Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan

Prepared by:

Great Basin Unified Air Pollution Control District

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Dedication

"Perched on mountains, I am a human speck of an observer to this wild extravagance of creative force. It extends my world, and time, to know that I cannot truly measure space, energy, and beauty. In the face of mountains, measurement seems contrived, impertinent, dwarfed. But mountains do not dwarf the spirit; they present reaches that convene with the universal."

from *A Practice of Mountains* by Andrea Mead Lawrence & Sara Burnaby

The Great Basin Unified Air Pollution Control District dedicates this plan to Andrea Mead Lawrence. Andrea's 14 years of leadership on the District Governing Board, her 16 years as a Mono County Supervisor and her lifetime of dedication to the environment have been inspiration for District staff to "do the right thing" for the air and the environment of the Eastern Sierra.

The authors gratefully acknowledge the enormous contributions of all the Great Basin staff and contract employees, who have worked for over a decade on research and development of fugitive dust control measures at Owens Lake.

Cover photos:

Top – Aerial view of the north end of the Owens Lake bed looking north up the Owens Valley. The crest of the Sierra Nevada runs along the top of the photo and wind scoured areas of the lake bed can be seen as the darker areas in the center of the photo. (photo by David Groeneveld)

Bottom – Aerial view of dust plumes coming off the bed of Owens Lake during a dust storm. The community of Keeler is just off the bottom right corner of the photo. The lake bed is emitting dust from the Keeler area down to Dirty Socks, a distance of approximately 10 miles. (photo by David Groeneveld)

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Summary

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S-1 PURPOSE OF THE SIP

The Owens Valley PM_{10} Demonstration of Attainment State Implementation Plan (SIP) has been prepared by the Great Basin Unified Air Pollution Control District (District) to meet federal requirements in the Clean Air Act Amendments of 1990 (CAAA). The SIP includes an analysis of the particulate matter air pollution problem in the Owens Valley and provides a control strategy to bring the area into attainment with the National Ambient Air Quality Standards (NAAQS) for particulate matter by December 31, 2006.

S-2 FEDERAL CLEAN AIR ACT AND THE SIP

On July 1, 1987, the US Environmental Protection Agency (USEPA) revised the NAAQS, replacing total suspended particulates (TSP) as the indicator for particulate matter with a new indicator called PM_{10} (i.e., particulate matter less than or equal to 10 microns in diameter). The intent of the new, health-based standard for particulate matter was to prevent concentrations of suspended particles in the air that are injurious to human health. PM_{10} can penetrate deep into the respiratory tract, and lead to a variety of respiratory problems and illnesses. On August 7, 1987, the USEPA designated the southern Owens Valley as one of the areas in the nation that violated the new PM_{10} NAAQS. Figure 1 shows the boundaries of the nonattainment area, which is known as the Owens Valley Planning Area. Subsequent air quality monitoring by the District has shown that the bed of Owens Lake – most of which is owned by the State of California and managed by the California State Lands Commission (SLC) – is the major source of PM_{10} emissions contributing to air quality violations in the Owens Valley Planning Area. In January 1993, the southern Owens Valley was reclassified as a "serious nonattainment" area for PM_{10}.

The USEPA required the State of California to prepare a SIP for the Owens Valley Planning Area that demonstrates how PM_{10} emissions will be decreased to prevent exceedances of the NAAQS. The District is the agency delegated by the state to fulfill this requirement. In accordance with Section 189(b) of the CAAA, an Attainment SIP for serious nonattainment areas must be submitted to the USEPA by February 8, 1997 that demonstrates conformance with the federal air quality standards through the implementation of a program of control measures. By statute, attainment of the NAAQS for PM_{10} must be accomplished by December 31, 2001. However, Section 188(e) of the CAAA makes provisions, under certain conditions, for a one-time, up to five-year, extension of the deadline, which the District believes is necessary in this case. Therefore, the latest possible date for attainment of the PM_{10} NAAQS is December 31, 2006.

This document was prepared to satisfy the requirements for a SIP that demonstrates attainment of the PM_{10} NAAQS. The SIP includes a PM_{10} control strategy to reduce wind blown PM_{10} emissions from the exposed playa at Owens Lake. The control strategy permits using gravel coverings, managed vegetation, or shallow flooding along with unspecified measures to accomplish PM_{10} emission reductions at Owens Lake. It is anticipated that the control strategy can be implemented such that the Owens Valley Planning Area will be brought into attainment by December 31, 2006 as required by the CAAA. After the District

