the alternatives would result in some unavoidable adverse impacts. Impacts to residential areas located near the proposed facilities during construction would include increases in daytime noise and fugitive dust, as well as traffic detours. Since these impacts are associated with the construction phase, they are short-term and temporary. Residences closest to the proposed Facility could experience an increase in noise of up to 10 dBA above the measured background noise level from the operation of the proposed Facility. This level of change in sound levels may be perceived as “dramatic” by these residents.

The generation of energy using gas turbines would cause unavoidable emissions of air pollutants that can be considered an adverse impact. Computer modeling shows that maximum concentrations of most pollutants would occur on the high terrain to the west and northwest of the proposed Facility on the eastern ridges or the Sacaton Mountains. However, these concentrations are expected to be well below applicable ambient air quality standards.

Construction and operation of the proposed Facility would result in the generation of small quantities of solid and hazardous wastes that could decrease the life of existing landfills and increase shipments to RCRA-permitted treatment and disposal facilities, respectively.

Construction of the pipeline would adversely impact about 124 acres of prime farmland soils. This would include compaction of these soils and damaging the soil structure during excavation.

In addition, increases in soil erosion could occur as a result of construction of all of the proposed facilities.

Construction and operation of the proposed Facility would cause loss and/or disturbance to existing native plant communities and loss of habitat for terrestrial animal populations. Cultural resources present in the affected areas could be adversely impacted by construction of the proposed Facility. Surveys conducted prior to construction would aid in mitigating these impacts. Affects that can be avoided would be mitigated through data recovery.

Since the view from nearby roads is of cropland and undisturbed areas, the proposed Facility exhaust stacks, either two at 100-foot and six at 60-foot tall or 12 at 60-foot tall, could considered to be an adverse impact on the viewshed to travelers on the nearby roads. The construction of new transmission towers could have a similar effect.

Table 4-19
Cumulative Impacts

Affected Environment	Proposed Action	Other Projects in Area
LAND USE	No long-term impacts related to siting, construction, and operation of the proposed Facility. No impacts to land status and land uses from proposed Facility construction and operation Short-term impacts are increased daytime noise and dust, the presence of crew and equipment and obstruction of traffic at crossings during construction. Access road would be constructed on proposed Site. No disruption to land uses from access road construction. Pipeline construction on agricultural land would cause temporary loss of crops on construction ROW. Crop yields reduced for 1 to 2 years following construction. Short-term affects would include traffic detours during construction. No impacts to existing land status and land uses from transmission line construction and operation. No impacts to recreational uses are expected. Short-term affects would include obstruction of traffic at road crossings and maintenance activities.	**Coolidge-Rogers** Wherever possible, access to each structure and the ROW would be by existing roads and trails. Much of the reconductoring on the line would be built onto the existing line. **All American Pipeline** The conversion of the pipeline from oil to natural gas would not involve new ROW and would not have impacts on land use. **Housing Subdivisions** The rezoning of the land from agricultural to residential could be approved whether or not the proposed Project is implemented. There could be potential conflicts over ROWs as infrastructure in the area is improved.
AIR QUALITY	No significant air quality impacts are expected in the proposed Project area. Emissions of criteria pollutants, PM_{10}, SO_2, CO, NO_2, and VOCs are expected to be negligible and less than one percent of all applicable ambient air quality standards. Hazardous air pollutants from the combustion of natural gas during operation are expected to be below AAAQG. Two visual impacts greater than 5 percent are predicted to occur in the Class I airshed, Superstition Wilderness, in December and March. Acid deposition impacts are predicted at two Class I airsheds, Superstition Wilderness and Saguaro West National Park.	**Coolidge-Rogers** The potential upgrade and reconductoring of the transmission line is expected to have no impacts on air quality. **All American Pipeline** The conversion of the pipeline from oil to natural gas would require the use of new compressor stations along the line. At this time, it is not anticipated that a compressor station would be built in the area. **Housing Subdivisions** If the proposed housing subdivisions were to be built and the proposed Project implemented, there would be more potential receptors for air pollutants from the proposed Facility. Modeling of the air

Table 4-19
Cumulative Impacts (continued)

Affected Environment	Proposed Action	Other Projects in Area
AIR QUALITY (continued)	Fugitive dust emission impacts are expected from pipeline and transmission line construction activities.	impacts shows that stack height precludes much of the impacts from the immediate vicinity of the proposed Facility.
NOISE	Noise emission levels ranging from 93-108 dBA at the source during construction and from 63-85 dBA during operation are expected. Noise level diminishes with distance from the proposed Site. Those residences closest to the proposed Facility could experience an increase in noise from operation of the proposed Facility equivalent to a residential air conditioner at 50 feet. Noise emission levels from pipeline and transmission line construction are expected to range from 40-45 dBA during daytime hours. Construction noise would be at each 1-mile interval of construction.	**Coolidge-Rogers** The potential upgrade and reconductoring of the transmission line would involve noise due to construction activities. Activities would not take place at same place or same time as the proposed Project activities. **All American Pipeline** The conversion of the pipeline would involve noise due to construction activities. Activities would not take place at same place or same time as the proposed Project activities. **Housing Subdivisions** Development of some of the nearby parcels of agricultural land into housing subdivisions will have several cumulative noise impacts. The development would likely increase both daytime and nighttime background noise levels whether or not the proposed Project is built. While, there would be more people nearby to experience noise from the proposed Facility, the increase in background noise would make the noise from the proposed Facility relatively less noticeable.
INFRASTRUCTURE/WASTE MANAGEMENT	No substantial impact from the proposed Facility infrastructure to local area power supplies or natural gas supply is anticipated. Potential contamination hazard from the storage and use of fuel, lubricants, and other fluids during construction of the proposed Facility, pipelines, transmission lines, and access road. Impacts would be minimized by the restriction of refueling activities from dry washes and by requiring immediate cleanup of spills and leaks. No significant affects to municipal solid waste facilities related to the generation of solid waste.	**Coolidge-Rogers** The potential upgrade and reconductoring of the transmission line would have no impacts to infrastructure or waste management. **All American Pipeline** The conversion of the pipeline would have no impacts to infrastructure or waste management. **Housing Subdivisions** There could be conflict over ROWs for increased infrastructure should the residential areas be constructed.

Table 4-19
Cumulative Impacts (continued)

Affected Environment	Proposed Action	Other Projects in Area
WATER RESOURCES	Minimal impacts to other users are anticipated from groundwater usage by the proposed Facility. Groundwater pumping is expected to have minimal impact on the Pinal AMA aquifer. No subsidence is anticipated from groundwater pumping. No impact to groundwater quality is expected from the proposed Facility construction and operation activities. No impacts from proposed Facility construction and operation are expected to other users of CAP water. The proposed Facility usage is expected to help defray operation and maintenance costs of CAP system. No impacts expected from the extraction of CAP water. Potential contamination from storage and use of fuels, lubricants, fluids, and chemicals during the proposed Facility construction and operation. Increased runoff is anticipated during pipeline and transmission line construction related to storms and large flow events in disturbed areas. Potential for increased erosion, sedimentation, turbidity, release of chemical and nutrient pollutants; and introduction of chemical contamination from fuels and lubricants. No impacts are anticipated from the design of the stormwater disposal dikes due to implementation of SPCC plans. No impacts are expected from the use of effluent water for agriculture.	**Coolidge-Rogers** The potential upgrade and reconductoring of the transmission line would not contribute to water usage in the area. There would be no significant impact to the Gila River and the small dry washes even though construction and upgrade of the line would cross the Gila River and the small dry washes. **All American Pipeline** The conversion of the pipeline would not contribute to water usage in the area. Disturbances to surface water are expected to be minimal. **Housing Subdivisions** The water use associated with the future development cannot be predicted. The likely source of the water would be groundwater.
BIOLOGICAL RESOURCES	Minimal impacts to native wash community from the proposed Facility construction and operation are anticipated. Potential loss and/or disturbance of 50 acres of sparse native vegetation during construction. Potential loss of 50 acres of non-game wildlife habitats.	**Coolidge-Rogers** The potential upgrade and reconductoring of the transmission line would involve minor temporary disturbances during construction activities.

