

## 3.2 GROUND WATER RESOURCES

### 3.2.1 Introduction

The affected environment discussion for ground water resources includes ground water hydrology, ground water quality, and ground water use and management. The Phase I study area is confined primarily to the Salton Basin, which is the region draining directly into the Salton Sea. The Salton Basin lies within a larger structural and topographical geologic feature known as the Salton Trough. Figure 3.2-1 shows the ground water basin divisions within the Salton Trough, as defined by the CRB-RWQCB (1994). The Salton Basin is divided into the following planning areas, which are important to the present analysis: the Coachella Valley Planning Area, the Imperial Valley Planning Area, the Anza-Borrego Planning Area, the East Mesa, and the Andrade Mesa in Mexico.

### 3.2.2 Ground Water Hydrology

In the Salton Basin, thick sequences of silt and clay have been deposited on the bottom of Lake Cahuilla and smaller lakes, alternating over time with coarser sands and gravels from periods when the lakes had dried out. Some of the sediments would have been brought into the basin in the sediment load of the Colorado River. These sediments contribute to the fertility of the soils in the Imperial and Coachella valleys. Then, as now, the lake sediments would have contained organic materials from the plants and animals that lived in the lake. As the lake dried, it left a residue of salts in the lakebed sediments. One of the results of this depositional sequence is that it has created hydraulically separated, confined aquifer units, bounded above and below by clay layers. The clay units tend to be thicker or more prevalent toward the center of the basin than at the edges, corresponding to the areas that have been inundated more frequently during past geologic time. Therefore, ground water is more likely to travel to greater depths on the margins of the basin, and most of the inflow to deeper aquifers probably occurs at the basin margins. Furthermore, since inflow to the basin is concentrated within washes and stream channels, most of the recharge to basin aquifers is likely to occur in the upper reaches of the washes and stream channels.

In the Coachella Valley Planning Area artesian ground water is confined below clay lakebed deposits that extend from the Salton Sea to about as far as Indio. The confined water is generally of good quality and is used for domestic supplies. Unconfined ground water, which is perched on the clay layers, is recharged primarily by irrigation. Faults, particularly the Mission Creek, Banning, and San Andreas faults, but also the Indio Hills, Garnet Hills, and Mecca faults, act as barriers to ground water flow. Ground water tends to pond behind the faults, creating springs and oases in some areas (CRB-RWQCB 1994).

Ground water is not widely used in the Imperial Valley Planning Area due to its high dissolved solids content. The shallow deposits are generally fine-grained in the northern portion of the valley and coarser in the south. Subsurface drains are required to prevent waterlogging of shallow soils under irrigation. The ground water is generally of poor quality and is not used for agriculture. In the central part of the valley, the TDS in most wells is between 1,000 and 3,000 mg/L. Water with TDS above 1,000 mg/L is

considered to be of poor quality. There are a few domestic wells at higher elevations in the valley, where salts are lower in concentration (CRB-RWQCB 1994). The alluvial fill sediments extend to great depths in the Imperial Valley, but much of the water is saline and heated. It has been estimated that about 20 percent of the 1.1 to 3.0 billion acre-feet of ground water in storage throughout the Imperial Valley is recoverable (Imperial County 1997). Annual recharge from all sources is estimated to be about 400,000 acre-feet.

In the Anza-Borrego Planning Area, ground water is pumped mainly from unconsolidated sedimentary aquifers, although some wells are completed in fractured bedrock. The natural flow of ground water has been affected by pumping. The safe yield of the aquifer is estimated to be about 22,000 AFY (CRB-RWQCB 1994).

The southeastern portion of the Salton Basin, including the East Mesa in the US and the Andrade Mesa in Mexico, is underlain by thick alluvial and dune sand deposits. The southeastern portion of this Mesa region overlies the Colorado River Aquifer, which extends eastward under the Yuma area and westward at least as far as Drop 3 on the All American Canal (Bureau of Reclamation 1994). Yields from wells in this area are moderate to high. The western part of the Mesa area lies within the Salton Basin, and part of it lies within the ancient shoreline of Lake Cahuilla. The hydraulic conductivity of the deposits decreases toward the west, due to the increased clay content of the sediments, and the yields in wells are also lower. About 10 percent of the recharge to the Colorado River Delta aquifer is from seepage from the All American Canal (Bureau of Reclamation 1994). This seepage forms a ground water ridge beneath the canal, with most of the seepage flowing toward the south. Presumably, the direction of this ground water flow is due primarily to the relatively higher permeability of sediments toward the south.

#### **Ground Water Inflow to the Salton Sea**

Ground water inflow to the Salton Sea has been estimated at 50,000 acre-feet, about 30,000 acre-feet (about 60 percent) of which is contributed by the Coachella Valley. About 10,000 acre-feet (20 percent) of the ground water inflow is underflow from San Felipe Creek. Only about 2,000 acre-feet (four percent) of the ground water inflow comes from the Imperial Valley. About 8,000 acre-feet (16 percent) of the ground water inflow is from the remaining sources, most which are on the east side of the Salton Sea (USDI 1970). Among these sources is leakage from unlined portions of the Coachella Canal.

The relatively small amount of ground water inflow from the Imperial Valley is due to low vertical permeability of soils and lack of recharge at the basin margins. Imperial Formation soils, which are found on the flatter slopes in the northern portion of Imperial Valley, are silty clays. These soils derive from ancient lakebed deposits and alluvium deposited when the basin was inundated by flooding from the Colorado River. Soils contain less clay and more sand toward the margins of the basin.

Tritium isotope concentrations can be used to determine the source and age of water. Tritium is an isotope of hydrogen that was released into the atmosphere by atomic weapons tests during the 1950s. Tritium is in the water imported from the Colorado River but is essentially absent from ground water at depths greater than about 65 feet throughout the Imperial Valley (Setmire et al. 1993). The lack of tritium in ground water below 65 feet is an indication that this water has been isolated from surface sources since at least the 1950s and suggests that there is very little deep recharge from irrigation water.

### 3.2.3 Ground Water Quality

The quality of ground water inflow to the Salton Sea varies significantly by source. The average concentration of TDS was estimated by the US Department of Interior (USDI 1970) for the principal inflow sources. Inflow from the Coachella Valley was estimated to contain about 800 mg/L, inflow from the San Felipe Valley contained 1,200 mg/L, and inflow from the Imperial Valley was estimated to contain 1,600 mg/L. Combined inflow from all other sources, primarily on the east side of the Salton Sea, was estimated to average 3,000 mg/L. Based on these concentrations multiplied by the volume of inflow, the total salt loading to the Salton Sea from all ground water inflow sources was estimated to be 86,500 tons per year. The average ground water salinity in all ground water inflow sources combined is about 1,300 mg/L.

### 3.2.4 Ground Water Use

Very little ground water is extracted from Imperial Valley, due to its relatively poor quality. The CRB-RWQCB reported that there are four domestic wells drilled to a depth of about 600 feet in the East Mesa Unit of the Imperial Irrigation District. Ground water is more extensively used in the Coachella Valley, where it accounts for most of the municipal water supplies.

## 3.3 GEOLOGY AND SOILS

### 3.3.1 Introduction

The affected environment discussion for geology and soils includes the geologic setting, soils and sediments, and geologic hazards. Geologic resources include topography, stratigraphy, soils and sediments, mineral resources, and landforms within the region and underlying the area of the proposed project. The geologic processes active in the region, such as erosion, slope stability, sedimentation, wind deposition, and seismicity, provide a pattern for the past influences on the project area and for likely future influences. Geologic hazards that could result from these processes include fault rupture, ground shaking, unstable slopes, and the potential for liquefaction, differential settlement, and lateral spreading. The Phase I study area for geology and soils is determined by the anticipated extent of direct and indirect disturbance to these resources and the anticipated area that could be affected by regional geologic hazard conditions. The affected environment section describes the existing conditions of geologic resources and processes within this area from which to compare potential effects of project-related actions.

### 3.3.2 Geologic Setting

The Salton Sea is in the northern portion of the Salton Trough, a seismically active rift valley extending northwestward from the Gulf of California into southern California. Most direct project-related influences are expected to occur within this region. The Salton Trough is approximately 130 miles long and 70 miles wide and is bounded by the San Geronio Pass to the northwest, the San Jacinto and Santa Rosa mountains on the west, and the Little San Bernadino and Chocolate mountains on the east. This structural basin encompasses the Coachella Valley in the north and the Imperial Valley, the Mexicali Valley, and the Gulf of California in Mexico in the south.