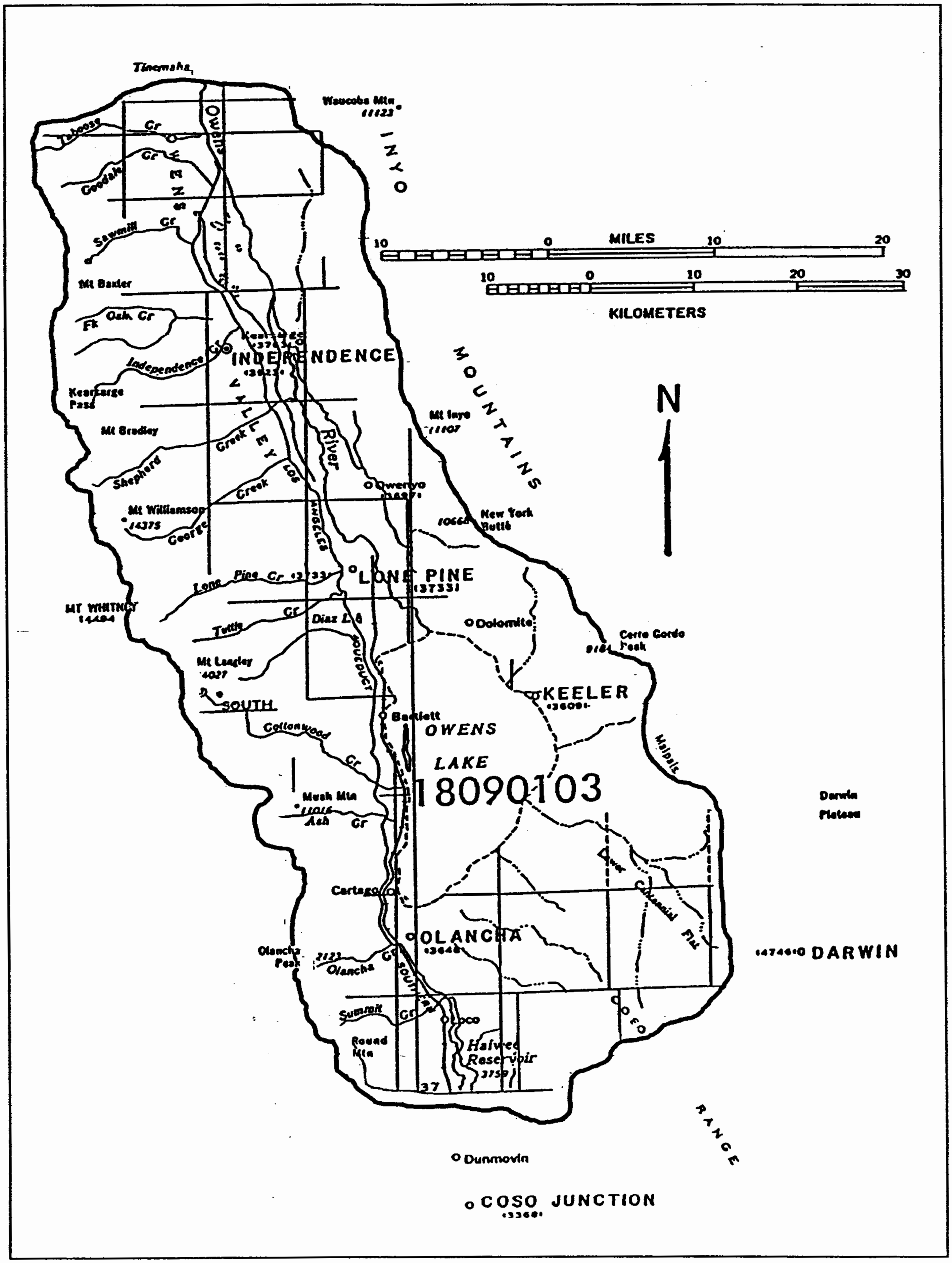

Figure 1: Boundaries of the federal PM_{10} non-attainment area.

Board adopts the SIP, it will be sent to the California Air Resources Board for review and approval. Once approval is granted by the state, it will then be officially submitted to the USEPA in compliance with federal requirements.

S-3 HEALTH IMPACTS OF PM_{10} FROM OWENS LAKE

Particulate pollution is generally associated with dust, smoke and haze and is measured as PM_{10}, which stands for particulate matter less than 10 microns in diameter. These particles are extremely small, approximately one-tenth the diameter of a human hair. Because of their small size they can easily penetrate deeply into the lungs. Breathing PM_{10} can cause a variety of health problems. It can increase the number and severity of asthma and bronchitis attacks. It can cause breathing difficulties in people with heart or lung disease, and it can increase the risk for, or complicate existing respiratory infections. The National Ambient Air Quality Standard is intended to protect people who are especially sensitive to elevated levels of PM_{10}, which includes; children, the elderly and people with existing heart and lung problems. The PM_{10} NAAQS for a 24-hour average is set at 150 $\mu g/m^3$. At much higher concentrations of PM_{10}, the dust can adversely affect even healthy individuals. The USEPA has set an episode level of 600 $\mu g/m^3$ as the level that can pose a significant risk of harm to the health of the general public, including otherwise healthy individuals (40 CFR 51.151).

The NAAQS for PM_{10} is frequently violated in the planning area because of wind blown dust from Owens Lake. Wind speeds greater than about 17 mph (7.6 m/s) have the potential to cause wind erosion from the barren lake bed. Ambient PM_{10} readings are the highest measured in the country. One PM_{10} reading from Keeler on April 13, 1995 reached 3,929 $\mu g/m^3$ – more than 25 times higher than the PM_{10} NAAQS. From 1987 through 1995 the PM_{10} NAAQS was violated about 19 times per year in Keeler, 5 times per year in Olancha and 2 times per year in Lone Pine.