Table 4-19
Cumulative Impacts (continued)

Affected Environment	Proposed Action	Other Projects in Area
BIOLOGICAL RESOURCES (continued)	Potential impacts from pipeline and transmission line construction to vegetation related to the loss and/or disturbance to native plant communities. No significant adverse impacts to special status species from the proposed Facility, pipeline, and transmission line construction and operation are anticipated to species in Pinal County. Minimal impact expected due to loss of habitat.	**All American Pipeline** The conversion of the pipeline would involve minor temporary disturbances during construction activities. **Housing Subdivisions** The development of housing subdivisions could disturb a large amount of land depending on the size of the development. The land parcels are currently used for agriculture, and therefore the impacts are not expected to be significant.
CULTURAL RESOURCES	No significant impacts on cultural resources are expected from the proposed Facility construction and operation. No significant historic properties were found in the proposed Facility site during previous cultural surveys. Prehistoric artifact scatter was recorded outside the potential affected area. Past investigations indicate a low potential for significant historic or prehistoric sites. Previous inventories would be reviewed before construction begins. Potential disturbances not covered by previous investigations would be inventoried before construction.	**Coolidge-Rogers** The potential upgrade and reconductoring of the transmission line probably would have an impact on cultural resources. **All American Pipeline** The conversion of the pipeline would have no impacts to cultural resources. **Housing Subdivisions** The development of housing subdivisions could disturb a large amount of land depending on the size of the development. No surveys of the parcels have been undertaken, so the potential for disturbance cultural resources is unknown.
VISUAL RESOURCES	Impacts to visual landscape from the addition of buildings, exhaust stacks, and night lighting when viewed from sensitive viewpoints, travel routes, recreation areas, and residences. Short-term impacts due to construction and operation of gas pipeline due to vegetation removal in the ROW, until vegetation has been reestablished in disturbed areas. No impacts to croplands after the ROW has been replanted with crops.	**Coolidge-Rogers** The potential upgrade and reconductoring of the transmission line would have no new visual impacts. **All American Pipeline** The conversion of the pipeline would have no new visual impacts. **Housing Subdivisions** Development of some of the nearby parcels of agricultural land into housing subdivisions would have several cumulative effects on visual resources. The proposed

Table 4-19
Cumulative Impacts (continued)

Affected Environment	Proposed Action	Other Projects in Area
VISUAL RESOURCES (continued)	Short-term impacts during construction while using local roads. Significant long-term impacts to the landscape from the installation of pole structures when viewed from sensitive viewpoints and in scenic landscapes, and a small number of residents and travelers on nearby county roads.	development would transform the area from an agricultural vista to a broken agricultural/residential housing view. While, there would be more people nearby to view the stacks and power poles, only those on the nearby edges of the development would be affected. Other residents would see neighboring houses in the foreground.
TRANSPORTATION	Minimal impacts to transportation are expected from the proposed Facility construction and operation. Access road would be entirely within the Site. Short-term traffic impacts are expected at the junction of Randolph Road and the access road by construction activities and construction traffic. Short-term traffic delays may occur in Coolidge due the large vehicles delivering equipment and construction activities. Short-term pipeline construction-related traffic impacts at highway crossings. Access to existing ROW expected to cause temporary traffic impacts from construction-related traffic stops and lane closures.	**Coolidge-Rogers** The potential upgrade and reconductoring of the transmission line would involve short-term traffic delays related to large vehicles delivering equipment and construction activities at highway crossings and intersections of local roads with access roads. **All American Pipeline** The conversion of the pipeline would involve short-term traffic delays related to large vehicles delivering equipment and construction activities at highway crossings and intersections of local roads with access roads. **Housing Subdivisions** The development of residential subdivisions could result in more traffic on more numerous and wider paved roads in the vicinity.
SOCIOECONOMICS	Positive impacts on the local economy are expected from the proposed Facility construction and operation. Increased tax revenues are anticipated. Local economy would be affected by direct project spending and induced economic effects. Minimal impacts to public utilities, services, and schools in Coolidge and Phoenix are anticipated. Positive impact anticipated for electricity supply and reliability of regional system.	**Coolidge-Rogers** The potential upgrade and reconductoring of the transmission line would have no impacts. **All American Pipeline** The conversion of the pipeline would result in increased availability of natural gas in the area and could increase the potential for development. **Housing Subdivisions** The residential development could increase burdens on schools and other community services. However, the increase to the.

SOCIOECONOMICS (continued)		property tax base should offset these burdens.
ENVIRONMENTAL JUSTICE	No impacts from construction and operation of the proposed Facility are anticipated. No impacts from construction and operation of pipelines are anticipated. No impacts from construction and operation of transmission lines are anticipated.	**Coolidge -Rogers** The potential upgrade and reconductoring of the transmission line would have no environmental justice impacts. **All American Pipeline** The pipeline conversion would have no environmental justice impacts. **Housing Subdivisions** The residential development would have no environmental justice impacts.

5.1 LAWS, REGULATIONS, EXECUTIVE ORDERS, AND DOE ORDERS

The major Federal law, regulations, Executive Orders, and other compliance actions that potentially apply to the proposed Project, depending on the various alternatives, are identified in Table 5-1. There are a number of Federal environmental statutes that address environmental protection, compliance or consultation. In addition, certain environmental requirements have been delegated to State authorities for enforcement and implementation. It is Western's policy to conduct its operations in an environmentally safe manner and in compliance with all applicable statutes, regulations, and standards. Although this chapter does on address pending legislation or future regulations, Western recognizes that the regulatory environment is in transition, and subject to many changes, and that the construction and operation of the proposed Project must be conducted in compliance with all applicable regulations and standards.

5.2 REGULATORY ACTIVITIES

New permits and approvals would be needed before the proposed Project and associated facilities could be constructed. Permits regulate many aspects of facility construction and operations, including the quality of construction, treatment and storage of hazardous waste, and discharges of effluents to the environment. These permits would be obtained as required from appropriate Federal, state, and local agencies. Table 5-2 contains a summary of the primary approvals that would be required to implement the Proposed Action or the alternatives.

5.3 CONSULTATIONS

Certain statutes and regulations require Western to consider consultations with Federal, state, local agencies, and federally recognized Native American groups regarding the potential for the proposed Project to disturb sensitive resources. The needed consultations must occur in a timely manner and are generally required before any land disturbance can begin. Most of these consultations are related to biological, cultural, and Native American resources. Biological resource consultations generally pertain to the potential for activities to disturb sensitive species or habitats. Cultural resource consultations pertain to the potential for destruction of important cultural or archeological sites. Native American consultations are concerned with the potential for disturbance of Native American ancestral sites or traditional practices.

Western has initiated informal consultation with the USFWS regarding Western's need to address effects to proposed, candidate, and listed threatened and/or endangered species (see Letters, Appendix A). Western's determination on whether the proposed Project would adversely affect proposed, candidate or listed species is pending on the completion of the biological assessment.

A Class I cultural resource review of the proposed Project has been completed. Consultations with the State Historic Preservation Officer and affected Tribes would be initiated upon completion of intensive and ethnographic surveys.

Table 5-1
Federal Environmental Statutes, Regulations and Orders

Resource Category	Statute/ Regulation/Order	Citation	Responsible Agency	Permits, Approvals, Consultations, and Notifications
Air Resources	Clean Air Act (CAA) As amended	42 USC §§ 7401 et seq.	Environmental Protection Agency (EPA)	Requires sources to meet standards and obtain permits to satisfy: National Ambient Air Quality Standards, State Implementation Plans, Standards of Performance for New Stationary Sources, National Emission Standards for Hazardous Air Pollutants, and Prevention of Significant Deterioration.
	National Ambient Air Quality Standards (NAAQS)/State Implementation Plans	42 USC §§ 7409 et seq.	EPA	Requires compliance with primary and secondary ambient air quality standards governing sulfur dioxide, nitrogen oxide, carbon monoxide, ozone, lead, and particulate matter and emission limits/reduction measures as designated in each state's implementation plan.
	Standards of Performance for New Stationary Sources	42 USC §§ 7411 et seq.	EPA	Establishes control/emission standards and recordkeeping requirements for new or modified sources specifically addressed by a standard.
	National Emission Standards for Hazardous Air Pollutants	42 USC §§ 7412 et seq.	EPA	Requires sources to comply with emission levels of carcinogenic or mutagenic pollutants; may require a preconstruction approval, depending on the process being considered and the level of emissions that will result from the new or modified source.
	Prevention of Significant Deterioration	42 USC §§ 7470 et seq.	EPA	Applies to areas that are in compliance with NAAQS. Requires comprehensive preconstruction review and the application of Best Available Control Technology to major stationary sources (emissions of 100 t/year) and major modifications; requires a preconstruction review of air quality impacts and the issuance of a construction permit from the responsible state agency setting forth emission limitations to protect the Prevention of Significant Deterioration increment.
	Noise Control Act of 1972	42 USC §§ 4901 et seq.	EPA	Requires facilities to maintain noise levels that do not jeopardize the health and safety of the public.

Table 5-1
Federal Environmental Statutes, Regulations and Orders

Resource Category	Statute/ Regulation/Order	Citation	Responsible Agency	Permits, Approvals, Consultations, and Notifications
Water Resources	Clean Water Act (CWA)	33 USC §§ 1251 et seq.	EPA	Requires EPA or state-issued permits and compliance with provisions of permits regarding discharge of effluents to surface waters.
	National Pollutant Discharge Elimination System (NPDES) (section 402 of CWA)	33 USC §§ 1342 et seq.	EPA	Requires permit to discharge effluents (pollutants) and stormwaters to surface waters; permit modifications are required if discharge effluents are altered.
	Safe Drinking Water Act (SDWA)	42 USC §§ 300f et seq.	EPA	Requires permits for construction/operation of underground injection wells and subsequent discharging of effluents to ground aquifers.
	Executive Order 11988: Floodplain Management	3 CFR, 1977 Comp., p. 117	Water Resources Council, Federal Emergency Management Agency, Council on Environmental Quality (CEQ)	Requires consultation if project impacts a floodplain.
Hazardous wastes and soil resources	Compliance with Floodplain/ Wetland Environmental Review Requirements	10 CFR 1022	Department of Energy (DOE)	Requires DOE to comply with all applicable floodplain/wetlands environmental review requirements.
	Farmland Protection Policy Act of 1981	7 USC §§ 4201 et seq.	Soil Conservation Service	DOE shall avoid any adverse effects to prime and unique farmlands.
Biological Resources	Bald and Golden Eagle Protection Act	16 USC §§ 668 et seq.	U.S. Fish and Wildlife Service (USFWS)	Consultations should be conducted to determine if any protected birds are found to inhabit the area. If so, DOE must obtain a permit prior to moving any nests due to construction or operation of project facilities.

