

SECTION 5

5.9 ENERGY AND MINERAL RESOURCES

5.9.1 AFFECTED ENVIRONMENT

This section describes the potential impacts on energy and mineral resources that could result from the Cadiz Project alternatives. Information for this section was obtained from Black and Veatch (1999), the California Division of Mines and Geology (CDMG 1999), BLM (1982 and 1999) and URS Greiner Woodward Clyde (1999).

There are three basic categories of mineral resources that are subject to claims on public lands and which are administered by the BLM: locatable, leasable and saleable. Locatable minerals include minerals such as calcium, lithium, gold, silver, lead, asbestos and mica. Leasable energy and mineral resources generally include oil, gas, oil shale, geothermal resources, potash, sodium, solid and semi-solid bitumen, bituminous rock, native asphalt, phosphate and coal. Saleable mineral resources generally include common varieties of sand, gravel, stone, pumice, cinders and clay.

Energy Use

The major existing energy consumers in the Cadiz Project area are the Iron Mountain Pumping Plant and the wells used to irrigate the Cadiz Inc. agricultural operations. There are seven irrigation wells which are currently powered by diesel engines. The pumps operating these wells use a total of approximately 191,500 gallons per year of diesel fuel.

The total existing annual electrical use for the entire Iron Mountain Pumping Plant and support facilities area is approximately 1,745,000 kilowatt-hours/year (1,745 megawatt-hours/year).

Natural gas is available for use at various locations throughout the Cadiz Project area. A six-inch natural gas pipeline owned by All American Pipeline, L.P. runs parallel to Cadiz-Rice Road and exclusively serves the pump and heater station for All American Pipeline, L.P.'s crude oil pipeline.

Mineral Resources

TETRA Technologies, Inc., Hills Brothers and National Chloride Company of America currently have liquid sodium and calcium chloride production operations on Bristol Dry Lake. Lee Chemical has liquid chloride (food grade) production operations on Cadiz Dry Lake.

Based on a review of existing information, the BLM has developed a series of maps representing potential mineral resources within a wide area of southeastern California. The applicable portions of these BLM maps are shown in Figures 5.9-1 through 5.9-5. These figures also depict the locations of the Cadiz Project alternatives.

Figure 5.9-1 shows the locations of various economic mineral resources, as classified and located by the BLM. The potential economic resources nearest the Cadiz Project are lithium, limestone, iron, and gypsum. Lithium is identified as concentrated in the Cadiz Dry Lake, west of the water conveyance facilities. As shown on Figure 5.9-1, the Western Alternative trends along the east edge of Cadiz Dry Lake where there is a potential source of lithium. Other potential mineral resources near the water conveyance facilities include a potential source of gypsum, about a mile east of the Cadiz Project area, at the northwest end of Danby Dry Lake; a potential source of iron, about five miles east of the north end of the Cadiz Project area; and a potential source of limestone, located to the north of the Cadiz Project area.

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Figure 5.9-2 shows areas of potential locatable minerals, as identified by the BLM. As shown, most of the water conveyance facilities will cross lands that could not be classified, either due to insufficient data or because the known geology was considered unfavorable for most locatable minerals. As shown on Figure 5.9-2, part of the northern reach of all the water conveyance facilities alignments will cross an area classified as potentially containing locatable minerals, based on limited data.

The locations of potential leaseable minerals are shown on Figure 5.9-3. There are areas that will be crossed by the water conveyance facilities that are classified as prospectively valuable for sodium. As defined by the BLM, “prospectively valuable” indicates that geologic conditions are similar to other areas where minerals have been extracted. As shown on Figure 5.9-3, these areas are located within both Cadiz and Danby dry lakes.

Figure 5.9-4 shows areas identified by the BLM as having a potential for saleable minerals. As shown, the water conveyance facilities cross land that was either unclassified or was classified as having potential sand and gravel resources. Those areas identified as having the potential for saleable sand and gravel are identified as principally sand-covered planes, river washes, sand dunes and sand-covered alluvial fans.

Figure 5.9-5 shows areas identified for potential energy georesources in the Cadiz Project area. Although most of this area does not include identified energy georesources, there are areas identified as having potential uranium and thorium deposits. One area was identified as potentially valuable for oil and gas. These energy resources are based on aerial surveys and have not been field confirmed in this area.

5.9.2 CEQA THRESHOLDS OF SIGNIFICANCE

For purposes of CEQA, the Cadiz Project would have a significant adverse impact related to energy and mineral resources if it would:

- Result in the loss of the availability of a known mineral resource that would be of value to the region and the residents of the state.
- Result in the loss of the availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.
- Encourage activities which result in the use of large amounts of fuel, and energy.
- Use fuel, water or energy in a wasteful manner.