Studies of dust transport from Owens Lake show that the standard can be exceeded more than 50 miles away and expose many more people to violations of the PM_{10} standard than just the residents near Owens Lake. Figure 2 shows the extent of possible PM_{10} violations from Owens Lake dust storms. The dust from Owens Lake at concentrations that can be above the federal PM_{10} standard annually affects about 40,000 permanent residents between Ridgecrest and Bishop. In addition, many visitors spend time in the dust impacted area to enjoy the many recreational opportunities the Eastern Sierra and high desert have to offer. Lone Pine annually hosts the Lone Pine film festival which draws thousands of visitors from outside the area. The National Park Service is concerned about the health hazard posed to an estimated 250,000 to 350,000 visitors that are expected to annually visit the Manzanar National Historic Site, 15 miles north of Owens Lake. The Park Service is concerned because a high percentage of the visitors to Manzanar will be older visitors who are more prone to airborne respiratory threats, and that they will spend 3 to 4 hours outdoors in a potentially harmful environment.

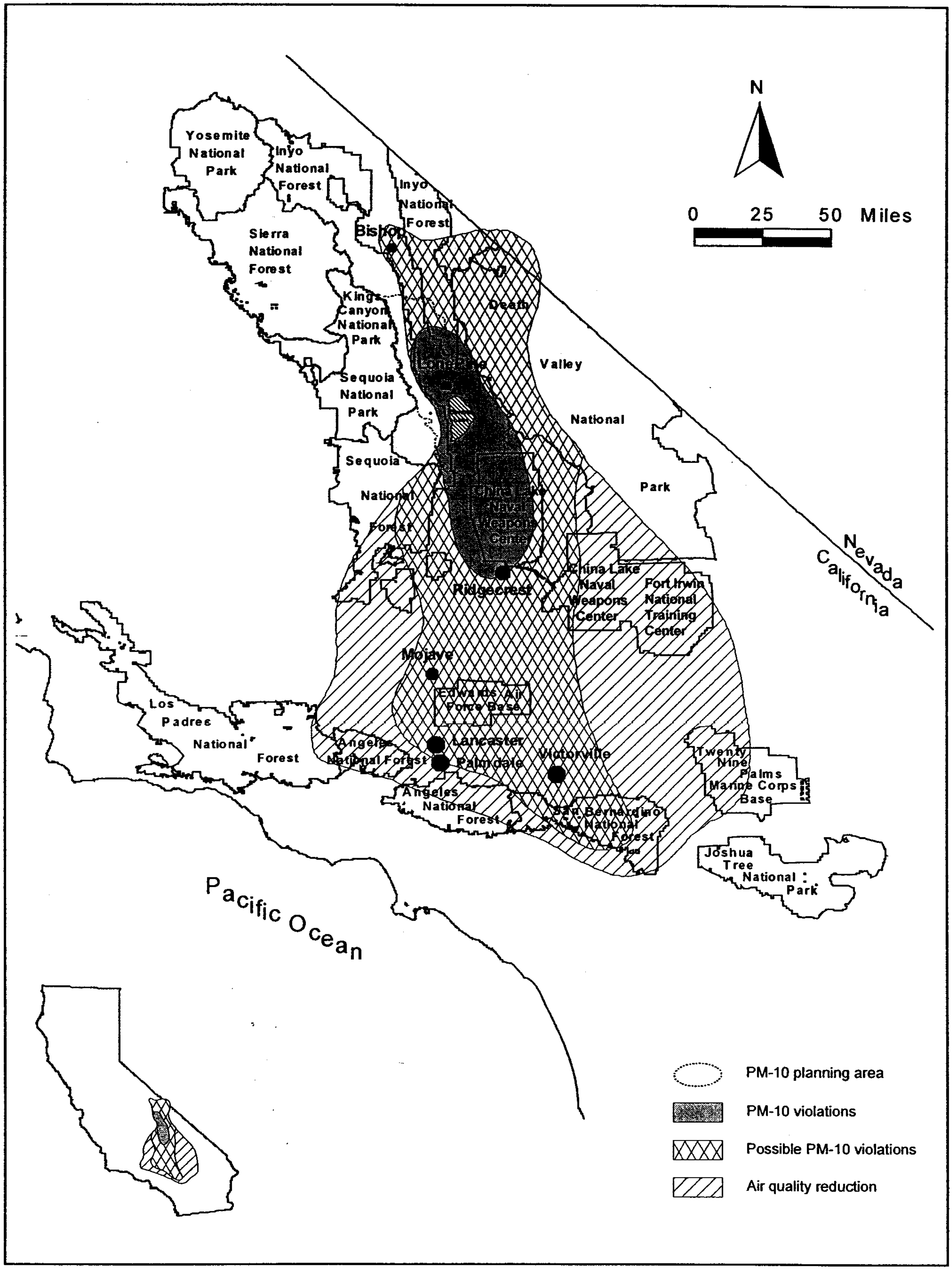

Figure 2: Projected area affected by dust from Owens Lake.

S-4 SOURCES OF PM_{10} EMISSIONS

Air pollution emissions in the nonattainment area are dominated by PM_{10} emissions from wind erosion from the exposed Owens Lake playa. Other wind erosion sources in the nonattainment area are: off-lake sources of lake bed dust, small mining facilities and some areas near Lone Pine and Independence that have been disturbed by human activity. There are few industrial sources in the Owens Valley and the only other source of criteria pollutant emissions are wood stoves, fireplaces, unpaved and paved road dust, and vehicle tailpipe emissions. In the future, the USDA Forest Service will also be emitting PM_{10} from prescribed burning activities in and around the nonattainment area. The prescribed burning activity, however, is not expected to be done on windy days when the Owens Lake dust storms occur. Predicted windy days are avoided when doing prescribed burns for fire safety reasons.