Table 5-1
Federal Environmental Statutes, Regulations and Orders

Resource Category	Statute/ Regulation/Order	Citation	Responsible Agency	Permits, Approvals, Consultations, and Notifications
Biological Resources (continued)	Migratory Bird Treaty Act	16 USC §§ 703 et seq.	USFWS	Requires consultation to determine if there are any impacts on migrating bird populations due to construction or operation of project facilities. If so, DOE will develop mitigation measures to avoid adverse effects.
	Endangered Species Act of 1973	16 USC §§ 1531 et seq.	USFWS/ National Marine Fisheries Service	Requires consultation to identify endangered or threatened species and their habitats, assess DOE impacts thereon, obtain necessary biological opinions, and, if necessary, develop mitigation measures to reduce or eliminate adverse effects of construction or operations.
Cultural Resources	National Historic Preservation Act of 1966, as amended	16 USC §§ 470 et seq.	President's Advisory Council on Historic Preservation	Require DOE to consult with the State Historic Preservation Office (SHPO) prior to construction to ensure that no historical properties will be affected.
	Archaeological and Historical Preservation Act of 1974	16 USC §§ 469 et seq.	Department of the Interior	Requires DOE to obtain authorization for any disturbances of archaeological resources.
	Antiquities Act	16 USC §§ 431-433	Department of the Interior	Requires DOE to comply with all applicable sections of the Act.
	American Indian Religious Freedom Act of 1978	42 USC §§ 1996	Department of the Interior	Requires DOE to consult with local Native American Indian tribes prior to construction to ensure that their religious customs, traditions, and freedoms are preserved.
	Executive Order 11593: Protection and Enhancement of the Cultural Environment	3 CFR 154, 1971-1975 Comp., p. 559	Department of the Interior	Requires DOE to aid in the preservation of historic and archeological data that may be lost during construction activities.
	Executive Order 13007: Protection and Accommodatior of Access to "Indian Sacred Sites"	May 24, 1996	Department of the Interior	Requires DOE to consider the potential impact of its actions on Native American sacred sites, access to sacred sites, or use of sacred sites.

Table 5-1
Federal Environmental Statutes, Regulations and Orders

Resource Category	Statute/ Regulation/Order	Citation	Responsible Agency	Permits, Approvals, Consultations, and Notifications
	Executive Order 13084: Consultation and Coordination With Indian Tribal Governments	May 14, 1998	Department of the Interior	Requires DOE to consult on a government-to-government basis with tribes and Nations
Worker Safety and Health	Occupational Safety and Health Act	5 USC §§ 5108	OSHA	Requires Agencies to comply with all applicable work safety and health legislation (including guidelines of 29 CFR 1960) and prepare, or have available, Material Safety Data Sheets.
Worker Safety and Health (continued)	Hazard Communication Standard	29 CFR 1910.1200	OSHA	Requires DOE to ensure that workers are informed of, and trained to handle all chemical hazards in the DOE workplace.
Other	National Environmental Policy Act	42 USC §§ 4321 et seq.	Council on Environmental Quality (CEQ)	Requires DOE to comply with NEPA implementing procedures in accordance with 10 CFR 1021.
	Toxic Substances Control Act (TSCA)	42 USC §§ 2011	EPA	Requires DOE to comply with inventory reporting requirements and chemical control provisions of TSCA to protect the public from the risks of exposure to chemicals. TSCA imposes strict limitations on use and disposal of polychlorinated biphenyl-contaminated equipment.
	Hazardous Materials Transportation Act	49 USC §§ 1801 et seq.	Department of Transportation (DOT)	Requires DOE to comply with the requirements governing hazardous materials and waste transportation.
	Emergency Planning and Community Right-To-Know Act of 1986	42 USC §§ 11001 et seq.	EPA	Requires the development of emergency response plans and reporting requirements for chemical spills and other emergency releases, and imposes right-to-know reporting requirements covering storage and use of chemicals which are reported in toxic chemical release forms.
	Pollution Prevention Act of 1990	42 USC §§ 11001-11050	EPA	Establishes a national policy that pollution should be reduced at the source and requires a toxic chemical source reduction and

Table 5-1
Federal Environmental Statutes, Regulations and Orders

Resource Category	Statute/ Regulation/Order	Citation	Responsible Agency	Permits, Approvals, Consultations, and Notifications
				recycling report for an owner or operator of facility required to file an annual toxic chemical release form under section 313 of SARA.
	Objects Affecting the Navigation Space	14 CFR 77	Federal Aviation Administration (FAA)	Provisions of these regulations specify the criteria used by the FAA for determining whether a "Notice of Proposed Construction or Alteration" is required for potential obstruction hazards. The need for such a notice depends on factors related to the height of the structure, the slope of an imaginary surface from the end of nearby runways to the top of the structure, and the length of the runway involved.
	Proposed Construction and/ or Alteration of Objects that May Affect the Navigation Space	FAA Advisory Circular (AC) No. 70/460-2H	FAA	This circular informs each proponent of a project that could pose an aviation hazard of the need to file the "Notice of Proposed Construction or Alteration" (Form 7640) with the FAA.
	Obstruction Marking and Lighting	FAA AC No. 70/460-1G	FAA	This circular describes the FAA standards for marking and lighting objects that may pose a navigation hazard as established using the criteria in Title 14, Part 77 of the CFR.
	Radio Frequency Device, Kits	47 CFR 15.25	Federal Communications Commission (FCC)	Provisions of these regulations prohibit operation of any devices producing force fields, which interfere with radio communications, even if (as with transmission lines) such devices are not intentionally designed to produce radio-frequency energy. The FCC requires each line operator to mitigate all complaints about interference on a case-specific basis. Staff usually recommends specific conditions of certification to ensure compliance with this FCC requirement.
	Executive Order 12843: Procurement Requirements and Policies for Federal Agencies for Ozone Depleting Substances	April 12, 1993	EPA	Requires Federal agencies to minimize procurement of ozone depleting substances and conform their practices to comply with Title VI of CAA Amendments referencing stratospheric ozone protection and to recognize the increasingly limited availability of Class I substances until final phaseout.

Table 5-1
Federal Environmental Statutes, Regulations and Orders

Resource Category	Statute/ Regulation/Order	Citation	Responsible Agency	Permits, Approvals, Consultations, and Notifications
	Executive Order12856: Federal Compliance with Right-To-Know Laws and Pollution Prevention Requirements	August 3, 1993	EPA	Requires Federal agencies to achieve 50-percent reduction of agency's total releases of toxic chemicals to the environment and offsite transfers, to prepare a written facility pollution prevention plan not later than 1995, to publicly report toxic chemicals entering any waste stream from Federal facilities, including any releases to the environment, and to improve local emergency planning, response, and accident notification.
	Executive Order 12873: Federal Acquisition, Recycling, and Waste Prevention	October 20, 1993	EPA	Requires Federal agencies to develop affirmative procurement policies and establishes a shared responsibility between the system program manager and the recycling community to effect use of recycled items for procurement.
	Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	February 11, 1994	EPA	Requires Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.
	Executive Order 12088: Federal Compliance with Pollution Control Standards	3 CFR, 1978 Comp., p. 243	Office of Management and Budget (OMB)	Requires Federal agency landlords to submit to OMB an annual plan for control of environmental pollution and to consult with EPA and state agencies regarding the best techniques and methods.
	Executive Order 11514: Protection and Enhancement of Environmental Quality	3 CFR, 1966-1970 Comp., p.902	CEQ	Requires Federal agencies to demonstrate leadership in achieving the environmental quality goals of NEPA; provides for DOE consultation with appropriate Federal, state, and local agencies in carrying out their activities as they affect the environment.`

Western has initiated consultations with Federal and State agencies as well as federally recognized Native American groups regarding the potential alternatives for the Sundance Energy proposed Project to disturb sensitive resources. Table 5-3 presents a summary of the consultations initiated by DOE. Appendix A contains copies of the various consultation letters sent by Western to Agencies and Native American groups and the written responses provided by those agencies and groups. All agencies and Native American groups will be provided with a copy of the Draft Sundance Energy EIS. Information from the agencies and Native American groups responses has been incorporated into Chapters 3 and 4 as appropriate.