The Salton Trough is filled with approximately 21,000 feet of Cenozoic sediments derived predominantly from the Colorado River, which emptied into the Gulf of California, forming a delta that spread and eventually separated the Salton Basin from the Gulf of California. The resultant basin topography is relatively flat, with little topographic relief, and is characterized by internal drainage (Bureau of Land Management, California Desert District and County of Imperial Planning and Building Department 1995). Windblown sand deposits form a 40-mile long by five-mile wide belt of sand dunes, called the Sand Hills, extending from the Mexican border along the east side of the Coachella Canal (US Geological Survey et al. 1966). An old lake shoreline has been identified by the presence of lacustrine deposits in areas within the Coachella and Imperial valleys. It is estimated that Lake Cahuilla covered an area approximately 117 miles long and 30 miles wide (US Department of the Interior and the State of California 1974). The sequence of sedimentary layers is underlain by the Imperial Formation, which is of marine origin and is underlain by igneous and metamorphic basement rocks (US Geological Survey et al. 1966).

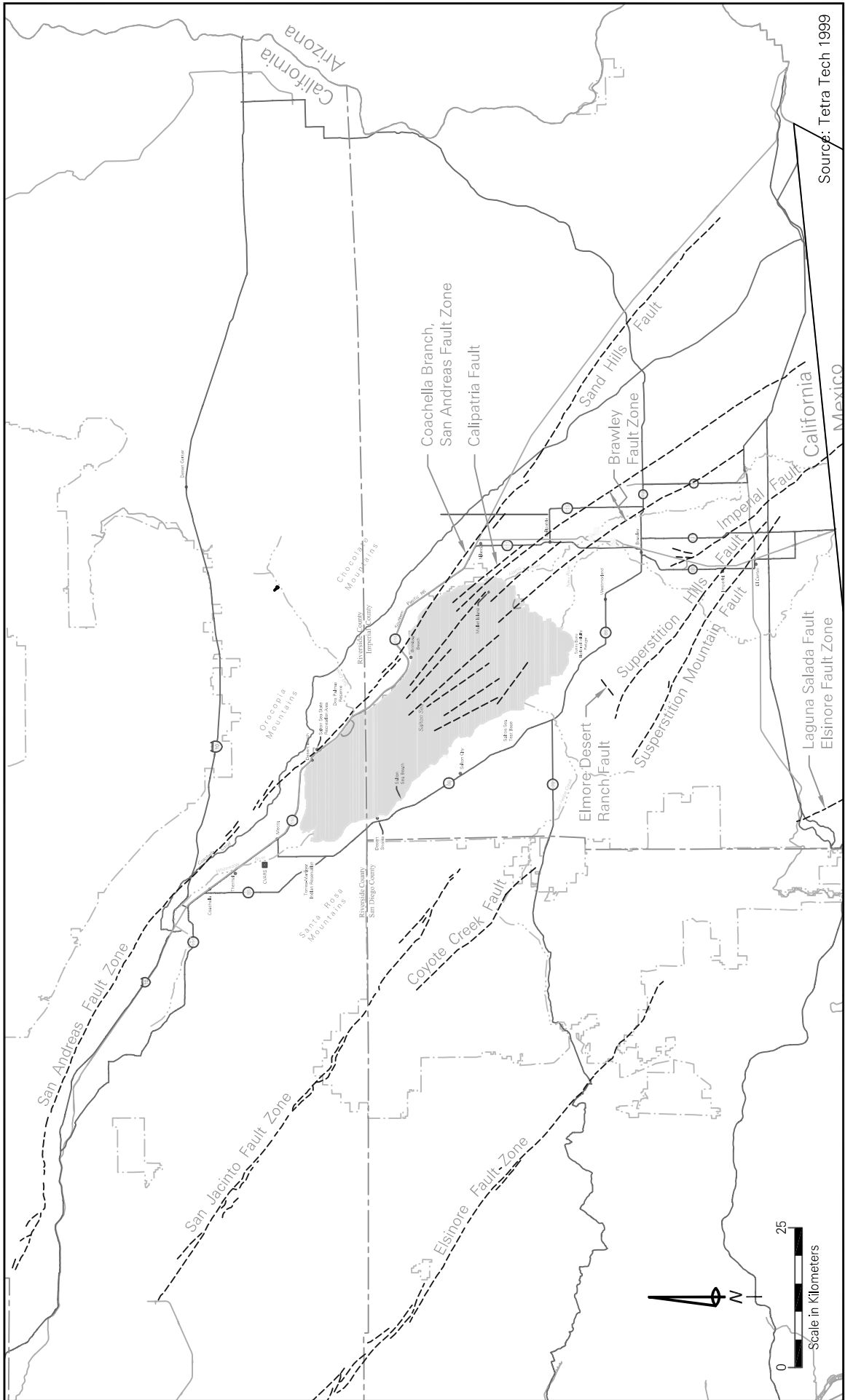
The Salton Trough is the northern extension of the Gulf of California Rift Zone and is characterized by northwest-southeast trending transform fault zones and several crustal rift areas between these fault zones. This region has undergone subsidence, uplift, tilting, folding, and crustal spreading over many millions of years and is considered one of the most active seismic areas in the world. The area regularly experiences perceptible earthquakes, both large-scale seismic events and low magnitude earthquake swarms (US Department of the Interior and the State of California 1974; Bureau of Land Management, California Desert District and County of Imperial Planning and Building Department 1995; ERC Environmental and Energy Services Co. 1989).

Numerous major and several less extensive active fault zones are within the Salton Trough. These zones contain a number of individual fault traces. Figure 3.3-1 and Table 3.3-1 describes the active and potentially active major faults within this region. An active fault is one that has experienced surface displacement within the last 11,000 years; a potentially active fault shows evidence of displacement within the last 1.6 million years (CDMG 1992). The southern portion of the Salton Sea has a much greater rate of seismicity than does the northern area (US Department of Interior, Bureau of Reclamation 1999).

The major fault zones in the area, which are characterized by right lateral movement, are the San Andreas, San Jacinto, and Elsinore fault zones. The Brawley fault and associated zone of seismicity includes much of the southeastern portion of the Salton Sea. This zone has been a persistent region of seismic activity since at least 1900 and surface rupture occurred along several miles of the fault zone during the 1979 Imperial Valley earthquake (US Department of Interior, Bureau of Reclamation 1999). The Elmore Ranch fault is a relatively short structure that experienced minor surface rupture associated with the 1987 Superstition Hills-Elmore Ranch earthquake sequence. Although the mapped length is only about 5 miles, the fault appears to be the western end of a zone of seismicity termed the Elmore Ranch Seismic Zone that extends several miles across nearly the entire southern end of the Salton Sea. This zone could also be a site for potential surface fault rupture for any facilities built across it in the southern Salton Sea (US Department of Interior, Bureau of Reclamation 1999). In addition, other inferred faults have been identified beneath the southern portion of the Salton Sea (US Department of the Interior and the State of California 1974).

### 3.3.3 Soils and Sediments

**Soils.** Soil associations in the Salton Trough can be grouped into two major categories: soils of the basin and soils of the mesas, alluvial fans, terraces, and mountains rimming the basin. The distribution of soil associations within the Salton Basin is shown on Figure 3.3-2. In general basin soils vary from excessively drained to poorly drained sand, silt, clay, and loam on nearly level to rolling topography (US Department of Agriculture Soil Conservation Service 1981). Soils on alluvial fans, valley fill, and lacustrine basins in the Coachella Valley are very deep, highly stratified sands to silty clays formed in alluvium and are used for irrigated truck and field crops (US Department of Agriculture Soil Conservation Service 1979). Lacustrine basin soils in the Imperial Valley formed in the area of Lake Cahuilla and are very deep, moderately well drained to well drained, except those adjacent to the Salton Sea, where they are poorly drained. There is a perched water table in these soils in most areas, due to the poorly drained nature of the soils coupled with seepage from canals and irrigation. These soils are used mainly for irrigated cropland (US Department of Agriculture Soil Conservation Service 1981).