Wind eroded material from Owens Lake comprises more than 99% of the 24-hour and annual emission inventories. Wind erosion emissions can be separated into on-lake and off-lake source areas. The on-lake source areas are the wind erosion areas on the historic playa of Owens Lake. Figure 3 shows the identified source areas that have been used for the attainment demonstration SIP. Off-lake sources of wind blown dust are caused by dust that was initially entrained from the exposed playa and then deposited in areas off the lake bed. These dust deposition areas, which are located adjacent to the lake bed from Keeler to Olancha, become secondary sources of dust that can be re-entrained under windy conditions.

The locations of on-lake source areas were determined by field mapping of eroded areas after storms. The boundaries of the eroded areas were mapped using a global positioning system (GPS). These data were transferred to a Geographic Information System to map the boundaries and determine the area size. Off-lake source area locations are based on observations of dust storms in 1994 and 1995 and by use of aerial photos of deposition areas.

A number of methods have been used to estimate PM_{10} emissions from Owens Lake dust storms including sun photometry and portable wind tunnel measurements. A range of annual emissions from around 130,000 to over 400,000 tons of PM_{10} per year was estimated using these methods.

S-5 PM_{10} CONTROL MEASURES

Control measures are defined as those methods of PM_{10} abatement that could be placed onto portions of the Owens Lake playa and when in place are effective in reducing the PM_{10} emissions from the surface of the playa. Since 1980 the District and other researchers have studied the lake environment and the mechanisms that cause Owens Lake's severe dust storms. Since 1989 the District has pursued a comprehensive research and testing program to develop PM_{10} control measures that are effective in the unique Owens Lake playa environment. Control measures that were tested on the lake but have not been shown to be effective dust control measures for the SIP include the use of sprinklers, chemical dust suppressants, surface compaction, sand fences, and brush fences. These measures are discussed in the Owens Valley PM_{10} Planning Area Demonstration of Attainment SIP Projects Alternatives Analysis document and in the Final Environmental Impact Report (FEIR) for the Project. The District, in cooperation with the City, has developed three PM_{10}