Table 5-2
Project List of Permits/Approvals

Agency	Permit/Approval
Arizona Corporation Commission (ACC)	Certificate of Environmental Compatibility
Pinal County Air Quality Control District	Air Quality Permits
U.S. Environmental Protection Agency (EPA)	– Prevention of Significant Deterioration (PSD) Permit – Operating Permit – Acid Rain Permit
	Toxic Air Emissions
Arizona Department of Environmental Quality (ADEQ)	Aquifer Protection Permit
ADEQ	Hazardous Waste Permit
ADEQ/EPA	Stormwater Permits
Arizona Department of State Lands	Condemnation by Western
Bureau of Land Management (BLM)	Right-of-way Grant
Arizona Department of Agriculture	Native Plant Permit
Arizona Department of Transportation (ADOT)	Encroachment Permit Crossing Permit Boring Permit Class C Permit
Pinal County	Zoning Approval Industrial Use Permit Excavation/Grading Permit Septic Permit Permit for Temporary Construction Facilities Permit for Temporary Power Building Permits Permit to Build in Roadway
US Fish and Wildlife Service	Concurrence or Biological Opinion
Arizona State Historic Preservation Office	Concurrence or Agreement Document
U.S. Army Corps of Engineers	Nationwide 404 Permit
Arizona State Museum	Cultural Resources Inventory Permit Burial Agreement

Table 5-3
Summary of Consultations Initiated by Western

Subject	DOE Consultation Letter	Agency/Group Response
	Addressed To (Date of Letter)	**From (Date of Response or Last Contact)**
Land Management	Mr. Mike Anable Arizona State Land Department (December 29, 2000)	
Land Management	Jim Anderson Bureau of Land Management (December 29, 2000)	Michael A. Taylor Bureau of Land Management (January 8, 2001)
Native American	Donald Antone Gila River Indian Community (December 20, 2000)	Barnaby Lewis – verbal contact (January 9, 2001)
Biological Resources	Robert Broshid Arizona Game and Fish Department (December 29, 2000)	
Native American	Delia Carlyle Ak-Cin Community (December 20, 2000)	Mr. Jon Shumaker – verbal contact (January 16, 2001)
NEPA	David Farrell Environmental Protectional Agency, Region 9 (December 29, 2000)	
Air Quality	Donald Gabrielson Pinal Air Quality Stationary Sources (December 20, 2000)	
Cultural Resources	James Garrison Arizona State Historic Preservation Officer (December 20, 2000)	
Biological Resources	David L. Harlow U.S Fish and Wildlife Service (October 12, 2000 and November 29, 2000)	David L. Harlow (November 15, 2000 and December 14, 2000)
Biological Resources	Kim Hartwig U.S Fish and Wildlife Service (December 29, 2000)	
State Official	Jane Dee Hull Governor of Arizona (December 20, 2000)	
Native American	Ivan Makil Salt River Pima-Maricopa Indian Community (December 20, 2000)	Mr. Ron Chiago – verbal contact (January 9, 2001)

Table 5-3
Summary of Consultations Initiated by Western

Subject	DOE Consultation Letter	Agency/Group Response
	Addressed To (Date of Letter)	**From (Date of Response or Last Contact)**
Native American	Edward Manuel Tohono O'odham Nation (December 21, 2000)	
Biological Resources	James McGinnis Arizona Department of Agriculture Native Plant & Cultural Resource Protection (October 13, 2000 and November 28, 2000)	James McGinnis (October 20, 2000)
Land Manage-ment	Davis F. Pecusa Bureau of Indian Affairs, Pima Agency (December 29, 2000)	
Biological Resources	Duane Shroufe Arizona Game and Fish Department (October 13, 2000 and November 20, 2000)	State of Arizona Game and Fish Department, Project Evaluation Program, Habitat Branch Heritage Data, (November 12, 2000 and December 20, 2000))
Cultural Resources	Don Spencer Casa Grande National Monument National Park Service (December 29, 2000)	
Native American	Raymond Stanley San Carlos Apache Tribe (December 20, 2000)	Vernelda Grant – verbal contact (January 9, 2001)
Native American	Peter Steere Tohono O'odham Nation (January 30, 2001)	Peter Steere – verbal contact (January 10, 2001)
Native American	Wayne Taylor, Jr. The Hopi Tribe (December 20, 2000)	Leigh Kuwanwisiwma – letter (October 23, 2000) verbal contact (January 18, 2001)
Air Quality	Richard Tobin Arizona Department of Environmental Quality (December 20, 2000)	
Native American	Robert Valencia Pascua Yaqui Tribe of Arizona (January 30, 2001)	Amalia Reyes – verbal contact (January 16, 2001)
Water Resources	Greg Wallace Arizona State Department of Water Resources (December 29, 2000)	

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LIST OF ACRONYMS AND ABBREVIATIONS

AAAQG	Arizona Ambient Air Quality Guidelines
AADT	Annual Average Daily Traffic
ACC	Arizona Corporation Commission
ADA	Arizona Department of Agriculture
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
AGFD	Arizona Game and Fish Department
ADHS	Arizona Department of Health Standards
AM	Amplitude Modulation
AMA	Pinal Active Management Area
APP	Aquifer Protection Permit
APS	Arizona Public Service
AQCR	Air Quality Control Region
AQRV	Air Quality Related Values
AZMET	Arizona Meteorological Network
BACT	Best Available Control Technology
BADCT	Best Available Demonstrated Control Technology
BLM	Bureau of Land Management
bsg	below surface grade
CAP	Central Arizona Project
CAS	Chemical Abstract Service
CATEF	California Air Toxics Emission Factors
CAWCD	Central Arizona Water Conservation District
CEQ	Council on Environmental Quality
CO	carbon monoxide
DEIS	Draft Environmental Impact Statement
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation

DSW	Western's Desert Southwest Customer Service Regional Office
ELF-EMF	extremely-low-frequency electric and magnetic field
EIS	Environmental Impact Statement
El Paso	El Paso Natural Gas Company
EMS	Emergency Medical System
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPRI	Electric Power Research Institute
Facility	Generating facility
FEIS	Final Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FLAG	Federal Land Managers' Air Quality Related Values Workgroup
FM	Frequency modulation
GE	General Electric
GMA	Groundwater Management Act
GR	General Rural
HAP	Hazardous Air Pollutant
HID	Hohokam Irrigation District
IGR	Irrigation Grandfathered Rights
ISCST	Industrial Source Complex Short Term
KOP	Key Observation Point
LCU	lower conglomerate unit
M&I	Municipal and Industrial
MSA	Metropolitan Statistical Area
MSCU	middle silt and clay unit
MSID	Maricopa-Stanfield Irrigation District
MSL	mean sea level
NEIC	National Earthquake Information Center
NEPA	National Environmental Policy Act
NIEHS	National Institute of Environmental Health Sciences
NIOSH	National Institute of Occupational Safety and Health

NRCS	Natural Resource Conservation Service
NWS	National Weather Service
ORV	off-road vehicle
OSC	Oil Spill Contingency
OSHA	Occupational Safety and Health Administration
PAD	Planned Area Development
PCAQCD	Pinal County Air Quality Control District
POC	point(s) of compliance
Project	Sundance Energy Project
PSD	Prevention of Significant Deterioration
RAPID	Research and Public Information Dissemination
RO	Reverse Osmosis
ROI	Region of Influence
ROW	rights-of-way
SCIDD	San Carlos Irrigation and Drainage District
SCR	Selective Catalytic Reduction
SCS	Soil Conservation Service
SIC	Standard Industrial Code
SPCC	Spill Prevention Countermeasure and Control
Tariff	Notice of Final Open Access Transmission Service Tariff
TDS	total dissolved solids
UAU	upper alluvial unit
UR	Urban Ranch Residential
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compounds
Western	Western Area Power Administration
WS	Waters of the State
WUS	Waters of the United States

CHEMICALS AND ABBREVIATIONS

ac-ft	acre foot or acre feet
bcf	billion cubic feet
cf/hr	cubic feet per hour
CO	carbon monoxide
dB	decibel
dBA	weighted sound levels
F	Fahrenheit
gm	gram
gpm	gallons per minute
K	Kelvin
km	kilometer
kV	kilovolt
lbs	pounds
$\mu g/m^3$	microgram per cubic meter
m	meter
mg/L	milligram per liter
MMBtu	million British Thermal Unit
MMscf	million standard cubic feet
mmcf	million cubic feet
MW	megawatt
NO_2	nitrogen dioxide
NO_x	nitrous oxides

O_3	ozone
PM_{10}	particulate matter less than 10 microns in diameter
Pb	lead
ppb	parts per billion
ppm	parts per million
ppmvd	parts per million dry volume
psig	pounds per square inch
SO_2	sulfur dioxide
VOC	volatile organic compounds
yr	year
*m*T	microtesla