Legend

----- Fault Traces

# Fault Map

Salton Sea, California

Figure 3.3-1

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**Table 3.3-1  
Salton Basin Fault Characteristics**

| <b>Fault</b>                             | <b>Maximum Credible Earthquake</b> | <b>Estimated Peak Ground Acceleration</b> | <b>Estimated Repeatable High Ground Acceleration</b> | <b>Estimated Maximum Mercalli Scale Intensity</b> |
|--|------------------------------------|---|--|---|
| <b>Active Faults</b>                     |                                    |   |  |   |
| San Andreas                              | 7.5                                | 0.275                                     | 0.180  | VIII  |
| Brawley                                  | 7.0                                | 0.290                                     | 0.190  | VIII  |
| Imperial                                 | 7.2                                | 0.275                                     | 0.180  | VIII  |
| Superstition Hills (Elmore Desert Ranch) | 7.0                                | 0.60                                      | 0.40   | IX  |
| San Jacinto (Coyote Creek)               | 7.2                                | 0.310                                     | 0.20   | VIII  |
| Elsinore                                 | 7.5                                | 0.210                                     | 0.210  | VIII  |
| <b>Potentially Active Faults</b>         |                                    |   |  |   |
| Calipatria                               | 7.5                                | 0.290                                     | 0.190  | VIII  |
| Sand Hills                               | 7.5                                | 0.150                                     | 0.150  | VII   |
| Superstition Mountain                    | 7.0                                | 0.360                                     | 0.234  | VIII-IX   |
| Laguna Salada                            | 7.25                               | 0.175                                     | 0.175  | VII-VIII  |

Source: ERC 1989.

***Sediment Types.*** Data characterizing the sediment types and current contaminant concentrations of the Salton Sea are extremely limited, and additional studies are in progress. Previous studies identified concentrations of organochlorine pesticide residues, including DDT and DDE, and some of the metals and chemicals known to be present in riverbeds feeding the Sea, such as selenium, boron, DDE, DDT, dichloromethane, PCBs, and pesticides (Bechtel 1997; Eccles 1979; Hogg 1963; and Setmire et al. 1993; Setmire & Stroud 1990). Some of the highest concentrations of DDT metabolites were found in bottom sediments at the outlets of the Alamo River, the New River, and Trifolium Drain 1 (Levine-Fricke 1999; Setmire et al. 1993). No evidence of residual chlorine compounds (which are common degradation products of DDE, DDT and PCBs) was presented in the most recent data collected by Levine-Fricke during the December 1998 and January 1999 sediment sampling study. Similarly, during 1999 field work, 67 semi-volatile compounds and 27 pesticides were sampled for in the water column within the Sea and all were found to be below detection limits (Holdren, personal communication 1999). The reader is referred to the Water Quality section of this document discussed within the Surface Water Resources section for more details on this study. An investigation of selenium toxicity derived from irrigation drainage was conducted to identify the potential for harmful effects on the Salton Sea ecosystem. A relatively high selenium concentration of 3.3 mg/kg was detected in one composite sediment sample from the Salton Sea, and the lowest concentration of 0.1 mg/kg was detected in sediments at the Whitewater River upstream of Highway 111 (Setmire et al. 1990).

Data collected by Levine-Fricke during December 1998 and January 1999 for an ongoing sediment sampling study provide the most current information on the distribution of inorganic and organic chemicals and grain sizes in Salton Sea sediments. The inorganic and organic chemicals of concern were identified using available comparative values (e.g., maximum “baseline value” for soils of the western United States (Severson et al., 1987; modified from Shacklette and Boerngen, 1984.) The National Oceanic and Atmospheric Administration (NOAA) biological effects range low (ERL) and effects range medium (ERM) values (Long et al., 1995) were also used as comparative values during the first phase of sampling to identify which contaminants should be the focus of additional sampling efforts in either second phase sampling or follow-up work. The ERL and ERM values are guidelines used to evaluate whether sediment chemical concentrations were within ranges that have been reported to be associated with biological effects. These guidelines were generated from a large national sediment database and are currently the most widely used and accepted sediment effects guidelines available. ERMs are the concentrations at which 50 percent of the studies for a particular chemical showed biological effects, and ERLs are the concentrations at which 10 percent of the studies showed biological effects.

Selenium and molybdenum do not currently have ERM or ERL values for comparison. Therefore for selenium, SFRWQCB guidelines for sediment suitable for cover (0.7mg/kg) and noncover (1.4 mg/kg) sediment in wetlands creation projects were used for comparison purposes. For molybdenum, a baseline value of 4.0 mg/kg (Severson et al., 1987; modified from Shacklette and Boerngen, 1984) was used as a comparative value.

This study identified levels of cadmium, copper, lead, nickel, and zinc in Salton Sea sediments that exceeded their respective ERL values but none were detected at concentrations above their respective ERM values. The highest cadmium concentrations were in the northeastern quadrant of the Sea, while high nickel concentrations were identified throughout most of the Sea sediments, except in areas of surface inflows, such as the Alamo River and New River delta areas. High zinc concentrations were localized near the northern shore, where the Whitewater River enters the Sea, and near the eastern shore, where Salt Creek enters the Sea. Selenium and molybdenum exceeded their screening values and in the Levine-Fricke study appeared to be elevated with respect to previously reported background concentrations and Salton Sea data. Confirming previous observations, the highest selenium levels were found in the central and north-central two thirds, and the lowest levels were in the southern third of the Sea. Since several past studies have reported differing results, further study should be done to confirm results of the latest Levine-Fricke work.

Selenium, which is one of the primary elements of concern in the Salton Sea, is found at its highest concentrations in water in the areas of tile-drain effluent. However, the greatest concentrations in sediments have been found predominantly in the central portion of the Sea, where concentrations in water were relatively low (Setmire et al. 1990; Levine-Fricke 1999). Since selenium is thought to be entering the Sea from agricultural drainage, some mechanism in the Whitewater River Delta is thought to be



removing selenium from the water and concentrating it in bottom sediments. Certain processes could concentrate selenium in bottom sediments that are distant from the waters from which the selenium was derived. These processes are incorporation of selenium in phytoplankton, which settle in the anoxic zone; oxidation and reduction processes, which can transform selenium compounds to insoluble forms; and removal and concentration due to the activity of microorganisms. Other elements, such as nickel, chromium, and zinc, which have been detected in elevated concentrations in the bottom sediment of the Whitewater River, are thought to be the result of industrial contamination rather than agricultural effluent (Setmire et al. 1990).

The potential for the observed contaminant concentrations to adversely affect benthic organisms can be assessed preliminarily by comparison with available sediment guidelines (ERLs and ERMs) however, as a result of the Sea's unique ecosystem, whose characteristics (especially high salinity) put it well outside the database used to develop the ERLs and ERMs, these comparative values may not be applicable for evaluating ecological risks at the Sea. The biota of the Salton Sea's high salinity waters also differ from the organisms found in estuarine areas for which the ERLs and ERMs were developed.

A cursory comparison of historic data with those obtained during the Levine-Fricke study show a broad decrease in maximum levels detected in sediment concentrations for many of the inorganic and organic chemicals, particularly pesticides, copper, and zinc. One of the most significant findings from the Levine-Fricke study was that semivolatile organic compounds, chlorinated pesticides, polychlorinated biphenyls (PCBs), organophosphate and nitrogen pesticides, and chlorinated herbicides were not detected in the sediment samples analyzed.

The most comprehensive study on the distribution and composition of Salton Sea sediments was conducted in 1961. This study describes the pH and the distribution of organic material, heavy minerals, and grain size throughout the sediments. In general, the pH of the sediments is lower than that of the overlying water, and grain size decreases inward toward the central portion of the Sea, with a few exceptions (Arnal 1961). The 1998 and 1999 Levine-Fricke data show sediments sampled on the bottom of the Sea consisted of silt, clay, and finer grained sands. The shallow sediment also included abundant barnacle shells and occasional fish bones (Levine-Fricke 1999). The surface sediment composition included a high percentage of sand outside Salton City and extending into the central, deeper parts of the Sea. Sand percentages near the mouths of the New and Alamo rivers were also high, as expected from deposition of these heavier particles from higher velocity inflows into the Sea. The lower velocity Whitewater River delta, on the other hand, was predominantly silt. Silt was also abundant along the southwest near shore area and along the shallow water bays near the New and Alamo rivers. A shallow layer of clay blankets the southwestern corner of the Sea and extends toward the center, near the deepest part of the Sea. Clay is also abundant near shore and offshore just north of Desert Shores. The majority of the deeper sediment sampled consisted predominantly of varied amounts of silt and clay, with lesser amounts of fine sand (Levine-Fricke 1999). A sedimentation rate of 0.02 to

0.03 inches per year in the 50 years after the 1905 flood was estimated for the central portion of the Sea, and a rate of two inches per year was estimated at the Alamo River and New River deltas (Arnal 1961). A layer of organic material overlies these sediments, deposited most heavily in areas where currents are weakest (Arnal 1961).