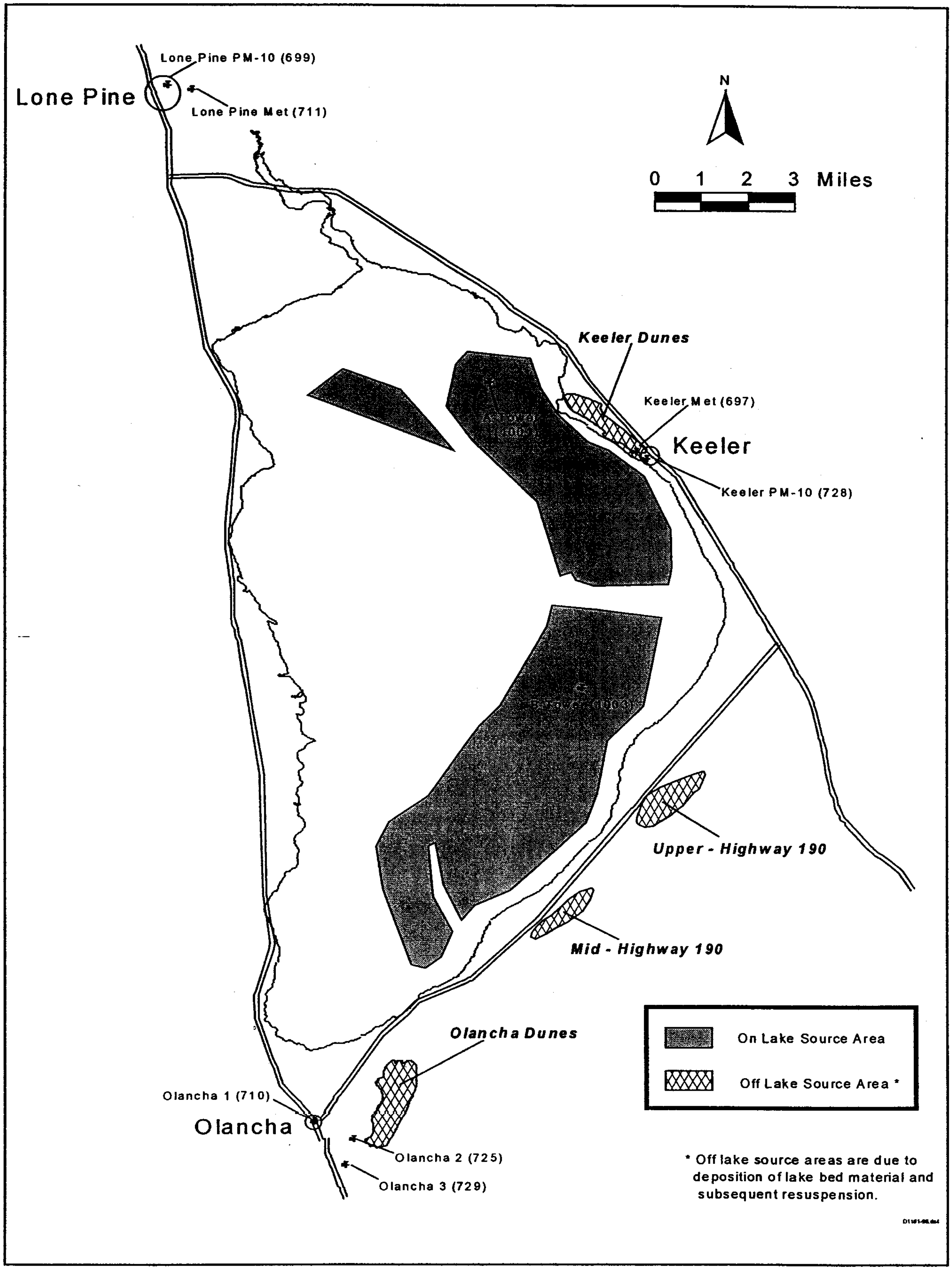

Figure 3: Owens Lake dust source areas for PM_{10} wind erosion.

control measures that it has found will prove to be feasible and effective: shallow flooding, managed vegetation and gravel.

S-5.1 Shallow Flooding for PM_{10} Control

The surfaces of naturally wet areas on the lake bed (i.e., those areas typically associated with seeps and springs) are resistant to wind erosion that causes dust. Shallow flooding mimics the physical and chemical processes that occur at and around natural springs and wetlands. In these areas, water discharges across the flat lake bed surface by raising the level of the shallow groundwater table to the surface. The areal extent of wetting is dependent upon the amount of water discharged to the surface, evaporation rate and lake bed topography. The size of the wetted area is less dependent on soil type because, once the water table is raised to the playa surface, surface evaporation is soil-type independent. Shallow flooding provides dust control over large areas with minimal infrastructure and it requires minimal ongoing operation, maintenance and lake bed access.

This control measure consists of releasing water along the upper edge of the PM_{10} emissive area elevation contour lines and allowing it to spread and flow down-gradient toward the center of the lake. To attain the required PM_{10} control efficiency, at least 75 percent of each square mile of the control area must be wetted (i.e., standing water or surface saturated soil) between September 15 and June 15 each year. This coverage can be determined by aerial photography. To maximize project water use efficiency, flows to the control area will be regulated at the outlets so that only sufficient water is released to keep the soil wet. Although the quantity of excess water will be minimized through system operation, any water that does reach the lower end of the control area will be collected and recirculated through the system. At the lower end of the flood area, or at intermediate locations along lower elevation contours, excess water will be collected along collection berms keyed into lake bed sediments and pumped back up to the outlets to be reused.

Due to the generally flat, uniform nature of the lake bed, the outlet water would spread over wide areas to create a random pattern of shallow pools. These pools would be generally less than a few inches deep. Pooled areas will produce no PM_{10}, and will act as sand traps to prevent crust abrasion and dust generation. Damp and saturated soils also resist wind erosion. Locally high areas or "islands" of non-wetted soil tend to self-level; the soil blows off the higher islands and is captured in the pools. Thus, over time the high areas would become lower and the low areas would become higher. This leveling process can be expected to occur over a period of a few years. In some limited cases, it may be necessary to mechanically level high areas. This would occur primarily where previous earthwork performed on the lake bed prevents natural uniform spreading of PM_{10} control waters.

Shallow Flooding has been shown to be effective for controlling wind blown dust in sand dominated soils on the lake bed. Between 1993 and 1996 a 600-acre test was conducted on the sand sheet between Swansea and Keeler (Figure 4). Effectiveness was evaluated in four ways; a) from aerial photographs assuming that flooded areas provided 100% control, b) from portable wind tunnel measurements of test and control areas, c) from fetch transect (2-dimensional) analysis of sand motion measurements; and d) from areal (3-dimensional)

Figure 4: Shallow flooding - test site photograph.

analysis of sand motion measurements. The average control effectiveness was 99% after the surface water covered 75% of the test area.

Where shallow flood water is distributed across the playa, opportunistic plant species are expected to establish themselves where conditions are favorable. Limited stands of cattails (*Typha* sp.), sedges (*Carex* sp.), saltgrass (*Distichlis spicata*), and other species associated with saturated alkaline meadows of the region have colonized the immediate vicinity of the water outlets on the flood irrigation project. Based on testing performed by the District at the North Flood Irrigation Project test area, naturally established vegetation can be expected to immediately occur on about 0.5 percent of the area that is controlled with shallow flooding. This percentage may increase over time.

The expansive shallow flooded areas and the naturally established vegetation provide ephemeral resting and foraging habitat for wildlife use. Insect and shorebird utilization of wet areas created by District testing on the lake bed was common during control measure testing. Based on these previous experiences, it is anticipated that shallow flooding will create large areas of plant and wildlife habitat in areas where very little previously existed.

Water flows between September 15 and June 15 will be maintained to provide the required 75 percent of the area in standing water or saturated soil. During cool weather when evaporation rates are low, it may be possible to shut off flows completely for short periods as long as saturated soil conditions are maintained. To maximize water use efficiency, water flows should be minimized during the summer months when PM_{10} standard violations are infrequent and evaporation rates are high. It is a mandatory element of this project that minimal water flows be maintained between June 16 and July 31 to sustain established vegetation and wildlife. Between August 1 and September 14 the District does not require any water to be supplied to areas controlled with shallow flooding. Based on the District's large-scale tests of shallow flooding, operating the shallow flooding control measure in this manner is predicted to use approximately four acre-feet per year (ac-ft/yr) of water per acre controlled. Careful management of shallow flood areas may allow for even less water to be used.