CONVERSION CHART

To Convert Into Metric			To Convert Into English		
If You Know	**Multiply By**	**To Get**	**If You Know**	**Multiply By**	**To Get**
Length					
inch	2.54	centimeter	centimeter	0.3937	inch
feet	30.48	centimeter	centimeter	0.0328	feet
feet	0.3048	meter	meter	3.281	feet
yard	0.9144	meter	meter	1.0936	yard
mile	1.60934	kilometer	kilometer	0.62414	mile (Statute)
Area					
square inches	6.4516	square centimeter	square centimeter	0.155	square inch
square feet	0.092903	square meter	square meter	10.7639	square feet
square yard	0.8361	square meter	square meter	1.196	square yard
acre	0.40469	hectare	hectare	2.471	acre
square mile	2.58999	square kilometer	square kilometer	0.3861	square mile
acre-foot	1233.48	cubic meters	cubic meters	0.00081	acre-foot
Volume					
fluid ounce	29.574	milliliter	milliliter	0.0338	fluid ounce
gallon	3.7854	liter	liter	0.26417	gallon
gallon	0.0039	cubic meter	cubic meter	256.14	gallon
cubic feet	0.028317	cubic meter	cubic meter	35.315	cubic feet
cubic yard	0.76455	cubic meter	cubic meter	1.308	cubic yard
Weight					
ounce	28.3495	gram	gram	0.03527	ounce
pound	0.45360	kilogram	kilogram	2.2046	pound
short ton	0.90718	metric ton	metric ton	1.1023	short ton
Force					
dyne	0.00001	newton	newton	100,000	dyne
Temperature					
Fahrenheit	Subtract 32 then multiply by 5/9ths	Celsius	Celsius	Multiply by 9/5ths, then add 32	Fahrenheit

METRIC PREFIXES

Prefix	Symbol	Multiplication Factor
exa-	E	1 000 000 000 000 000 000 = 10^{18}
peta-	P	1 000 000 000 000 000 = 10^{15}
tera-	T	1 000 000 000 000 = 10^{12}
giga-	G	1 000 000 000 = 10^{9}
mega-	M	1 000 000 = 10^{6}
kilo-	k	1 000 = 10^{3}
hecto-	h	l00 = 10^{2}
deka-	da	l0 = 10^{1}
deci-	d	0.1 = 10^{-1}
centi-	c	0.01 = 10^{-2}
milli-	m	0.001 = 10^{-3}
micro-	*m*	0.000 001 = 10^{-6}
nano-	n	0.000 000 001 = 10^{-9}
pico-	p	0.000 000 000 001 = 10^{-12}
femto-	f	0.000 000 000 000 001 = 10^{-15}
atto-	a	0.000 000 000 000 000 001 = 10^{-18}

Acre-foot: The volume of water that will cover an area of 1 acre to a depth of 1 foot (326,000 gallons, 0.5 second foot days, 1,233.5 cubic meters).

Active storage: Storage in a reservoir that is normally used for water development and flood control. Storage above the minimum power pool and below the top of the flood control storage.

Advisory Council on Historic Preservation: A 19-member body appointed to advise the President and Congress in the coordination of actions by Federal agencies on matters relating to historic preservation.

Adjustment provisions: Sales contract provisions for changes in hydrologic resources.

Administrator: The Administrator of the Western Area Power Administration.

Aeolian: Borne, deposited, produced, or eroded by the wind.

Aesthetics: Referring to the perception of beauty.

Affected environment: Existing biological, physical, social, and economic conditions of an area subject to change, both directly and indirectly, as the result of a proposed human action.

Air dispersion modeling: a mathematical simulation, usually computer-generated, of how gases, vapors, or particles disperse into the air.

Air fogging system: During hot weather conditions, the air fogging system cools incoming air to combustion turbines by spraying a fine mist – or a fog – of water in front of the air intakes which in turn increases turbine generating capacity.

Air pollutant: Generally, an airborne substance that could, in high enough concentrations, harm living things or cause damage to materials. From a regulatory perspective, an air pollutant is a substance for which emissions or atmospheric concentrations are regulated or for which maximum guideline levels have been established due to potential harmful effects on human health and welfare.

Air quality: Generally, an airborne substance that could, in high enough concentrations, harm living things or cause damage to materials. From a regulatory perspective, an air pollutant is a substance for which emissions or atmospheric concentrations are regulated or for which maximum guideline levels have been established due to potential harmful effects on human health and welfare.

Air Quality Control Region (AQCR): Geographic subdivisions of the United States established to regulate pollution on a region or local level. Some regions span more than one state.

Air Quality Standards: The level of pollutants prescribed by regulation that may not be exceeded during a specified time in a defined area.

Alluvial deposits: Deposits of earth, sand, gravel, and other materials carried by moving surface water deposited at points of weak water flow.

Ambient air: Any unconfined portion of the atmosphere; open air, surrounding air. That portion of the atmosphere, external to buildings, to which the general public has access.

Amperes: Measure of the flow of electric current; source of a magnetic field.

Aquifer: A body of rock or sediment in a formation, group of formations, or part of a formation that is saturated and sufficiently permeable to transmit economic quantities of water to wells and springs.

Archaeological sites (resources): Any location where humans have altered the terrain or discarded artifacts during either prehistoric or historic times.

Archaeology: A scientific approach to the study of human ecology, cultural history, and cultural process.

Artifact: An object produced or shaped by human workmanship of archaeological or historical interest.

Attainment area: An area which the U.S. Environmental Protection Agency (EPA) has designated as being in compliance with one or more of the National Ambient Air Quality Standards (NAAQS) for sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and particulate matter. Any area may be in attainment for some pollutants but not for others.

Atmospheric dispersion: The process of air pollutants being dispersed into the atmosphere. This occurs by the wind that carries the pollutants away from their source and by turbulent air motion that results from solar heating of the Earth's surface and air movement over rough terrain and surfaces.

Auxiliary transformer: A backup transformer.

Background noise: The total acoustical and electrical noise from all sources in a measurement system that may interfere with the production, transmission, time averaging, measurement, or recording of an acoustical signal.

Baseload: Within the alternatives, this refers to operating the hydropower system to maximize baseload energy production. Baseload power plants have high capacity factors meaning they operate much of the time.

Bounding: A credible upper limit to consequences or impacts.

Blading: The use of a steel blade or steel fork attachment on a tracked or rubber-tired vehicle that removes vegetation through a combination of pushing and/uplifting motions.

Breaker: A switching device that is capable of closing or interrupting an electrical circuit under over-load or short- circuit conditions as well as under normal load conditions.

Bus: A set of two or more electrical conductors that serve as common connections between load circuits and each of the phases (in alternating current systems) of the source of electric power.

Candidate species: A species of plant or animal for which there is sufficient information to indicate biological vulnerability and threat, and for which proposing to list as "threatened" or "endangered" is or may be appropriate.

Capability: The maximum load that a generator, turbine, transmission circuit, apparatus, station, or system can supply under specified conditions for a given time interval, without exceeding approved limits of temperature and stress.

Capacity: The load for which a generator, turbine, transformer, transmission circuit, apparatus, station, or system is rated. Capacity is also used synonymously with capability.

Carbon monoxide (CO): A colorless, odorless gas that is toxic if breathed in high concentrations over a period of time. It is formed as the product of the incomplete combustion of hydrocarbons (fuel).

Class I, II, and III Areas: Area classifications, defined by the *Clean Air Act*, for which there are established limits to the annual amount of air pollution increase. Class I areas include international parks and certain national parks and wilderness areas; allowable increases in air pollution are very limited. Air pollution increases in Class II areas are less limited, and are least limited in Class III areas. Areas not designated as Class I start out as Class II and may be reclassified up or down by the state, subject to federal requirements.

Clean Air Act (CAA): (42 U.S. Code 7401 et seq.) Establishes (1) national air quality criteria and control techniques (Section 7408); (2) National ambient air quality standards (Section 7409); (3) state implementation plan requirements (Section 4710); (4) federal performance standards for stationary sources (Section 4711); (5) national emission standards for hazardous air pollutants (Section 7412); (6) applicability of CAA to federal facilities (Section 7418), i.e., Federal agency must comply with federal, state, and local requirements respecting control and abatement of air pollution, including permit and other procedural requirements, to the same extent as any person; (7) federal new motor vehicle emission standards (Section 7521); (8) regulations for fuel (Section 7545); (9) aircraft emission standards (Section 7571).

Clean Water Act: (33 U.S. Code 1251 et seq.) Restores and maintains the chemical, physical, and biological integrity of the nation's waters.

Climatology: The science that deals with climates and investigates their phenomena and causes.

Code of Federal Regulations (CFR): All Federal regulations in force are published in codified form in the Code of Federal Regulations.

Combined-Cycle Generation Facility The combination of a gas turbine and a steam turbine in an electric generation plant. The waste heat from the gas turbine provides the heat energy for the steam turbine.

Combustion turbine: Turbine operating on fuels that are capable of converting heat energy into electrical energy.

Community (biotic): All plants and animals occupying a specific area under relatively similar conditions.

Compressor: A machine, especially a pump, for compressing air, gas, etc.

Conservation: A reduction in electric power consumption as a result of increases in the efficiency of energy use, production, or distribution.

Consumptive water use: The difference in the volume of water withdrawn from a body of water and the amount released back into the body of water.

Corona effect: Electrical breakdown of air into charged particles. It is caused by the electric field at the surface of conductors.