For a further discussion of CEQA thresholds of significance, see Section 5.20.

5.9.3 METHODOLOGY

The potential impacts of the Cadiz Project on energy and mineral resources were evaluated based on the Cadiz Valley Agricultural Development FEIR (November 1993), mineral resource classification and location information from the Mineral Lands Classification for San Bernardino County (June 1999), CDMG (June 1999), URS Greiner Woodward Clyde (1999) and mineral resource maps from the BLM (June 1982 and 1999).

5.9.4 IMPACTS

Eastern and Eastern/Canal Alternatives

Mineral Resources

Construction Impacts. None of the existing active mineral extraction operations in the vicinity of the Cadiz Project area would be directly impacted by construction of the Eastern or Eastern/Canal alternatives.

As shown on Figures 5.9-1 through 5.9-5 and as summarized in Table 5.9-1, the Eastern and Eastern/Canal alternatives pass through or near areas with potential mineral resources. Limestone is documented for the area where a portion of the project wellfield and project spreading basins would be located. However, that potential is based on limited data and most locales are identified as only prospective at this time.

Construction of the Eastern or Eastern/ Canal alternatives would result in temporary access delays to areas along the water conveyance facilities, including areas identified for potential mineral resources. These temporary access delays would only occur if these areas were developed for mineral extraction and would be substantially mitigated based on implementation of measures T-1 and T-3, described earlier in Section 5.7 (Transportation). Construction of the Eastern and Eastern/Canal alternatives would not result in long term access limitations or delays to areas identified for potential mineral resources. No mitigation is necessary.

Operations Impacts. In the long term, mineral extraction may be somewhat restricted in the immediate vicinity of the water conveyance facilities, project spreading basins, project wellfield and other facilities in the permanent easement for the Eastern or Eastern/Canal alternatives. No existing active mineral extraction operations would be directly impacted by operations under the Eastern and Eastern/Canal alternatives. Groundwater storage and withdrawal associated with operation of the Cadiz Project could potentially affect the sodium and calcium chloride producers on Bristol or Cadiz dry lakes. This concern is addressed in Section 5.5 (Water Resources). The conclusion, described in more detail in that section, is that Cadiz Project operations would not impact the existing salt mining operations on either dry lake.

In the future, depending on the economic viability of the potential mineral resources in the general vicinity of the Cadiz Project area, extraction of identified minerals could be proposed. To protect the facilities that would be constructed in conjunction with the Eastern and Eastern/Canal alternatives, it may be necessary to restrict or prohibit recovery of certain resources within the permanent easement for these alternatives. In this event, Metropolitan would coordinate with the BLM, other property owners and/or the mining company, as appropriate, to ensure protection of the Cadiz Project facilities. Depending on the specific mineral resource extraction program proposed, Metropolitan may have to compensate the property owner for resources which cannot be extracted, in order to protect the pipeline and its facilities. These are not considered significant adverse impacts because the majority of these resources are identified only as potential or prospective at this time; there are no existing or proposed extraction activities affected; and future extraction activities can in all likelihood be conducted.

**TABLE 5.9-1
POTENTIAL MINERAL RESOURCES**

Mineral Resource	Eastern and Eastern/ Canal Alternatives	Western Alternative	Combination Alternative
Economic Mineral Resources (Figure 5.9-1)	Limestone is documented for the area in the Project wellfield and Project spreading basins. Non-metallic gypsum is identified east of the water conveyance facilities.	Limestone is documented for the area of the Project wellfield and Project spreading basins. Lithium is documented in the dry lakes areas.	Limestone is documented for the area in the Project wellfield and Project spreading basins. Non-metallic gypsum is identified east of the water conveyance facilities.
Locatable Mineral Resources (Figure 5.9-2)	The Cadiz Project area is shown as either unclassified or with no documented resources of this type.	The Cadiz Project area is shown as either unclassified or with no documented resources of this type.	The Cadiz Project area is shown as either unclassified or with no documented resources of this type.
Leaseable Mineral Resources (Figure 5.9-3)	Sodium is identified for the area east of the water conveyance facilities.	Sodium is identified in the area west of the water conveyance facilities.	Sodium is identified for the area east and west of the water conveyance facilities.
Saleable Mineral Resources (Figure 5.9-4)	Substantial parts of the Cadiz Project area are shown as having potential for sand and gravel.	Substantial parts of the Cadiz Project area are shown as having potential for sand and gravel.	Substantial parts of the Cadiz Project area are shown as having potential for sand and gravel.
Energy Georesources (Figure 5.9-5)	The Cadiz Project area crossed by the southern segment of the water conveyance facilities is shown as having potential for uranium, thorium, oil and gas.	The Cadiz Project area crossed by the southwest segment of the water conveyance facilities is shown as having potential for uranium and thorium.	The Cadiz Project area crossed by the east and west segments of the water conveyance facilities is shown as having potential for uranium and thorium.