***Economic Resources.*** Resources in the region consist of numerous known geothermal areas and such mineral resources as rock and stone, sand, gravel, clay, and gypsum, and such metals as gold, silver, nickel, and lead, and several radioactive elements. In general, geothermal resource areas and sources of sand and gravel are found in the basin area, and other minerals are found in the surrounding hills. Within the Imperial Valley, there are six known geothermal resource areas (KGRAs), delineated by the USGS and covering approximately 254,827 acres (Layton 1978). These geothermal areas include the Salton Sea KGRA, Brawley KGRA, Heber KGRA, Glamis KGRA, East Mesa KGRA, and the Dunes KGRA. Sand and gravel has been a significant resource in both Imperial and Riverside counties. Most of this material in the Salton Basin is derived from shoreline deposits from ancient Lake Cahuilla. Other sources of lower quality can be found in alluvial fan deposits (Morton 1977; California Department of Conservation, Division of Mines and Geology 1988).

#### 3.3.4 Geologic Hazards

Potential geologic hazards associated with the Salton Trough include seismic hazards, such as ground rupture, ground acceleration, liquefaction and dynamic settlement, seismically induced landsliding, and nonseismic hazards, such as differential compaction and settlement, expansion, erosion, and reactivity.

Ground rupture, which is the physical displacement of surface deposits due to seismic activity, could occur along both major and minor faults as a result of activity along the major fault zones in the area. Ground acceleration is measured in terms of peak ground motion associated with an earthquake and is expressed in terms of a percentage of gravitational acceleration (g). Large earthquakes along major faults, such as the Imperial Fault, could produce potentially destructive ground shaking in the Salton Trough. Ground acceleration as intense as 0.6 g near Westmorland has been projected for a magnitude 7.0 earthquake along one of the Superstition Hills faults (ERC Environmental and Energy Services Co. 1989, 1991; Bureau of Land Management, California Desert District, and County of Imperial Planning and Building Department 1995).

In California, special restrictions apply to construction within “fault-rupture hazard zones,” as defined by the California Department of Mines and Geology (CDMG) under the Alquist-Priolo Special Studies Zones Act of 1972, Cal. Pub. Res. Code §2621, et seq. These restrictions are designed to prevent structures for human occupancy being built across the traces of active faults. A number of these zones have been identified throughout the Salton Trough and are shown on Figure 3.3-3.

Liquefaction and dynamic setting could occur in loose, sandy, fine-grained granular settlements that are saturated or nearly saturated at depths of less than 100 feet during a

strong seismic event (ERC Environmental and Energy Services Co. 1989, 1991; Bureau of Land Management, California Desert District, and County of Imperial Planning and Building Department 1995).

Seiches are produced when seismic waves cause massive oscillatory motion in restricted water bodies, such as bays and lakes, such as the Salton Sea (Bureau of Land Management, California Desert District, and County of Imperial Planning and Building Department 1995).

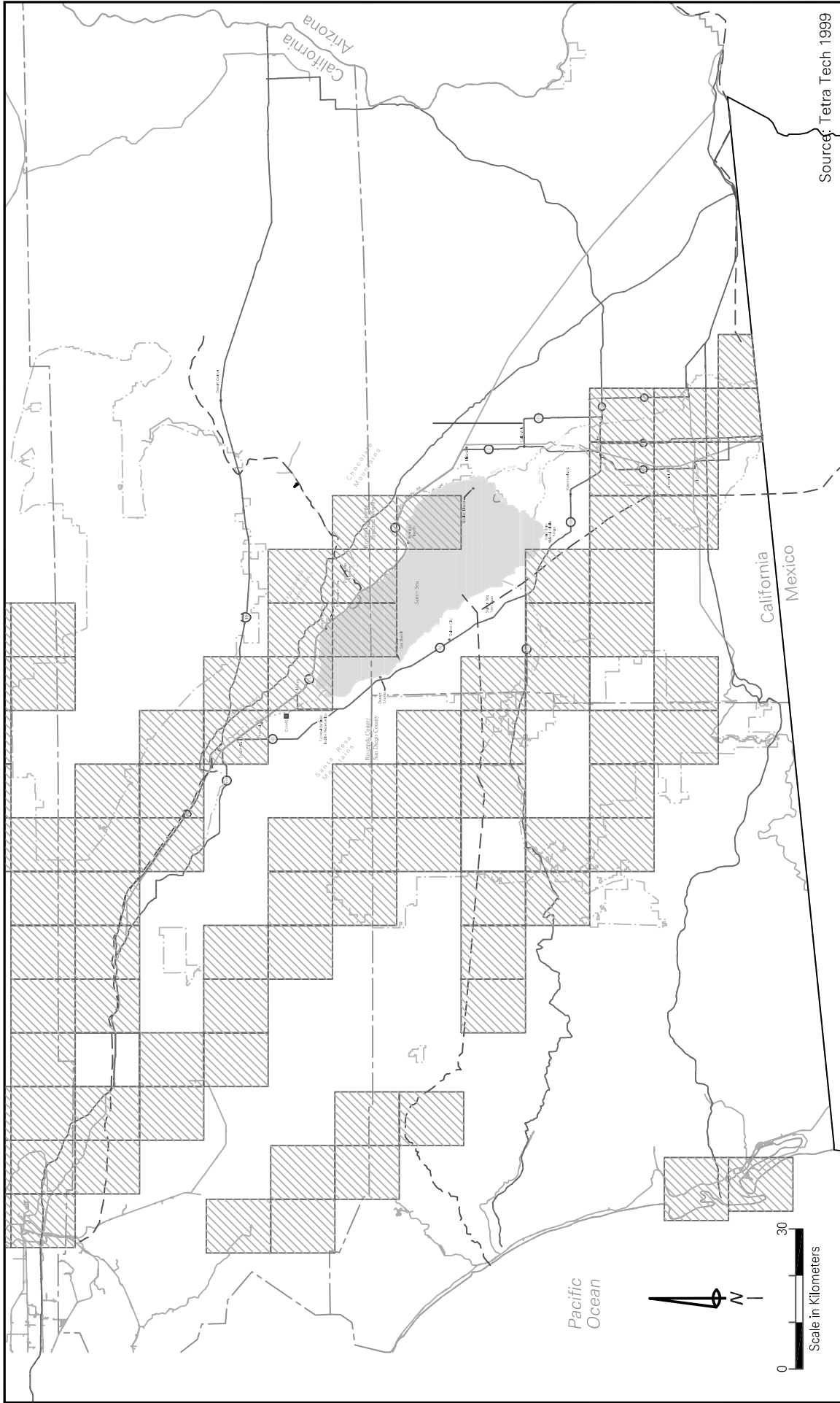
Nonseismic geologic hazards also can affect the integrity of structures that are built on areas exhibiting these characteristics. Differential compaction and settlement typically occur in loose, well-graded soils as a result of tectonic subsidence, saturation of dry unconsolidated sediments, withdrawal of fluids from porous soils, or collapse into subsurface voids. Sediments with high clay content may be subject to expansion. Erosion related to stormwater runoff and seasonal high winds in the area also could constrain construction. Alkaline soils, soils with soluble sulfates and chlorides, and soils that exhibit low resistivity can corrode subsurface facilities (ERC Environmental and Energy Services Co. 1989, 1991; Bureau of Land Management, California Desert District, and County of Imperial Planning and Building Department 1995).

### 3.4 AIR QUALITY

#### 3.4.1 Introduction

The affected environment discussion for air quality addresses ambient air quality standards, existing ambient air quality conditions, air quality planning, and regulatory considerations. Air quality management programs have evolved using two distinct management approaches:

- Setting ambient air quality standards for acceptable exposure to air pollutants, conducting monitoring programs to identify locations experiencing air quality problems, and then developing programs and regulations designed to reduce or eliminate those problems; and
- Identifying specific chemical substances that are potentially hazardous to human health, and then regulating the amount of those substances that can be released by individual commercial or industrial facilities or by specific types of equipment.



Source: Tetra Tech 1999

### Fault Rupture Hazard Zones

Salton Sea, California

- Legend**
- Proposed Pipeline Locations
  - ▨ Area Represented by USGS Quadratic Map with Identified Fault Rupture Hazard Zones

Figure 3.3-3

Air quality programs based on ambient air quality standards typically address air pollutants that are produced in large quantities by widespread types of emission sources and which are of public health concern because of their toxic properties. Air quality programs based on regulation of other hazardous substances typically address chemicals used or produced by limited categories of industrial facilities. Programs regulating hazardous air pollutants focus on: substances that alter or damage the genes and chromosomes in cells, creating the potential for cancer, birth defects, or other developmental abnormalities; substances with serious acute toxicity effects; and substances that undergo radioactive decay processes, resulting in the release of ionizing radiation.