Council on Environmental Quality (CEQ): Established by the *National Environmental Policy Act* (NEPA), the CEQ consists of three members appointed by the President. A CEQ regulation (Title 40 Code of Federal Regulations [CFR] 1500-1508, as of July 1, 1986) describes the process for implementing NEPA, including preparation of environmental assessments and environmental impacts statements, and the timing and extent of public participation.

Criteria pollutants: An air pollutant that is regulated by the National Ambient Air Quality Standards (NAAQS). The U.S. Environmental Protection Agency (EPA) must describe the characteristics and potential health and welfare effects that form the basis for setting or revising the standard for each regulated pollutant. Criteria pollutants include sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and particulate matter.

Critical habitat: Defined in the Endangered Species Act of 1973 as "specific areas within the geographical area occupied by [an endangered or threatened] species..., essential to the conservation of the species and which may require special management considerations or protection; and specific areas outside the geographical area occupied by the species... that are essential for the conservation of the species."

Cultural resources: Districts, sites, structures, and objects and evidence of some importance to a culture, a subculture, or a community for scientific, traditional, religious, and other reasons. These resources and relevant environmental data are important for describing and reconstructing past lifeways, for interpreting human behavior, and for predicting future courses of cultural development.

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

Customer: Any entity or entities purchasing power from the power generator or distributor provider.

Decibel (dB): A unit for expressing the relative intensity of sounds on a logarithmic scale from zero for the average least perceptible sound to about 130 for the average level at which sound causes pain to humans. For traffic and industrial noise measurements, the A-weighted decibel (dBA), a frequency-weighted noise unit, is widely used. The A-weighted decibel scale corresponds approximately to the frequency response of the human ear and thus correlates well with loudness.

Demand: The rate at which energy is used at a given instant or averaged over a designated period of time.

Demineralization: To remove minerals, as salt, from water.

Deposition: In geology, the laying down of potential rock-forming materials; sedimentation. In atmospheric transport, the settling out on ground and building surfaces of atmospheric aerosols and particles ("dry deposition") or their removal from the air to the ground by precipitation ("wet deposition" or "rainout").

Discharge: The volume of water released from a dam or powerhouse at a given time, usually expressed as cubic feet per second.

Distance zones: The relative visibility from travel routes or observation points.

Double-circuit: Two sets of lines (circuits) on a single tower (a single circuit consists of three conductors).

Drainage basin: An aboveground area that supplies the water to a particular stream.

Drawdown: The height difference between the natural water level in a formation and the reduced water level in the formation caused by the withdrawal of groundwater.

Drinking water standards: The prescribed level of constituents or characteristics in a drinking water supply that cannot be exceeded legally.

Ecology: A branch of science dealing with the interrelationships of living organisms with one another and with their nonliving environment.

Ecosystem: Living organisms and their nonliving (abiotic) environment functioning together as a community.

Effects: As used in NEPA documentation, the terms effects and impacts are synonymous. Effects can be ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.

Effluent: A waste stream flowing into the atmosphere, surface water, ground water, or soil. Most frequently the term applies to wastes discharged to surface waters.

Elevation: Height in feet above sea level.

Eligibility: The criteria of significance in American history, architecture, archeology, engineering, and culture. The criteria require integrity and association with lives or events, distinctiveness for any of a variety of reasons, or importance because of information the property does or could hold.

Eligible cultural resource: A cultural resource that has been evaluated and reviewed by an agency and the State Historic Preservation Office(r) and recommended as eligible for inclusion in the National Register of Historic Places, based on the criteria of significance.

Emissions: Pollution discharged into the atmosphere from smoke stacks, other vents, and surface areas of commercial or industrial facilities, residential chimneys, and vehicle exhausts.

Emission Standards: Requirements established by a state, local government, or the U.S. Environmental Protection Agency (EPA) Administrator that limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis.

Endangered Species: Plants or animals that are in danger of extinction through all or a significant portion of their ranges and that have been listed as endangered by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service following the procedures outlined in the Endangered Species Act and its implementing regulations (50 CFR 424). *Note: Some states also list species as endangered. Thus, in certain cases a state definition would also be appropriate*.

Endangered Species Act: (16 U.S. Code 1531 et seq.) Provides for listing and protection of animal and plant species identified as in danger, or likely to be in danger, or extinction throughout all or a significant portion of their range. Section 7 places strict requirements on federal agencies to protect listed species.

Environmental Impact Statement: The detailed written statement that is required by section 102(2)(C) of the National Environmental Policy Act (NEPA) for a proposed major Federal action significantly affecting the quality of the human environment. A DOE EIS is prepared in accordance with applicable requirements of the Council on Environmental Quality NEPA regulations in 40 CFR Parts 1500-1508, and the Department of Energy NEPA regulations in 10 CFR Part 1021.

Environmental Justice: An identification of potential disproportionately high and adverse impacts on low-income and/or minority populations that may result from proposed federal actions (required by Executive Order 12898).

Energy: That which does or is capable of doing work. It is measured in terms of the work it is capable of doing; electric energy is usually measured in kilowatt-hours.

Ephemeral stream: A stream that flows only after a period of heavy precipitation.

Erosion: Wearing away of soil and rock by weathering and the actions of surface water, wind, and underground water.

Ethnographic: Information about cultural beliefs and practices.

Executive Order 12898: Issued by the President on February 11, 1994, this Executive Order requires federal agencies to develop implementation strategies, identify low-income and minority populations that may be disproportionately impacted by proposed federal actions, and solicit the participation of low-income and minority populations.

Facility: The power generating components of the natural gas-fired, simple cycle peaking power plant.

Fault: A fracture or a zone of fractures within a rock formation along which vertical, horizontal, or transverse slippage has occurred. A normal fault occurs when the hanging wall has been depressed in relation to the footwall. A reverse fault occurs when the hanging wall has been raised in relation to the footwall.

Federal Energy Regulatory Commission: An agency in the U.S. Department of Energy that regulates interstate transfers of electrical energy, certificates for natural gas pipelines, resource development, and other energy actions.

Field effect: Induced currents and voltages as well as related effects that might occur as a result of electric and magnetic fields at ground level.

Floodplain: The lowlands adjoining inland and coastal waters and relatively flat areas, including at a minimum that area inundated by a 1-percent or greater chance flood in any given year. The base floodplain is defined as the 100-year (1.0 percent) floodplain. The critical action floodplain is defined as the 500-year (0.2 percent) floodplain.

Flow: The volume of water passing a given point per unit of time. Same as streamflow.

Formation: In geology, the primary unit of formal stratigraphic mapping or description. Most formations possess certain distinctive features.

General Rural (GR) Zone: The General Rural (GR) Regulatory Zone is intended to identify areas that are: (1) remote and will have no or very low density development (i.e. 1 dwelling unit per 40 acres), (2) in transition from rural to suburban or urban densities on the urban fringe, and (3) remote but where unique developments may occur (e.g. destination resorts, conference centers, etc.). This regulatory zone identifies areas that may have one or more of the following characteristics:

(a) Floodplains. The parcel or area is within the 100-year floodplain identified on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) or, where these maps are unavailable, is within other potential floodplain areas identified by the Washoe County Department of Community Development.

(b) Potential Wetlands. The parcel or area is within a "potential wetland area" as identified by the U.S. Army Corps of Engineers (COE) or, where COE maps are unavailable, is within other potential wetland areas identified by the Washoe County Department of Community Development.

(c) Slopes. The parcel or area has moderate slopes (between 15 and 30 percent) or steep slopes (30 percent or steeper) based on interpretation of the topographic information on the USGS maps for Washoe County.

(d) Public Ownership. The parcel or area is under public ownership.

(e) Remote Location Lacking Infrastructure. The parcel or area is in a remote location that does not have public infrastructure adjacent to or near the site.

Generating unit: The combination of generator and step-up transformer.

Generation: The act or process of producing electricity from other forms of energy.

Generator: A machine that converts mechanical energy into electrical energy.

Groundwater: Water within the earth that supplies wells and springs.

Groundwater basin: Subsurface structure having the character of a basin with respect to collection, retention, and outflow of water.

Hazardous Air Pollutants: Air pollutants that are not covered by ambient air quality standards, but that may present a threat of adverse human health effects or adverse environmental effects.

Hazardous waste: A category of waste regulated under the Resource Conservation and Recovery Act (RCRA). To be considered hazardous, a waste must be a solid waste under RCRA and must exhibit at least one of four characteristics described in 40 CFR 261.20 through 40 CFR 261.24 (i.e., ignitability, corrosivity, reactivity, or toxicity) or be specifically listed by the Environmental Protection Agency in 40 CFR 261.31 through 40 CFR 261.33.

Historic properties: Under the *National Historic Preservation Act*, these are properties of national, state, or local significance in American history, architecture, archaeology, engineering, or culture, and worthy of preservation.

Hydraulic conductivity: A coefficient describing the rate at which water can move through a permeable medium.