Maintenance activities associated with shallow flooding would consist of minor grading and berming on the control areas to ensure uniform water coverage and prevent water channeling. Staffing requirements for operation and maintenance of the shallow flooding areas are estimated at approximately one full-time equivalent employee (FTEE) per 3,200 acres of control area.

S-5.2 Managed Vegetation for PM_{10} Control

Where water appears on the playa surface with quantity and quality sufficient to leach the salty playa surface and sustain plant growth, vegetation has naturally become established. The saltgrass meadows around the playa margins and the scattered spring mounds found on the playa are examples of such areas. Vegetated surfaces are resistant to soil movement and thus provide protection from PM_{10} emissions. The managed vegetation strategy creates a mosaic of irrigated fields provided with subsurface drainage to create soil conditions suitable for plant growth using a minimum of applied water. Because this measure relies on earthen infrastructure for water distribution, it is best suited for use in clay soils. The lake bed clay soils can be used for the construction of the ditches, berms, channels and reservoirs that allow for level border irrigation strategies that leach and drain readily through the fractured structure of the soil. The proposed methods of soil reclamation are similar to those used elsewhere in this country and world-wide for desalinization of salt-affected soils, allowing such soils to be useful for plant growth.

This control measure consists of a creating a farm-like environment containing small (approximately 4- to 20-acre) confined fields constructed on contour that are irrigated with shallow pulses of water (Figure 5). The amount of water required to leach the soils to within a level suitable for salt-tolerant species depends on specifics of soil type and of surface treatment. Studies at the test plot indicate that between 3½ and 6 feet of water will be necessary to permanently reclaim a two-foot deep soil profile to a level suitable for planting with saltgrass. This amount of water can be delivered to the fields in 4 to 6 irrigation events, which can take place during a period of about 3 to 4 months. As the salt levels in the leached plots decline, plants can be introduced to the fields and irrigated using the same methods. Therefore, if leaching began during the winter months, saltgrass could be planted during the spring of the same year.

To attain the required PM_{10} control efficiency, a plant cover of 50 percent live or dead cover will be sufficient on the 75 percent of the total managed vegetation control area that will be vegetated. Data from test plots on the lake indicate that such cover can be achieved during the third growing season. Total cover will include both live and dead plant materials, as both function to prevent PM_{10} emissions. Field studies on Owens Lake test plots confirm that the target saltgrass cover of 50 percent can be sustained with 2½ ac-ft/yr of irrigation water for each acre planted with saltgrass. This results in an overall water requirement of two acre-feet of water per year per total acre of managed vegetation control area. The remaining 25 percent of the total control area will consist of such control measure infrastructure as roads, reservoirs, canals and drains. Percent cover can be measured by the point-frame method.

Saltgrass (*Distichlis spicata*) will be the only plant species considered by this SIP to be introduced to the fields. It is tolerant of relatively high soil salinity, spreads rapidly via rhizomes, and provides good protective cover year-round even when dead or dormant. Saltgrass stands can subsist with minimal amounts of applied water during the summer, and dust control effectiveness remains undiminished, provided that adequate irrigation has stimulated plant growth and has provided stored water in the plants' rooting zone during the spring months.

Control efficiencies were calculated for Owens Lake clay soils in both the field and the laboratory wind tunnels. The field studies showed 99.5% control efficiency with 11% saltgrass cover, and the laboratory study demonstrated 99.2% control efficiency at 54% cover as compared to uncontrolled emissions at Owens Lake.

Figure 5: Managed vegetation - test site aerial photograph.

The plan for managed vegetation is to achieve cover values of at least 50%, a value that would include dead or dormant stems that would provide erosion protection without presenting a transpirative surface. This level of cover could be retained with minimal water use during the summer, and would function during winter months as well without irrigation.

Based on field studies done at Owens Lake and elsewhere, the District concludes that more than 99% reduction of soil erosion and PM_{10} will be achieved at Owens Lake with a salt grass cover of 50%. For modeling and emissions inventory purposes the controlled PM_{10} emissions from the vegetation managed area are estimated at 1% of the uncontrolled emission rate.

Although saltgrass is the only plant species that will be deliberately introduced to the managed vegetation area, other plant species are expected to establish themselves opportunistically. Plant species observed on saltgrass test plots include alkali sacaton (*Sporobolus airoides*), arrowscale (*Atriplex phyllostegia*), cattail (*Typha latifolia*) parry saltbush (*Atriplex parryi*), rabbitfoot grass (*Polypogon monospeliensis*), seablight (*Sesuvium verrucosum*) and stinkweed (*Cleomella sp.*). The species typical of transmontane alkaline meadows elsewhere in the region, such as inkweed (*Nitrophila occidentalis*), Nevada sedge (*Scirpus nevadensis*), and yerba mansa (*Anemopsis californica*) would also be expected to appear, adding diversity and wildlife habitat value to the fields. On saltgrass test plots established by the District on the playa, evidence of use by rabbits, rodents, insects, spiders and even coyotes was found. The mosquito and salt cedar control programs discussed in the shallow flooding description above would also take place on the managed vegetation control measure.