The air quality study area for Phase 1 aspects of the project emphasizes conditions in the Salton Sea Air Basin, which encompasses the Coachella Valley portion of Riverside County and all of Imperial County. Most facilities for the project alternatives would be located in the Imperial County portion of the Salton Sea Air Basin. The Imperial County portion of the air basin is within the jurisdiction of the Imperial County Air Pollution Control District (Imperial County APCD). The Riverside County portion of the air basin falls within the regulatory jurisdiction of the South Coast Air Quality Management District (South Coast AQMD). The Torres-Martinez Tribe has the authority to assume jurisdiction over any facilities constructed on tribal lands.

Appendix C provides additional supporting information, including: a background discussion of terminology related to particulate matter; tabular and graphical summaries of ambient air quality monitoring data from the Salton Sea Air Basin; and tabular and graphical summaries of meteorological data from the Salton Sea Air Basin.

#### 3.4.2 Ambient Air Quality Standards

Both the California Air Resources Board (CARB) and the U.S. Environmental Protection Agency (EPA) have established ambient air quality standards for several different pollutants. The federal and state ambient air quality standards for the pollutants of greatest concern in the Salton Sea Air Basin are summarized in Table 3.4-1. Ambient standards for some air pollutants have been set for two or more exposure periods. EPA adopted a new 8-hour ozone standard and new fine particle (PM<sub>2.5</sub>) standards in July 1997. These standards became effective in September 1997, and are included in Table 3.4-1. The new federal 8-hour ozone standard eventually will replace the federal 1-hour ozone standard. The federal 1-hour ozone standard will be rescinded for an area only after EPA determines that the 1-hour standard has been achieved in that area. The new particulate matter and ozone standards have been challenged in court. Air quality management programs related to these standards are on hold pending final resolution of the court challenges.

**Table 3.4-1  
Federal and State Ambient Air Quality Standards**

| Pollutant | Symbol | Averaging Time | Standard, as parts per million |          | Standard, as micrograms per cubic meter |          | Violation Criteria |          |
|-----------|--------|----------------|--------------------------------|----------|---|----------|--------------------|----------|
|           |        |                | California                     | National | California                              | National | California         | National |

|                              |                   |                        |      |      |        |        |             |   |
|------------------------------|-------------------|------------------------|------|------|--------|--------|-------------|---|
| Ozone                        | O <sub>3</sub>    | 1 hour                 | 0.09 | 0.12 | 177    | 235    | If exceeded | If exceeded on more than 3 days in 3 years<br>If exceeded by the mean of annual 4 <sup>th</sup> highest daily values for 3 years.                 |
|                              |                   | 8 hours                | ---  | 0.08 | ---    | 157    | ---         |   |
| Carbon monoxide              | CO                | 8 hours                | 9.0  | 9    | 10,000 | 10,000 | If exceeded | If exceeded on more than 1 day per year<br>If exceeded on more than 1 day per year  |
|                              |                   | 1 hour                 | 20   | 35   | 23,000 | 40,000 | If exceeded |   |
| Inhalable particulate matter | PM <sub>10</sub>  | Annual Geometric Mean  | ---  | ---  | 30     | ---    | If exceeded | ---   |
|                              |                   | Annual Arithmetic Mean | ---  | ---  | ---    | 50     | ---         |   |
|                              |                   | 24 hours               | ---  | ---  | 50     | 150    | If exceeded |   |
| Fine particulate matter      | PM <sub>2.5</sub> | Annual Arithmetic Mean | ---  | ---  | ---    | 15     | ---         | If exceeded as a 3-year spatial average of data from designated stations<br>If exceeded by the mean of annual 98th percentile values over 3 years |
|                              |                   | 24 hours               | ---  | ---  | ---    | 65     | ---         |   |

Source: California Air Resources Board 1991. State and National Ambient Air Quality Standards (ARB Fact Sheet 39). 40 CFR § 50, 53, and 58.

Notes: All standards except the national PM<sub>10</sub> and PM<sub>2.5</sub> standards are based on measurements corrected to 25 degrees C and 1 atmosphere pressure.

The national PM<sub>10</sub> and PM<sub>2.5</sub> standards are based on direct flow volume data without correction to standard temperature and pressure.

Decimal places shown for standards reflect the rounding precision used for evaluating compliance.

Except for the 3-hour sulfur dioxide standard, the national standards shown are the primary (health effects) standards.

The national 3-hour sulfur dioxide standard is a secondary (welfare effects) standards.

USEPA adopted new ozone and particulate matter standards on July 18, 1997; the new standards became effective on September 16, 1997.

The national 1-hour ozone standard will be rescinded for an area when USEPA determines that the standard has been achieved in that area.

Previous national PM<sub>10</sub> standards (which had different violation criteria than the September 1997 standards) will remain in effect for existing PM<sub>10</sub> nonattainment areas until USEPA takes actions required by Section 172(e) of the Clean Air Act or approves emission control programs for the relevant PM<sub>10</sub> state implementation plan.

Violation criteria for all standards except the national annual standard for PM<sub>2.5</sub> are applied to data from individual monitoring sites.

Violation criteria for the national annual standard for PM<sub>2.5</sub> are applied to a spatial average of data from one or more community-oriented monitoring sites representative of exposures at neighborhood or larger spatial scales (40 CFR § 58).

The "10" in PM<sub>10</sub> and the "2.5" in PM<sub>2.5</sub> are not particle size limits; these numbers identify the particle size class (aerodynamic equivalent diameters in microns) collected with 50% mass efficiency by certified sampling equipment. The maximum particle size collected by PM<sub>10</sub> samplers is about 50 microns aerodynamic equivalent diameter; the maximum particle size collected by PM<sub>2.5</sub> samplers is about 6 microns aerodynamic equivalent diameter (40 CFR § 53).

Federal ambient air quality standards are based on evidence of acute and chronic toxicity effects. Most state ambient air quality standards are based primarily on health effects data, but can reflect other considerations, such as protection of crops, protection of materials, or avoidance of nuisance conditions (such as objectionable odors). Most state ambient air quality standards are more stringent than the comparable federal standards or address pollutants that are not covered by federal ambient air quality standards.

Air pollutants covered by federal and state ambient air quality standards can be categorized by the nature of their toxic effects as:

- Irritants (such as ozone, particulate matter, nitrogen dioxide, sulfur dioxide, sulfate particles, hydrogen sulfide, and vinyl chloride) that affect the respiratory system, eyes, mucous membranes, or the skin;

- Asphyxiants (such as carbon monoxide and nitric oxide) that displace oxygen or interfere with oxygen transfer in the circulatory system, affecting the cardiovascular and central nervous systems;
- Necrotic agents (such as ozone, nitrogen dioxide, and sulfur dioxide) that directly cause cell death; or
- Systemic poisons (such as lead particles) that affect a range of tissues, organs, and metabolic processes.

Ozone and particulate matter are the air pollutants of greatest concern in the Salton Sea Air Basin, with carbon monoxide being an additional pollutant of concern in the Calexico area. Ozone is a strong oxidizing agent that reacts with a wide range of materials and biological tissues. Ozone is a respiratory irritant that can cause acute and chronic effects on the respiratory system. Recognized effects include reduced pulmonary function, pulmonary inflammation, increased airway reactivity, aggravation of existing respiratory diseases (such as asthma, bronchitis, and emphysema), physical damage to lung tissue, decreased exercise performance, and increased susceptibility to respiratory infections (Horvath and McKee, 1994). In addition, ozone causes significant damage to leaf tissues of crops and natural vegetation. Ozone also damages many materials by acting as a chemical oxidizing agent. Because of its chemical activity, indoor ozone levels are usually much lower than outdoor levels.

Suspended particulate matter represents a diverse mixture of solid and liquid material having size, shape, and density characteristics that allow the material to remain suspended in the air for meaningful time periods. The physical and chemical composition of suspended particulate matter is highly variable, resulting in a wide range of public health concerns.

Many components of suspended particulate matter are respiratory irritants. Some components (such as crystalline or fibrous minerals) are primarily physical irritants. Other components are chemical irritants (such as sulfates, nitrates, and various organic chemicals). Suspended particulate matter also can contain compounds (such as heavy metals and various organic compounds) that are systemic toxins or necrotic agents. Suspended particulate matter or compounds adsorbed on the surface of particles can also be carcinogenic or mutagenic chemicals.

Public health concerns focus on the particle size ranges likely to reach the lower respiratory tract or the lungs. Inhalable particulate matter (PM<sub>10</sub>) represents particle size categories that are likely to reach either the lower respiratory tract or the lungs after being inhaled. Fine particulate matter (PM<sub>2.5</sub>) represents particle size categories likely to penetrate to the lungs after being inhaled.