Impacts (effects): As assessment of the meaning of changes in all attributes being studied for a given resource; an aggregation of all the adverse effects, usually measured using a qualitative and nominally subjective technique. In this EIS, as well as in the CEQ regulations, the word impact is used synonymously with the word effect.

Indirect impacts: Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Infrastructure: The basic installations and facilities on which the continuance and growth of a community or state (e.g., roads, schools, power plants, transportation, communication systems) are based.

Intensity (of an earthquake): A measure of the effects (due to ground shaking) of an earthquake at a particular location, based on observed damage to structures built by humans, changes in the earth's surface, and reports of how people felt the earthquake. Earthquake intensity is measured in numerical units on the Modified Mercalli scale. [See Modified Mercalli Intensity scale and magnitude (of an earthquake).]

Intertie: A transmission line that links two or more regional electric power systems.

Interested parties: Those groups or individuals that are interested, for whatever reason, in the project and its progress. Interested parties include but are not limited to private individuals, public agencies, organizations, customers, and potential customers.

Invertebrate: Animals characterized by not having a backbone or spinal column, including a wide variety of organisms such as insects, spiders, worms, clams, crayfish, etc.

Irrigation District: An irrigation district performs only an irrigation function. If other electrical functions are performed, such as residential service or other utility responsibilities, the district may be considered a utility. The term irrigation districts may include agricultural types of districts, such as electrical districts, water delivery districts, and water conservation districts.

Isolated occurrence: A grouping of less than ten artifacts or a single undatable feature. These often consists of redeposited material of questionable locational context that are not related to nearby archaeological sites.

Jurisdictional wetlands: Those wetlands that meet the hydrophytic vegetation, hydric soils, and wetland hydrology criteria under normal circumstances (or meet the special circumstances as described in the U.S. Army Corps of Engineers, 1987, wetland delineation manual where one or more of these criteria may be absent and are a subset of "Waters of the United States").

Kilovolt (kV): The electrical unit of power that equals 1,000 volts.

Lacustrine deposits: Deposits found or formed in lakes.

Level of service: In transportation analysis, a qualitative measure describing operational conditions within a traffic stream and how they are perceived by motorists and/or passengers.

Lithic: A stone artifact that has been modified or altered by human hands.

Load: The amount of electric power required at a given point on a system.

Loop: To tie a substation into an existing transmission line in such a manner as to complete the circuit along that line. Running a double-circuit loop line to a substation would allow an incoming line and an outgoing line.

Low-income population: A population that is classified by the U.S. Bureau of the Census as having an aggregated mean income level for a family of four that correlates to $13,359, adjusted through the poverty index using a standard of living percentage change where applicable, and whose composition is at least 25 percent of the total population of a defined area or jurisdiction.

Loam: A rich, permeable soil composed of a mixture of clay, silt, sand, and organic matter.

Magnitude (of an earthquake): A quantity characteristic of the total energy released by an earthquake, as contrasted to "intensity," which describes its effects at a particular place. Magnitude is calculated using common logarithms (base 10) of the largest ground motion. A one-unit increase in magnitude (for example, from magnitude 6 to magnitude 7) represents a 30-fold increase in the amount of energy released. Three common types of magnitude are Richter (or local) (M_L), P body wave (m_b), and surface wave (M_s).

Major source: Any stationary source or group of stationary sources in which all of the pollutant-emitting activities at such source emit, or have the potential to emit, 100 or more tons per year of any regulated air pollutants.

Mammal: Animals in the class Mammalia that are distinguished by having self regulating body temperature, hair, and in females, milk-producing mammary glands to feed their young.

Megawatt (MW): The electrical unit of power that equals 1 million watts or 1 thousand kilowatts.

Merchant plant: A power plant not owned by a utility.

Mesa: An isolated relatively flat-topped natural elevation.

Meteorology: The science dealing with the dynamics of the atmosphere and it phenomena, especially relating to weather.

Mineral: Naturally occurring inorganic element or compound.

Minority Population: A population that is classified by the U.S. Bureau of the Census as African American, Hispanic American, Asian and Pacific American, American Indian, Eskimo, Aleut, and other non-White persons, whose composition is at least 25 percent of the total population of a defined area or jurisdiction.

Mitigation: The alleviation of adverse impacts on environmental resources by avoidance through project redesign or project relocation, by protection, or by adequate scientific study.

Modified Mercalli Intensity Scale: The Modified Mercalli Intensity Scale is a standard of relative measurement of earthquake intensity, developed to fit construction conditions in most of the United States. It is a 12-step scale, with values from I (not felt except by a very few people) to XII (damage total).

National Ambient Air Quality Standards (NAAQS): Standards defining the highest allowable levels of certain pollutants in the ambient air. Because the U.S. Environmental Protection

Agency (EPA) must establish the criteria for setting these standards, the regulated pollutants are called criteria pollutants.

National Emissions Standards for Hazardous Air Pollutants (NESHAPs): Emissions standards set by the Environmental Protection Agency for air pollutants which are not covered by National Ambient Air Quality Standards (NAAQS) and which may, at sufficiently high levels, cause increased fatalities, irreversible health effects, or incapacitating illness.

National Environmental Policy Act: 42 U.S.C. 4341, passed by Congress in 1975. The Act established a national policy designed to encourage consideration of the influences of human activities (e.g., population growth, high-density urbanization, industrial development) on the natural environment. NEPA also established the Council on Environmental Quality (CEQ). NEPA procedures require that environmental information be made available to the public before decision are made. Information contained in NEPA documents must focus on the relevant issues in order to facilitate the decision-making process.

National Historic Preservation Act (NHPA): (16 U.S.C. 470) Provides for an expanded national Register of Historic Places (NRHP) to register districts, sites, buildings, structures, and objects significant to American history, architecture, archaeology, and culture. Section 106 requires that the President's Advisory Council on Historic Preservation be afforded an opportunity to comment on any undertaking that adversely affects properties listed in the NRHP.

National Pollutant Discharge Elimination System (NPDES) Permit: Federal regulation (40 CFR Parts 122 and 125) that requires permits for the discharge of pollutants from any point source into the waters of the U.S. regulated through the *Clean Water Act*, as amended.

National Register of Historic Places: A list maintained by the Secretary of the Interior of districts, sites, buildings, structures, and objects of prehistoric or historic local, state, or National significance. The list is expanded as authorized by Section 2(b) of the *Historic Sites Act of 1935* (16 U.S.C. 462) and Section 101(a)(1)(A) of the *National Historic Preservation Act of 1966*, as amended.

Native American: A tribe, people, or culture that is indigenous to the U.S.

Native vegetation: Plant life that occurs naturally in an area without agricultural or cultivation efforts. It does not include species that have been introduced from other geographical areas and have become naturalized.

Noise: Unwanted or undesirable sound, usually characterized as being so loud as to interfere with, or be inappropriate to, normal activities such as communication, sleep, study or recreation. (See background noise.)

Nonattainment: An area shown by monitored data or modeling to exceed National Ambient Air Quality Standards for a particular air pollutant.

Nonattainment area: An area that the U.S. Environmental Protection Agency (EPA) has designated as not meeting (that is, not being in attainment of) one or more of the National

Ambient Air Quality Standards (NAAQS) for criteria pollutants. An area may be in attainment for some pollutants, but not others.

Obligate species: Plant species that almost always occur in wetlands (i.e., greater than 99 percent of the time).

Open Access Transmission Service Tariff: Supports the intent of FERC's Notice of Proposed Rulemaking for Open Access Transmission. Tariff requires Western to offer its transmission lines for delivery of electricity when capacity is available.

Ozone: The triatomic form of oxygen. In the stratosphere, ozone protects the earth from the sun's ultraviolet rays but in the lower levels of the atmosphere, ozone is considered an air pollutant.

Paleontology: The study of fossils.

Particulate Matter: Any finely divided solid or liquid material, other than uncombined water.

Parker-Davis Project: In 1954, the Parker Dam Power Project and the Davis Dam Project were consolidated to form the Parker-Davis Project. The major works include Davis (originally named "Bullhead") Dam and Powerplant, Parker Dam and Powerplant, a high-voltage transmission system, and substations which sectionalize the long transmission lines.

Peak capacity: The maximum capacity of a system to meet loads.

Peak demand: The highest demand for power during a stated period of time.

Peaking power/peaking generation: Power plant capacity that is typically used to meet rapid increases or the highest levels of demand in a utility's load or demand profile. Peaking generation is usually oil, gas-fired, or hydropower generation.

Perched aquifer: Groundwater separated from the underlying main body of groundwater, or aquifer, by unsaturated rock.

Perched groundwater: A body of groundwater of small lateral dimensions lying above a more extensive aquifer.

Permeability: The ability of rock or soil to transmit a fluid.

pH: A measure of the relative acidity or alkalinity of a solution, expressed on scale from 0 to 14, with the neutral point at 7.0. Acid solutions have pH values lower than 7.0, and basic (i.e., alkaline) solutions have pH values higher than 7.0. Because pH is the negative logarithm of the hydrogen ion (H^+) concentration, each unit increase in pH value expresses a change of state of 10 times the preceding state. Thus, pH 5 is 10 times more acidic than pH 6, and pH 9 is 10 times more alkaline than pH 8.