Every effort will be made to limit the potential for introduction of exotic pest plant species into source emission areas that will be controlled through the use of managed vegetation. Exotic pest plants have not invaded test plots established on the playa. Fortunately, the existing saline soil conditions inherent to the lake bed are inhospitable to most plants including exotic pest plants such as tamarisk, puncture weed and Russian thistle and noxious grasses such as *Cenchrus*. Exotic pest plants and noxious grasses will be removed from the source emission area (if present) prior to planting with saltgrass. Another potential source for the introduction of exotic pest plants would be from the saltgrass stands harvested for rhizomes to vegetate the panels. Exotic pest plants will be removed from the saltgrass stands (if present) prior to harvesting. Removal will be accomplished through an appropriate combination of biological, mechanical and chemical control methods. Berms and other elements of infrastructure will be constructed from lake bed soils, which are not likely to be subject to invasion from these pest plants due to the high levels of salinity.

Managed vegetation is predicted to utilize approximately two ac-ft/yr of water per acre controlled, or 2½ acre-feet per irrigated acre. Non-irrigated acres (roads, berms, water storage, etc. account for approximately 25% of the controlled area. The distribution of the water over the entire vegetated area will be irregular, because at any given time some fields will be irrigated for maximum growth while others will be receive minimal amounts of water allowing for minimal stand maintenance. Water use will be higher during the initial stages of development of this measure, as it will take 3½ to 6 feet of water to leach the top two feet of soil to a salinity level tolerable to saltgrass, depending on surface treatment. Since the later stages of leaching can be accomplished after planting, total water use for the first year of implementation will be seven ac-ft/ac. After the first year, water use will be reduced to at or below 2½ ac-ft/ac/yr.

Operation and maintenance activities for managed vegetation would consist of implementing an irrigation schedule for the fields, and necessary repair to water transmission and delivery structures and to the berms and ditches associated with the fields. Staffing requirements for operation and maintenance of the managed vegetation area are estimated at approximately one FTEE per 1,500 acres of control area.

S-5.3 Gravel Cover for PM_{10} Control

A four-inch layer of coarse gravel laid on the surface of the Owens Lake playa will prevent PM_{10} emissions by: (a) preventing the formation of efflorescent evaporite salt crusts, because the large spaces between the gravel particles interfere with the capillary forces that transport the saline water to the surface where it evaporates and deposits salts; and (b) raising the threshold wind velocity required to lift the large gravel particles (i.e., larger than d-inch diameter) so that transport of the particles is not possible by wind speeds typical of the Owens Lake area. Gravel blankets can work effectively on essentially any type of soil surface. Gravel test plots on Owens Lake have been in place for approximately 10 years and continue to completely protect the emissive surfaces beneath (Figure 6). Gravel placed onto the lake bed surface will be durable enough to resist wind and water deterioration and leaching and will be approximately the same color as the existing lake bed.

Under certain limited conditions of sandy soils combined with high ground water levels, it may be possible for some of the gravel blanket to settle into lake bed soils and thereby lose effectiveness in controlling PM_{10} emissions. To prevent the settling of protective gravel material into lake bed soils, a permeable geotextile fabric may be placed between the soil and the gravel where necessary. This will prevent gravel settling.

Gravel areas must be protected from water- and wind-borne soil and dust. For this reason the gravel blanket is projected to be the last control measure to be installed. Therefore, wind-borne depositions will be eliminated. Gravel areas will also be protected from flood deposits with flood control berms, drainage channels and desiltation/retention basins. These measures will ensure that the gravel blanket will remain an effective PM_{10} control measure for many years.

To attain the required PM_{10} control efficiency, 100 percent of all areas designated for gravel must be covered with a layer of gravel at least four inches thick. All gravel material placed shall be screened to a size greater than ⅜-inch in diameter. The gravel material shall be at least as durable as the rock from the three sources analyzed in the Final Environmental Impact Report (FEIR) associated with this document. The material shall have no larger concentration of metals than found in the materials analyzed in the FEIR. The color of the material used shall be such that it does not significantly change the color of the lake bed.