In addition to public health impacts, suspended particulate matter causes a variety of material damage and nuisance effects: abrasion; corrosion, pitting, and other chemical reactions on material surfaces; soiling; and transportation hazards due to visibility impairment.

Carbon monoxide is a public health concern because it combines readily with hemoglobin in the blood, and thus reduces the amount of oxygen transported to body tissues. Relatively low concentrations of carbon monoxide can significantly affect the amount of oxygen in the blood stream since carbon monoxide binds to hemoglobin 200-250 times more strongly than oxygen. Both the cardiovascular system and the central nervous system can be affected when 2.5-4.0 percent of the hemoglobin in the blood is bound to carbon monoxide rather than to oxygen (Goldsmith, 1986; Gutierrez, 1982; McGrath, 1982). Because of its low chemical reactivity and low solubility, indoor carbon monoxide levels usually are similar to outdoor levels.

### 3.4.3 Ambient Air Quality Conditions

#### *Attainment Status Designations*

The status of areas with respect to federal and state ambient air quality standards generally is categorized as nonattainment, attainment, or unclassified. However, this general terminology is used somewhat differently for federal versus state designations. State designations of attainment status are nonattainment (in violation of a state standard), transitional (in violation of a state standard but very close to attainment status), attainment (in compliance with a state standard), or unclassified (no data to determine status).

For most air pollutants, federal status designations initially are made as either nonattainment, unclassifiable, or attainment/cannot be classified. For simplicity and clarity, the federal unclassifiable and attainment/cannot be classified designations will be called unclassified throughout this EIS/EIR. Federal nonattainment designations for ozone, carbon monoxide, and PM<sub>10</sub> normally include subcategories indicating the severity of the air quality problem (moderate or serious for carbon monoxide and PM<sub>10</sub>; extreme, severe, serious, moderate, and marginal for ozone).

In the federal usage, the unclassified designation (either unclassifiable or attainment/cannot be classified) includes attainment areas that comply with federal standards as well as areas for which monitoring data are lacking. Unclassified areas are treated as attainment areas for most regulatory purposes. In the federal usage, formal attainment designations generally are used only for areas that transition from a nonattainment status to an attainment status. Areas that have been reclassified from nonattainment to attainment of federal air quality standards are automatically considered "maintenance areas" for the next 20 years, although this designation is seldom noted in status listings. Both nonattainment and maintenance areas are subject to the Clean Air Act conformity requirements discussed in a subsequent section.

Table 3.4-2 summarizes the federal and state attainment status designations for the counties that may be affected by one or more of the alternatives. For simplicity and clarity, the federal attainment status designations in Table 3.4-2 are characterized as nonattainment, maintenance, unclassified, or attainment. Federal Clean Air Act conformity requirements apply to the relevant pollutants in locations with federal nonattainment or maintenance designations. Pollutants with federal unclassified or



attainment designations are excluded from consideration under Clean Air Act conformity requirements.

Table 3.4-2 does not address the new federal 8-hour ozone standard or the new federal PM<sub>2.5</sub> standards. As noted in Table 3.4-1, violation criteria for the new federal standards required 3 years of monitoring data. Nonattainment designations related to the new standards were not be made retroactively, and will not be made until issues raised by court challenges have been resolved.

Figure 3.4-1 illustrates the boundaries of the various federal nonattainment areas in the Salton Sea region. Most of the Salton Sea Air Basin has a nonattainment status for the federal 1-hour ozone standard. Most of the Riverside County portion of the air basin has a “severe” ozone nonattainment designation. The extreme eastern side of the Riverside County portion of the air basin has an unclassified (i.e., attainment) designation for the federal 1-hour ozone standard. The Imperial County portion of the air basin has a “moderate” ozone nonattainment designation.

Most of the Salton Sea Air Basin has a federal nonattainment designation for PM<sub>10</sub>. The Riverside County portion of the air basin has “serious” PM<sub>10</sub> nonattainment designation. The Imperial Valley portion of the air basin has a “moderate” PM<sub>10</sub> nonattainment designation. The eastern portion of Imperial County has an unclassified (i.e., attainment) designation for the federal PM<sub>10</sub> standards.

#### *Air Quality Monitoring Data*

Three air pollutants violate federal or state air quality standards in the Salton Sea Air Basin: carbon monoxide, ozone, and PM<sub>10</sub>. Appendix C includes tabular and graphical summaries of monitoring data for these pollutants at various monitoring locations in the Salton Sea Air Basin. Carbon monoxide problems in the air basin are limited to the Calexico area. Ozone and PM<sub>10</sub> problems occur intermittently throughout most of the air basin. As noted below, air quality conditions in the

**Table 3.4-2  
Federal and State Attainment Status Designations for Riverside, Imperial,  
and San Diego Counties**

| <b>County</b>    | <b>Subregion</b>                                     | <b>Pollutant</b> | <b>Federal Status</b> | <b>State Status</b> |
|------------------|--|------------------|-----------------------|---------------------|
| Riverside County | South Coast Air Basin<br>Portion of County           | Ozone            | Nonattainment         | Nonattainment       |
|                  |  | Carbon Monoxide  | Nonattainment         | Attainment          |
|                  |  | Nitrogen Dioxide | Maintenance           | Attainment          |
|                  |  | PM <sub>10</sub> | Nonattainment         | Nonattainment       |
|                  |  | Sulfur Dioxide   | Attainment            | Attainment          |
|                  |  | Lead             | no designation        | Attainment          |
|                  | AQMA Portion of<br>Coachella<br>Valley Planning Area | Ozone            | Nonattainment         | Nonattainment       |
|                  |  | Carbon Monoxide  | Unclassified          | Attainment          |

|                 |   |                  |                |               |
|-----------------|---|------------------|----------------|---------------|
|                 |   | Nitrogen Dioxide | Unclassified   | Attainment    |
|                 |   | PM <sub>10</sub> | Nonattainment  | Nonattainment |
|                 |   | Sulfur Dioxide   | Unclassified   | Attainment    |
|                 |   | Lead             | no designation | Attainment    |
|                 | Remainder of Coachella Valley Planning Area             | Ozone            | Unclassified   | Nonattainment |
|                 |   | Carbon Monoxide  | Unclassified   | Attainment    |
|                 |   | Nitrogen Dioxide | Unclassified   | Attainment    |
|                 |   | PM <sub>10</sub> | Nonattainment  | Nonattainment |
|                 |   | Sulfur Dioxide   | Unclassified   | Attainment    |
|                 |   | Lead             | no designation | Attainment    |
|                 | Mojave Desert Air Basin Portion of County               | Ozone            | Unclassified   | Nonattainment |
|                 |   | Carbon Monoxide  | Unclassified   | Attainment    |
|                 |   | Nitrogen Dioxide | Unclassified   | Attainment    |
|                 |   | PM <sub>10</sub> | Unclassified   | Nonattainment |
|                 |   | Sulfur Dioxide   | Unclassified   | Attainment    |
|                 |   | Lead             | no designation | Attainment    |
| Imperial County | City of Calexico  | Ozone            | Nonattainment  | Nonattainment |
|                 |   | Carbon Monoxide  | Unclassified   | Nonattainment |
|                 |   | Nitrogen Dioxide | Unclassified   | Attainment    |
|                 |   | PM <sub>10</sub> | Nonattainment  | Nonattainment |
|                 |   | Sulfur Dioxide   | Attainment     | Attainment    |
|                 |   | Lead             | no designation | Attainment    |
|                 | Rest of Imperial Valley Planning Area Portion of County | Ozone            | Nonattainment  | Nonattainment |
|                 |   | Carbon Monoxide  | Unclassified   | Attainment    |
|                 |   | Nitrogen Dioxide | Unclassified   | Attainment    |
|                 |   | PM <sub>10</sub> | Nonattainment  | Nonattainment |
|                 |   | Sulfur Dioxide   | Attainment     | Attainment    |
|                 |   | Lead             | no designation | Attainment    |