**TABLE 5.9-2
DAILY CONSUMPTION OF FOSSIL FUEL DURING CONSTRUCTION**

Description	Fossil Fuel Consumption (gal/day)			
	Eastern Alternative	Western Alternative	Combination Alternative	Eastern/Canal Alternative
Water Conveyance Facility	2,698	2,428	2,428	2,840
Canal	-	-	-	1,101
Pumping Plant(s)	428	493	493	856
Spreading Basins	478	478	478	478
Wellfield	131	131	131	181
Power Distribution	319	397	397	319
Total	4,054	3,927	3,927	5,275

Source: Black and Veatch (1999).

Note: Average fuel use based on days of construction for each Cadiz Project component.

Fossil Fuels and Energy Resources

As shown in Table 5.9-2, short term fossil fuel consumption estimates for the Eastern and Eastern/Canal alternatives are based on the total fossil fuels used during construction of the capital facilities, divided by the number of construction days for each facility type: water conveyance facilities, pumping plant(s), project wellfield, electrical substations (located in the project wellfield), project spreading basins, power distribution facilities, etc. As shown on Table 5.9-2, the daily demand

for fossil fuels during construction is estimated at 4,054 gallons per day for the Eastern Alternative. Table 5.9-2 also presents an estimate for the Eastern/Canal Alternative of 5,725 gallons per day. This estimate is higher than for the Eastern Alternative due to the need to construct two pumping plants, and a shorter construction schedule for the pipeline segment resulting in higher daily fuel use for that component. For both alternatives, this represents an increase from the existing consumption of fossil fuel in the Cadiz Project area, but is within the overall supply of fuel in the region and adequate supplies appear to be available in the foreseeable future. Therefore, the impacts of the Eastern and Eastern/Canal alternatives related to short term fossil fuel consumption would be below a level of significance.

There would be only limited demand for fossil fuels in the long term for maintenance and operation of the Cadiz Project facilities. This consists of demand for fuel for operation of two trucks that would be used for facility inspections. The total amount of fuel needed for this purpose is considered minimal. All other facilities would use electric power. Therefore, no long term adverse impacts related to fossil fuels related to the Cadiz Project would occur.

Electricity

The Eastern and Eastern/Canal alternatives would result in consumption of electricity during the construction phase for use by construction trailers and lighting at those locations where electric power service is currently available, such as at the Cadiz Inc. landholdings and the Iron Mountain Pumping Plant. Other needs for electric power during construction would be met using generators. Where power is available, this would represent only minor amounts of demand. Given the small demand, the construction impacts of the Cadiz Project related to electricity would not be anticipated to be significant. No mitigation is necessary.

For long-term operations, power would be supplied to the project wellfield via a 69 kV overhead transmission line from the Iron Mountain Pumping Plant switchyard. Three new substations located in the project wellfield would be supplied with a 69 kV SF6 circuit breaker, a 20 MVA rated 69/4.16 kV transformer and switch gear which would contain a 3,000 ampere main circuit breaker.

The peak demand for electricity for the operation of the Eastern Alternative in the withdrawal mode is estimated at 454,000 kWh/day as shown in Table 5.9-3. In the storage mode it is 187,500 kWh/day. The increase in electrical demand compared to existing conditions is primarily due to operation of the project wellfield, water conveyance facilities and energy distribution facilities. This energy supply would be drawn from Metropolitan's existing power supply on the Colorado River Aqueduct. Colorado River Aqueduct pumps located east of the Cadiz Project would be shut down to simultaneously allow for sufficient downstream capacity in the Colorado River Aqueduct to accommodate water from the Cadiz Project and provide power to operate the project wellfield. Similarly, pumps to the west would be shut down to accommodate storage operations making power available to operate Cadiz Project pumping facilities. Therefore, no long-term operational impacts related to electricity would occur. No mitigation is necessary.