Physiography: The science of the surface of the earth and the interrelations of air, water, and land.

Pinal County Comprehensive Plan: Plan which contains goals, objectives, and policies for the natural environment.

Plume: Visible or measurable discharges of a contaminant from a given point or area of origin into environmental media.

Potable: Suitable for drinking.

Prehistoric: Of, relating to, or existing in times antedating written history. Prehistoric cultural resources are those that antedate written records of the human cultures that produced them.

Present value: The worth of future returns or costs in terms of their current value. To obtain a present value, an interest rate is used to discount these future returns and costs.

Prevention of Significant Deterioration (of air quality) (PSD): Regulations established to prevent significant deterioration of air quality in areas that already meet National Ambient Air Quality Standards (NAAQS). Among other provisions, cumulative increases in sulfur dioxide, nitrogen dioxide, and PM-10 levels after specified baseline dates must not exceed specified maximum allowable amounts.

Prime farmland: Soil types with a combination of characteristics that make the soils particularly productive for agriculture.

Production Costs: The cost of producing electricity.

Project: Involves the construction and operation of the natural gas-fired, simple cycle peaking facility, upgrade and extension of existing 230-kV transmission lines, construction of new 230-kV transmission lines, and construction of the 14-mile long pipeline.

Property: The 300-acre property controlled by Sundance.

Public Involvement Plan: Methodology used by the agency to encourage public participation.

Quaternary: The second period of the Cenozoic era, following the Tertiary; also, the corresponding system of rocks. It consists of two epochs, the Pleistocene and the Holocene.

Raptor: Birds of prey including various types of hawks, falcons, eagles, vultures, and owls.

Record of decision (ROD): A concise public document that records a federal agency's decision(s) concerning a proposed action for which the agency has prepared an environmental impact statement (EIS). The ROD is prepared in accordance with the requirements of the Council on Environmental Quality NEPA regulations (40 CFR 1505.2). A ROD identifies the alternatives considered in reaching the decision, the environmentally preferable alternative(s), factors balanced by the agency in making the decision, whether all practicable means to avoid or minimize environmental harm have been adopted, and if not, why they were not.

Reliability: The ability of the power system to provide customers uninterrupted electric service. Includes generation, transmission, and distribution reliability.

Region of Influence (ROI): The geographical region that would be expected to be affected in some way by proposed action and alternative.

Resident fish: Fish species that reside in fresh water throughout their lives.

Right-of-way: An easement for a certain purpose over the land of another, such as a strip of land used for a transmission line, roadway or pipeline.

Riparian: Of or pertaining to the bank of a river, stream, lake, or other water bodies.

Runoff: The portion of rainfall, melted snow, or irrigation water that flows across the ground surface and may eventually enter streams.

San Carlos Irrigation Project: Irrigation and Power Agency operated by the Bureau of Indian Affairs, Department of the Interior. The Power Division covers approximately 3,000 square miles in Pinal, Pima, Gila, and Maricopa counties of central Arizona.

Saturated zone: The zone in which the voids in the rock or soil are filled with water at a pressure greater than atmospheric pressure. The water table is the top of the saturated zone in an unconfined aquifer.

SCONOx™: The SCONOx ™ Catalytic Absorption System is a proprietary catalyst developed by Goal Line Environmental Technologies LLC. The system design is based on catalytic oxidation and absorption technologies. The catalytic functions of the system are the oxidation of CO to CO2 and NO to NO2 . The system is designed to reduce both CO and NOx emissions from natural gas-fired power plants to levels below ambient concentrations.

Scoping: An early, open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action.

Section 106 process: A National Historic Preservation Act (16 U.S.C. §470 et seq.) review process used to identify, evaluate, and protect cultural resources eligible for nomination to the National Register of Historic Places that may be affected by federal actions or undertakings.

Sediment: Material deposited by wind or water.

Sedimentation: The process of deposition of sediment, especially by mechanical means from a state of suspension in water.

Seismic: Pertaining to any earth vibration, especially an earthquake.

Sensitive species: Those plants and animals identified by the Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trend in populations or density and significant or predicted downward trend in habitat capability.

Simple-Cycle facility: A facility which contains combustion turbines similar to a jet engine. Large volumes of air are forced to high pressures in a compressor. Natural gas is injected and combustion occurs. The resulting high-temperature, high-pressure exhaust gases are expanded in a turbine which produces electricity.

Site: Land that contains the generating power plant and the infrastructure occupying less than 50 acres of the Property.

Socioeconomics: The social and economic condition in the study area.

Solid waste: In general, solid wastes are non-liquid, non-soluble discarded materials ranging from municipal garbage to industrial wastes that contain complex and sometimes hazardous substances. Solid wastes include sewage sludge, agricultural refuse, demolition wastes, and mining residues.

Spill: Water passed over a spillway or regulating outlets and not going through turbines to produce electricity.

Stability class: A category characterizing the degree of stability, or absence of turbulence, in the atmosphere.

Standard provisions: One of the initial components, it refers to standard contract terms and conditions included in Sierra Nevada Region transactions.

State Historic Preservation Officer (SHPO): The official within each state, authorized by the state at the request of the Secretary of the Interior, to act as liaison for purposes of implementing the *National Historic Preservation Act.*

Step-up transformer: Transformer in which the energy transfer is from a low- to a high-voltage winding or windings. (Winding means one or more turns of wire forming a continuous coil for a transformer, relay, rotating machine, or other electric device.)

Stratigraphic: Of, relating to, or determined by stratigraphy; the superposition of layers (soil, rock, and other materials) often observed at archaeological sites.

Substation: Facility with transformers where voltage on transmission lines change from one level to another.

Surface water: All bodies of water on the surface of the earth and open to the atmosphere, such as rivers, lakes, reservoirs, ponds, seas, and estuaries.

Sundance Energy LLC: The applicant proposing to construct and operate the Sundance Energy Project.

Switchyard: Facility with circuit breakers and automatic switches to turn power on and off on different transmission lines.

Tap: To tie a substation into an existing transmission line through a connection.

Tap Point: The point where two transmission lines interconnect.

Tesla: Unit of measurement of magnetic field.

Threatened species: Plant and wildlife species likely to become endangered in the foreseeable future.

Threatened or Endangered species: Animals, birds, fish, plants, or other living organisms threatened with extinction by man-made or natural changes in their environment. Requirements for declaring species endangered are contained in the *Endangered Species Act of 1973*.

Traditional Cultural Property/Use Area: Areas of significance to the beliefs, customs, and practices of a community of people that have been passed down through generations.

Transformer: A device for transferring energy from one circuit to another in an alternating-current system. Its most frequent use in power systems is for changing voltage levels.

Transmission line: The structures, insulators, conductors and other equipment used to transfer electrical power from one point to another.

Transmission services: These services may include firm and nonfirm transmission, as well as transmission by a third party. Firm and nonfirm transmission services occur when capacity and energy are received into a system at points of interconnection with other systems and transmitted and delivered to points of delivery from a system. The CVP system may include transmission facilities owned by the Sierra Nevada Region or facilities that the Sierra Nevada Region has an entitlement or contractual right to use. Third party transmission means the Sierra Nevada Region uses transmission facilities other than its own to provide delivery of CVP power to its customers.

Transmissivity: A measure of a water-bearing unit's capacity to transmit fluid: the product of the thickness and the average hydraulic conductivity of a unit. Also, the rate at which water is transmitted through a strip of an aquifer of a unit width under a unit hydraulic gradient at a prevailing temperature and pressure.

U.S. Environmental Protection Agency (EPA): The independent federal agency, established in 1970, that regulates federal environmental matters and oversees the implementation of federal environmental laws.

Vertebrate: Animals that are members of the subphylum Vertebrata, including the fishes, amphibians, reptiles, birds, and mammals, all of which are characterized by having a segmented bony or cartilaginous spinal column.

Volatile Organic Compounds: A broad range of organic compounds, often halogenated, that vaporize at typically background or relatively low temperatures.

Volt: The unit of voltage or potential difference. It is the electromotive force which, if steadily applied to a circuit having a resistance of one ohm, will produce a current of one ampere.

Voltage: Potential for an electric charge to do work; source of an electric field.

Water rights: Permits or licenses issued after application to the State Water Resources Control Board are submitted.

Western Area Power Administration: A power marketing agency of the U.S. Department of Energy (DOE) that was established on December 21, 1977, pursuant to Section 302 of the DOE Organization Act, Public Law 95-961.

Western's Desert Southwestern Customer Service Regional Office (DSW): Manages transmission facilities in the States of Arizona, California, and Nevada.

Wetland: Land or areas exhibiting hydric soil concentrations, saturated or inundated soil during some portion of the year, and plant species tolerant of such conditions.

Wind rose: A circular diagram showing, for a specific location, the percentage of the time the wind is from each compass direction. A wind rose for use in assessing consequences of airborne releases also shows the frequency of different wind speeds for each compass direction.

Yield: A measure of the availability of water to meet authorized purposes sometimes defined in terms of the ability to meet project needs within specific time periods.