**Table 3.4-2**  
**Federal and State Attainment Status Designations for Riverside, Imperial,**  
**and San Diego Counties (continued)**

| <b>County</b>    | <b>Subregion</b>                 | <b>Pollutant</b> | <b>Federal Status</b> | <b>State Status</b> |
|------------------|----------------------------------|------------------|-----------------------|---------------------|
| Imperial County  | Remaining Eastern Part of County | Ozone            | Nonattainment         | Nonattainment       |
|                  |                                  | Carbon Monoxide  | Unclassified          | Attainment          |
|                  |                                  | Nitrogen Dioxide | Unclassified          | Attainment          |
|                  |                                  | PM <sub>10</sub> | Unclassified          | Nonattainment       |
|                  |                                  | Sulfur Dioxide   | Attainment            | Attainment          |
|                  |                                  | Lead             | no designation        | Attainment          |
| San Diego County | Western 2/3 of County            | Ozone            | Nonattainment         | Nonattainment       |
|                  |                                  | Carbon Monoxide  | Maintenance           | Attainment          |
|                  |                                  | Nitrogen Dioxide | Unclassified          | Attainment          |
|                  |                                  | PM <sub>10</sub> | Unclassified          | Nonattainment       |
|                  |                                  | Sulfur Dioxide   | Attainment            | Attainment          |
|                  |                                  | Lead             | no designation        | Attainment          |
|                  | Eastern 1/3 of County            | Ozone            | Nonattainment         | Nonattainment       |
|                  |                                  | Carbon Monoxide  | Unclassified          | Attainment          |
|                  |                                  | Nitrogen Dioxide | Unclassified          | Attainment          |
|                  |                                  | PM <sub>10</sub> | Unclassified          | Nonattainment       |
|                  |                                  | Sulfur Dioxide   | Attainment            | Attainment          |
|                  |                                  | Lead             | no designation        | Attainment          |

Sources: 40 CFR 81.305; California Air Resources Board, 1997.

Notes: PM<sub>10</sub> = inhalable particulate matter

Federal and state attainment status designations do not always use the same geographic boundaries.

Subregion identifications in this table reflect the mixture of federal and state designation areas. In Riverside County, the Coachella Valley Planning Area (used for federal PM10 designation purposes) is larger than the AQMA boundaries used for federal ozone designation purposes. The Coachella Valley Planning Area represents the Riverside County portion of the Salton Sea Air Basin. In Imperial County, the City of Calexico has a different state carbon monoxide designation than the rest of the Imperial Valley Planning Area (used for federal PM10 designation purposes). Other federal and state attainment status designations apply to all of Imperial County.

Status designation categories for state air quality standards are nonattainment, transitional, attainment, or unclassified.

Status designation categories for federal ozone, carbon monoxide, nitrogen dioxide, and PM<sub>10</sub> standards are either nonattainment or attainment/cannot be classified; attainment designations are made when areas are reclassified from nonattainment to attainment status.

For clarity, federal attainment/cannot be classified designations are listed in this table as unclassified.

A federal redesignation to attainment for ozone, carbon monoxide, nitrogen dioxide, or PM10 implies maintenance area status; for clarity, such areas are listed as maintenance in this table.

Status designation categories for the federal sulfur dioxide standard are nonattainment of primary standard, nonattainment of secondary standard, attainment, or unclassified.

EPA is required to make nonattainment designations for the federal lead standard, but is not required to make formal attainment designations except when reclassifying an area from nonattainment to attainment. The absence of a formal designation implies attainment status.

Salton Sea Air Basin have been generally stable since 1992, with few upward or downward trends of any magnitude.

**Carbon Monoxide.** High carbon monoxide levels in the Calexico area are caused primarily by foreign vehicles which lack effective emission controls. The number of violations of federal and state carbon monoxide standards has fluctuated from year to year without any clear upward or downward trend.

**Ozone.** Most ozone problems in the Salton Sea Air Basin are caused by pollutant transport from the South Coast Air Basin (Los Angeles County, Orange County, western Riverside County, and southwestern San Bernardino County), San Diego County, or Mexico. Maximum 1-hour ozone concentrations have not shown any clear upward or downward trend in the air basin since 1991. The highest ozone concentrations generally occur in the Calexico area, with Palm Springs sometimes showing comparably high concentrations. Ozone concentrations in the Indio and El Centro areas tend to be slightly lower than those in either Calexico or Palm Springs.

The number of violations of the state ozone standard has historically been the highest in the Palm Springs area. In recent years, however, the number of violations of the state standard has declined at Palm Springs and Indio while the number of violations has risen somewhat at El Centro and Calexico.

Violations of the federal ozone standard are based on data for three-year periods, not single year totals. There has been a general decline in violations of the federal 1-hour ozone standard for Palm Springs and Indio. Data also suggest a recent decline in violations of the federal 1-hour ozone standard for the Calexico Grant Street station. In contrast, violations of the federal 1-hour ozone standard have been increasing at El Centro.

Ozone precursor emissions in the Salton Sea Air Basin for 1995 were estimated to be 58 tons per day of reactive organic compounds and 77 tons per day of nitrogen oxides, with emissions divided evenly between the Riverside County and Imperial County portions of the air basin (California Air Resources Board 1999).

**PM<sub>10</sub>** Violations of the state 24-hour PM<sub>10</sub> standard are frequent at most monitoring stations in the air basin. Most monitoring stations also exceed the state annual average PM<sub>10</sub> standard. Violations of the less stringent federal 24-hour PM<sub>10</sub> standard are recorded occasionally at most monitoring stations in the air basin. The federal annual average PM<sub>10</sub> standard is exceeded occasionally at Indio and Brawley, and is exceeded routinely in Calexico.

PM<sub>10</sub> conditions in the Salton Sea Air Basin are due primarily to emission sources within the Salton Sea Air Basin, with additional contributions due to pollutant transport from the South Coast Air Basin or Mexico (Desert Research Institute, 1995). Major contributors to high concentrations of PM<sub>10</sub> include wind-blown dust, agricultural burning, mining activities, vehicle travel on unpaved roads, motor vehicle emissions,

and other fuel combustion sources. The most obvious sources of wind-blown dust are areas disturbed by agricultural practices or off-road vehicle activities, and vehicle travel on unpaved roads. Undisturbed desert areas would be a significant source of wind-blown dust only during periods of very strong winds. PM<sub>10</sub> emissions in the Salton Sea Air Basin were estimated to be 191 tons per day in 1995, with most of the emissions (152 tons per day) occurring in the Imperial County portion of the air basin (California Air Resources Board 1999).

Most PM<sub>10</sub> monitoring stations collect one 24-hour sample every six days. The relatively low frequency of sampling means that maximum concentration events are unlikely to be sampled in most years at any particular station. In addition, PM<sub>10</sub> monitoring stations throughout the Salton Sea Air Basin normally are operated on the same basic six day cycle. Concurrent sampling simplifies comparisons among monitoring stations, but makes it more difficult to identify time history trends from maximum annual 24-hour PM<sub>10</sub> data.

Annual average concentration values provide a more reliable indicator of annual trends and geographic patterns. PM<sub>10</sub> concentrations are lowest in the Palm Springs area and highest in the Calexico area. PM<sub>10</sub> concentrations between Indio and El Centro are very similar. Average PM<sub>10</sub> levels in the Salton Sea Air Basin have remained very uniform over most of the 1991-1997 period. Average PM<sub>10</sub> concentrations at Indio have shown a slight increase since 1992, while those at Calexico have shown a modest increase since 1995. There is no evidence from the monitoring data that the Salton Sea or surrounding land uses have any disproportionate impact on PM<sub>10</sub> levels in the air basin.

***Chloride, Sulfate, and Nitrate Content of PM<sub>10</sub>*** PM<sub>10</sub> concentrations from some monitoring stations are analyzed for chloride, sulfate, and nitrate content. Data from these analyses provide some general indications about sources contributing to PM<sub>10</sub> concentrations. The chloride content of PM<sub>10</sub> can indicate the relative importance of marine air intrusion. In some situations, the chloride content might also indicate spray irrigation with moderately saline water, wind erosion of salt deposits in arid areas, or salt spray contributions from a large saline water body such as the Salton Sea. The sulfate and nitrate content of PM<sub>10</sub> can indicate pollutant transport from heavily urbanized areas. In addition, the sulfate content can be an indication of fuel oil or diesel fuel combustion sources or of wind erosion from salt deposits in arid areas.

Except for the Palm Springs monitoring station, chloride, sulfate, and nitrate compounds in combination account for 8 percent -13 percent of average PM<sub>10</sub> concentrations in the Salton Sea Air Basin. At the Palm Springs monitoring station, these constituents account for 14 percent - 20 percent of average PM<sub>10</sub> concentrations.

There is a clear and consistent geographic pattern of declining chloride concentrations from the south end to the north end of the air basin. The chloride fraction of PM<sub>10</sub> is highest in the El Centro and Calexico areas, and lowest in the Indio area. The chloride fraction of PM<sub>10</sub> is higher at Palm Springs than at Indio, but is lower than that of the

other monitoring stations in the air basin. The spatial pattern of chloride levels implies that marine air intrusion is the predominant influence on the chloride content of PM<sub>10</sub>. There is no evidence that the Salton Sea or its shoreline areas have a measureable effect on chloride levels in the air basin.