**TABLE 5.9-3
DAILY POWER CONSUMPTION IN kWh/Day**

Operating Scenario	Eastern Alternative	Western Alternative	Combination Alternative	Eastern/Canal Alternative
Storage Mode	187,500	178,600	187,500	129,400
Withdrawal Mode	454,000	505,100	505,100	259,000

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The peak demand for electricity for the operation of the Eastern/Canal Alternative in the withdrawal mode is estimated at 259,000 kWh/day as shown in Table 5.9-3. In the storage mode it is 129,400 kWh/day. As with the Eastern Alternative, the increase in electrical use would primarily be due to the operation of the project wellfield, water conveyance facilities and energy distribution facilities. Similar to the Eastern Alternative, this energy supply would be drawn from Metropolitan's existing power supply on the Colorado River Aqueduct. Like the Eastern Alternative, pumps would be shut down along the Colorado River Aqueduct thereby simultaneously providing aqueduct capacity and power supply for the Cadiz Project.

Natural Gas

Natural gas would not be used during project construction. Therefore, no adverse impacts associated with natural gas would occur under the Eastern or Eastern/Canal alternatives. No mitigation is necessary.

There would be no long-term use of natural gas for the Cadiz Project facilities under the Eastern or Eastern/Canal alternatives. Therefore, no adverse impacts under these alternatives related to natural gas would occur.

The use of natural gas to power the project wellfield was investigated. This investigation was conducted in the interest of eliminating the need to run power lines from Metropolitan's existing power easement located south of these facilities. It was also done to determine if there would be any favorable cost differences in relying on natural gas versus electricity as a source of power for the Cadiz Project.

To operate the Cadiz Project facilities on natural gas, a new natural gas line would have to be constructed to connect to an existing line approximately six miles to the northwest of the project area. A new distribution system would also have to be constructed to deliver the natural gas to engine drives located at each well. When in use during withdrawal operations, the gas-fueled engine drives and gas supply system would require approximately thirty percent more maintenance personnel than needed for the electric power scenario. This is because gas drive systems typically require more maintenance to operate. Requirements for maintenance personnel are the same for both gas and electric powered systems when the wells are not being operated.

When in operation, a natural gas-powered project wellfield would consume 7,200 cubic feet per hour of natural gas, and would run twenty-four hours a day, seven days a week. Assuming it was operated for an entire year, the natural gas-powered system would consume approximately 1.8 billion cubic feet of natural gas. Comparing the cost to operate and amortize the capital cost of a gas driven system versus use of electric power, the gas system was found to cost almost twice as much, with a present worth cost differential in the tens of millions of dollars. Therefore, it was rejected as a cost-effective way of providing an energy source for the project wellfield.

Western Alternative

Mineral Resources

Like the Eastern and Eastern/Canal alternatives, the Western Alternative will not adversely impact the existing salt mining operations on Bristol or Cadiz dry lakes. Section 5.5 (Water Resources) provides further discussion of this concern.

The nearest potential economic resource identified in the vicinity of the Western Alternative water conveyance facilities is locatable lithium, which is identified as occurring in Cadiz Dry Lake, west of the pipeline alignment. Known lithium deposits at this site are calculated to be less than one million short tons. As previously shown on Figure 5.9-1, the Western Alternative water conveyance facilities would trend along the east edge of the area mapped as a potential source of lithium. However, that potential is based on limited data and is identified as only prospective at this time. The potential construction impacts under the Western Alternative related to mineral resources would be similar to the impacts described for the Eastern and Eastern/Canal alternatives. For example, possible short-term access delays to potential mineral resource areas exist near the Cadiz Dry Lake and in the areas where the project wellfield and project spreading basins may occur. Mitigation measures T-1 and T-3, described earlier in Section 5.7, would mitigate these potential short-term access impacts to below a level of significance.

The operational related impacts on mineral resources under the Western Alternative would be similar to the potential long term impacts on mineral resources described earlier under the Eastern and Eastern/Canal alternatives. These impacts would not be significant and no mitigation is necessary.

Fossil Fuel and Energy Resources

The amount of fossil fuel anticipated to be used during construction of the Western Alternative is an estimated 3,927 gallons per day, similar to the 4,054 gallons per day used under the Eastern Alternative. Although this represents an increase from existing fossil fuel use in this area, this represents only a minor increase region-wide and would be expected to be within the overall supply of fossil fuel available in the region. Therefore, the impacts of the Western Alternative related to short term fossil fuel consumption would be below a level of significance. No mitigation is necessary.

Similar to the Eastern and Eastern/Canal Alternatives, the use of fossil fuels under the Western Alternative would be limited in the long-term. Therefore, no long-term adverse impacts related to fossil fuels would occur under this alternative. No mitigation is necessary.