Over the 1991 - 1997 period, there has been a slight decline in the chloride content of PM<sub>10</sub> for the Imperial County portion of the air basin, and an increase in the chloride content of PM<sub>10</sub> for the Riverside County portion of the air basin. Chloride levels in Palm Springs have shown a noticeable increase since 1993. Increased use of spray irrigation for residential landscaping and golf courses might account for this trend.

On an absolute concentration basis, PM<sub>10</sub> sulfate levels are similar at all monitoring stations except Calexico. Calexico also has the highest overall PM<sub>10</sub> concentrations in the air basin. The sulfate fraction of PM<sub>10</sub> is similar for areas from Indio south to Calexico. PM<sub>10</sub> samples from Palm Springs have a distinctly higher sulfate fraction than those from the rest of the air basin, suggesting a greater impact of pollutant transport from the South Coast Air Basin. There is no evidence that the Salton Sea has a measureable effect on sulfate levels in the air basin.

On an absolute concentration basis, there are no clear geographic patterns to PM<sub>10</sub> nitrate levels. Indio and Calexico tend to have the highest average values, but the pattern is not consistent from year to year. The nitrate fraction of PM<sub>10</sub> is similar for areas from Indio south to El Centro. PM<sub>10</sub> samples from Palm Springs have a noticeably higher nitrate content than those from the rest of the air basin, suggesting a greater impact of pollutant transport from the South Coast Air Basin. The nitrate content of PM<sub>10</sub> tends to be lowest in the Calexico area, suggesting a lower impact of pollutant transport from the South Coast Air Basin. There is no evidence that the Salton Sea has a measureable effect on nitrate levels in the air basin.

#### 3.4.4 Air Quality Planning

##### *Federal Requirements*

The federal Clean Air Act requires each state to develop, adopt, and implement a state implementation plan (SIP) to achieve, maintain, and enforce federal air quality standards throughout the state. Deadlines for achieving the federal air quality standards vary according to air pollutant and the severity of existing air quality problems. The SIP must be submitted to and approved by EPA. In California, the state implementation plan consists of separate elements for different regions of the state. SIP elements are developed on a pollutant-by-pollutant basis whenever one or more air quality standards are being violated. Local councils of governments and air pollution control districts have had the primary responsibility for developing and adopting the regional elements of the California SIP.

##### *Federal Clean Air Act Conformity Process*

Section 176(c) of the Clean Air Act requires federal agencies to ensure that actions undertaken in nonattainment or maintenance areas are consistent with the Clean Air

Act and with federally enforceable air quality management plans. EPA has promulgated separate rules that establish conformity analysis procedures for transportation-related actions and for other (general) federal agency actions. Transportation conformity requirements apply to highway and mass transit projects funded or approved by the Federal Highway Administration or the Federal Transit Administration.

General conformity requirements are potentially applicable to most other federal agency actions, but apply only to those aspects of an action that involve on-going federal agency responsibility and control over direct or indirect sources of air pollutant emissions. Emission sources that are not under direct or indirect federal agency control are excluded from Clean Air Act conformity reviews under the EPA general conformity rule.

The EPA general conformity rule applies to federal actions occurring in nonattainment or maintenance areas when the total direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified thresholds. The emission thresholds that trigger requirements of the conformity rule are called *de minimis* levels. Table 3.4-3 identifies the federal nonattainment pollutants and the relevant *de minimis* emission thresholds for federal nonattainment areas in Imperial, Riverside, and San Diego counties. Figure 3.4-1 illustrates the boundaries of the various federal nonattainment areas in the Salton Sea region.

The EPA conformity rule establishes a process that is intended to demonstrate that the proposed federal action:

- Will not cause or contribute to new violations of federal air quality standards;
- Will not increase the frequency or severity of existing violations of federal air quality standards; and
- Will not delay the timely attainment of federal air quality standards.

Compliance with the conformity rule can be demonstrated in several ways. Compliance is presumed if the net increase in direct and indirect emissions from a federal action would be less than the relevant *de minimis* level. As noted above, the only emissions considered in this analysis are those emissions that are or will remain under the control of federal agencies.

**Table 3.4-3  
Federal Clean Air Act Conformity De Minimis Levels for Riverside, Imperial,  
and San Diego Counties**

| <b>County</b>    | <b>Geographic Area</b>                               | <b>Air District Jurisdiction</b> | <b>Nonattainment/<br/>Maintenance<br/>Pollutant</b> | <b>Nonattainment<br/>Severity<br/>Classification</b> | <b>Precursors</b>                   | <b>De Minimis<br/>Threshold<br/>(Tons/Year)</b> |
|------------------|--|----------------------------------|---|--|-------------------------------------|---|
| Riverside County | South Coast Air Basin<br>Portion of County           | South Coast AQMD                 | Ozone   | Extreme  | ROG, NOx                            | 10  |
|                  |  |                                  | Carbon Monoxide                                     | Serious  | CO                                  | 100   |
|                  |  |                                  | Nitrogen Dioxide                                    | Maintenance  | NOx                                 | 100   |
|                  |  |                                  | PM <sub>10</sub>                                    | Serious  | PM <sub>10</sub> , ROG, NOx,<br>SOx | 70  |
| Riverside County | AQMA Portion of<br>Coachella Valley Planning<br>Area | South Coast AQMD                 | Ozone   | Severe   | ROG, NOx                            | 25  |
|                  |  |                                  | PM <sub>10</sub>                                    | Serious  | PM <sub>10</sub> , ROG, NOx,<br>SOx | 70  |
| Imperial County  | Imperial Valley Planning<br>Area                     | Imperial County APCD             | PM <sub>10</sub>                                    | Moderate   | PM <sub>10</sub> , ROG, NOx,<br>SOx | 100   |
|                  | Entire County  | Imperial County APCD             | Ozone   | Transitional   | ROG, NOx                            | 100   |
| San Diego County | Entire County  | San Diego APCD                   | Ozone   | Serious  | ROG, NOx                            | 50  |
|                  | Western 2/3 of County                                | San Diego APCD                   | Carbon Monoxide                                     | Maintenance  | CO                                  | 100   |

Sources: 40 CFR 81.305; 40 CFR 93.153; California Air Resources Board, 1997.

Notes: APCD = Air Pollution Control District  
AQMD = Air Quality Management District  
ROG = reactive organic compounds  
NOx = oxides of nitrogen  
SOx = oxides of sulfur  
PM<sub>10</sub> = inhalable particulate matter  
CO = carbon monoxide  
De minimis thresholds apply to individual pollutants and precursors, not to the combination of precursors.



If net emissions increases exceed the relevant *de minimis* value, a formal conformity determination process must be followed. Federal agency actions subject to the general conformity rule cannot proceed until there is a demonstration of consistency with the SIP through one of the following mechanisms:

- By dispersion modeling analyses demonstrating that direct and indirect emissions from the federal action will not cause or contribute to violations of federal ambient air quality standards;
- By showing that direct and indirect emissions from the federal action are specifically identified and accounted for in an approved SIP;
- By showing that direct and indirect emissions associated with the federal agency action are accommodated within emission forecasts contained in an approved SIP;
- By showing that emissions associated with future conditions will not exceed emissions that would occur from a continuation of historical activity levels;
- By arranging emission offsets to fully compensate for the net emissions increase associated with the action;
- By obtaining a commitment from the relevant air quality management agency to amend the SIP to account for direct and indirect emissions from the federal agency action; or
- In the case of regional water or wastewater projects, by showing that any population growth accommodated by such projects is consistent with growth projections used in the applicable SIP.

Dispersion modeling analyses can be used to demonstrate conformity only in the case of primary pollutants such as carbon monoxide or directly emitted PM<sub>10</sub>. Modeling analyses cannot be used to demonstrate conformity for secondary pollutants such as ozone or photochemically generated particulate matter because the available modeling techniques generally are not sensitive to site-specific emissions.

#### *State Requirements*

The California Clean Air Act of 1988 requires air pollution control districts and air quality management districts to develop air quality management plans for meeting state ambient air quality standards for ozone, carbon monoxide, sulfur dioxide, and nitrogen dioxide. CARB is responsible for addressing actions required to meet state PM<sub>10</sub> standards, but is not required to develop a formal plan for meeting the state PM<sub>10</sub> standards.

The California Clean Air Act does not set specific deadlines for achieving state air quality standards. Instead, attainment is required “as expeditiously as practicable”, with various emission control program requirements based on the attainment status for ozone and carbon monoxide standards.