Electricity

The demand for electricity under the Western Alternative would be minor, consisting of providing power for construction trailers and lighting at Cadiz Inc. landholdings and the Iron Mountain Pumping Plant where power is currently available. Other needs for electric power during construction would be met using generators. Therefore, the construction of the Western Alternative would not result in short-term adverse impacts related to electricity. No mitigation is necessary.

The peak demand for electricity for the operation of the Western Alternative in the withdrawal mode is 505,100 kWh/day as shown in Table 5.9-3. In the storage mode it is 178,600 kWh/day. The amount of electricity that would be used for the Western Alternative is, therefore, slightly greater when compared to the demand for electricity under the Eastern Alternative. This increase could also be met using Metropolitan's available power supply. Therefore, the Western Alternative is not expected to result in adverse impacts related to electricity in the long term. No mitigation is necessary.

Impacts Related to Natural Gas

As with the Eastern and Eastern/Canal alternatives, natural gas would not be anticipated to be used for the construction or operation of the Cadiz Project facilities under the Western Alternative. Therefore, this alternative would not result in adverse impacts related to natural gas. No mitigation is necessary.

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Combination Alternative

Mineral Resources

Like the Eastern, Eastern/Canal and Western alternatives, the Combination Alternative would not adversely impact the existing salt mining operations on Bristol and Cadiz dry lakes. Section 5.5 (Water Resources) provides further discussion of this concern.

The construction impacts under the Combination Alternative related to mineral resources would be similar to the impacts described for the Eastern, Eastern/Canal and Western alternatives related to short-term access delays to potential mineral resource areas in the area where the project wellfield and project spreading basins would be located. Mitigation measures T-1 and T-3, described earlier in Section 3.7, would mitigate these potential short-term access impacts to below a level of significance.

The operations-related impacts on mineral resources under the Combination Alternative would be similar to the potential long-term impacts on mineral resources described earlier under the Eastern, Eastern/Canal and Western alternatives. These impacts would not be significant and no mitigation is necessary.

Fossil Fuels and Energy Resources

The amount of fossil fuel anticipated to be used during construction of the Combination Alternative is estimated to be 3,297 gallons per day (Table 5.9-2), similar to the 4,054 gallons per day estimated for the Eastern Alternative. Although this represents an increase from existing fossil fuel use in this area, this represents only a minor increase region-wide and would be expected to be within the overall supply of fossil fuel available in the region. Therefore, the impacts of the Combination Alternative related to short term fossil fuel consumption would be below a level of significance. No mitigation is necessary.

Similar to the Eastern, Eastern/Canal and Western alternatives, the use of fossil fuels under the Combination Alternative would be limited in the long-term. Therefore, no long term adverse impacts related to fossil fuels would occur under this alternative. No mitigation is necessary.

Electricity

The demand for electricity under the Combination Alternative during construction would be minor, for providing power for construction trailers and site lighting at Cadiz Inc. agricultural operations and the Iron Mountain Pumping Plant, where power is currently available. Other needs for electric power during construction would be met using generators. Therefore, the construction of the Combination Alternative would not result in short-term adverse impacts related to electricity. No mitigation is required.

The peak demand for electricity for the operation of the Combination Alternative in the withdrawal mode is 505,100 kWh/day. In the storage mode it is 187,500 kWh/day. Consequently, the amount of electricity anticipated to be used during operations under the Combination Alternative is higher than the electricity demand under the Eastern Alternative, as shown earlier in Table 5.9-3. This increase could be met using Metropolitan's available supply in the region and, therefore, the Combination Alternative would not result in adverse impacts related to electricity in the long-term. No mitigation is necessary.

Natural Gas

As with the other build alternatives, natural gas is not anticipated to be used for the construction or operation of the Cadiz Project facilities under the Combination Alternative. Therefore, this alternative would not result in adverse impacts related to natural gas. No mitigation is necessary.

No Project Alternative

The No Project Alternative would not include construction of any of the proposed Cadiz Project facilities. Therefore, the No Project Alternative would not result in any impacts on energy and mineral resources.

5.9.5 MITIGATION MEASURES

E-1 During construction, Metropolitan will maintain access into and out of any potentially affected mineral extraction operations authorized by the BLM and the County, to the greatest extent possible. If access cannot be provided, Metropolitan will compensate the owner of such operations for lost revenues directly resulting from temporary closure of the extraction operation during construction.

5.9.6 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Implementation of mitigation measure E-1 above will reduce the impacts of the Cadiz Project on energy and mineral resources to below a level of significance. Implementation of mitigation measure E-1 will ensure that mineral rights holders affected by the Cadiz Project will be compensated for any potential loss of mineral resources related to revenues and will ensure that access into and out of any active mineral extraction operation will be maintained during Cadiz Project construction.