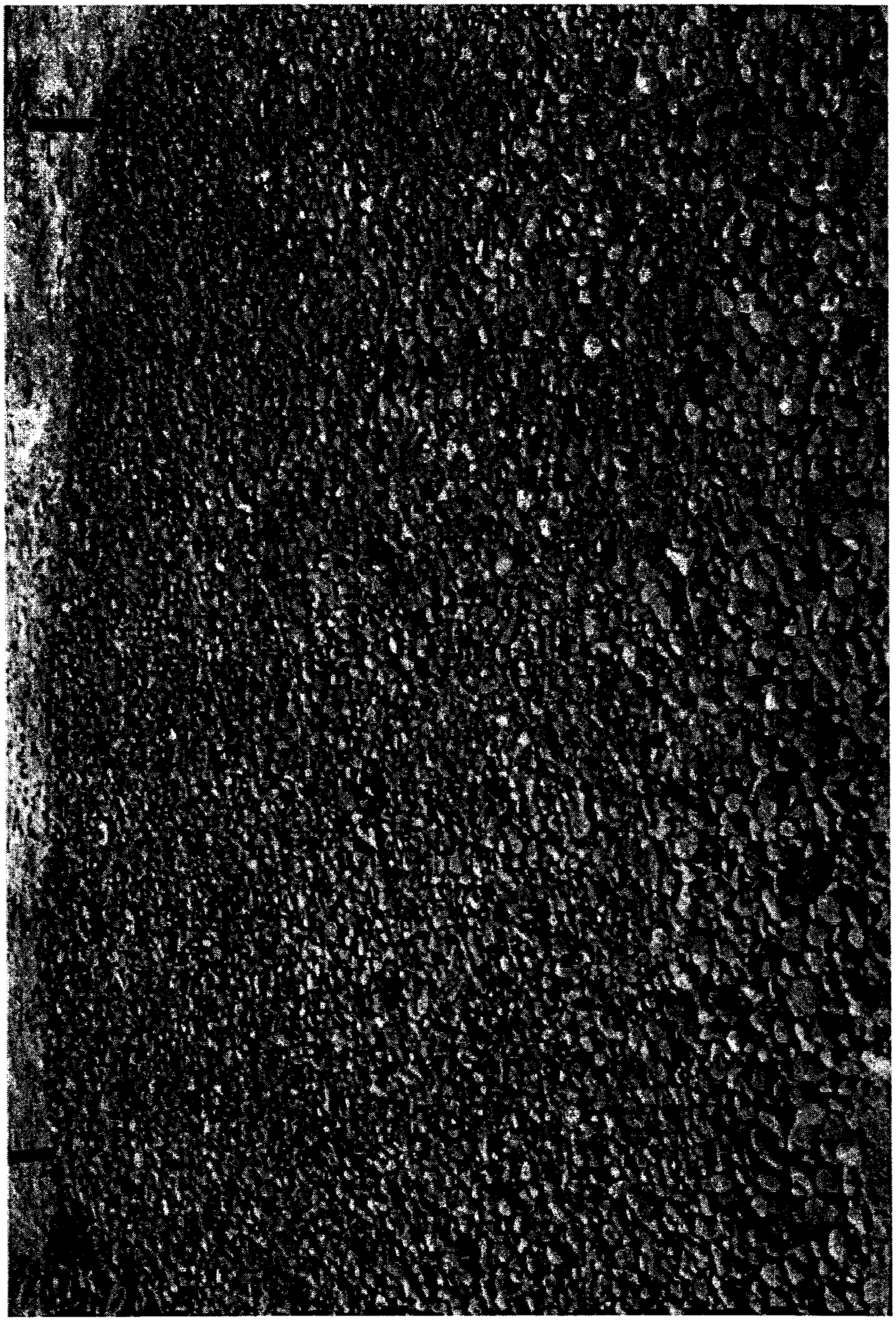

Figure 6: Gravel - test site photograph.

A gravel cover forms a non-erodible surface when the size of the gravel is large enough that the wind cannot move the surface. If the gravel surface does not move, it protects finer particles from being emitted from the surface. The potential PM_{10} emissions from a gravel surface can be estimated using the USEPA emission calculation method for industrial wind erosion for wind speeds above the threshold for the surface. PM_{10} will not be emitted if the wind speed is below the threshold speed.

Based on a minimum particle size of ¼ inch, the proposed gravel cover will have a threshold wind speed of 90 miles per hour measured at 10 meters. This wind speed is rarely exceeded in the Owens Lake area. A more typical gust for Owens Lake may be around 50 miles per hour. The PM_{10} emissions are expected to be zero for the gravel cover since the threshold wind speed to entrain gravel, and thus PM_{10}, is above the highest expected wind speeds expected for the area. This will result in 100% reduction of PM_{10} from areas that are covered by a gravel blanket.

Once the gravel cover has been applied to the playa, limited maintenance would be required to preserve the gravel blanket. The gravel would be visually monitored weekly to ensure that the gravel blanket was not filled with sand or dust, or had not been inundated or washed-out from flooding. If any of these conditions were observed over a substantial area, additional gravel would be transported to the playa and applied to the playa surface. Operation and maintenance staffing requirements are estimated to be one FTEE per five square miles of gravel and an ongoing maintenance amount of gravel of 3,200 cubic yards per square mile per year.

S-6 PROPOSED CONTROL STRATEGY

The selected PM_{10} control strategy sets forth an overall plan to control dust from Owens Lake by combining the three control measures discussed above, shallow flooding, managed vegetation and gravel, with unspecified control measures to be chosen by the City for the Dirty Socks area of the lake bed (Zone 4 in Figure 7). Through the use of air quality modeling, the District has determined that this control strategy has a high likelihood of bringing the Owens Valley PM_{10} Planning Area (OVPA) into attainment with the PM_{10} NAAQS by December 31, 2006, or sooner.

The proposed control strategy will take place in two increments. Increment 1 will take place between November 16, 1998 and December 31, 2003. Increment 1 requires the implementation of control measures on sixteen and one-half (16.5) square miles of the Owens Lake bed, unless the District finds that attainment is achieved by placing control measures on a smaller area. During Increment 1 the emphasis will be on controlling the most emissive areas of the lake bed (in terms of frequency and severity of emissions). Increment 1 will focus on improving control measure efficiencies and on identifying those remaining areas of the lake bed that will continue to contribute to PM_{10} NAAQS violations, if any. Increment 2 will take place between January 1, 2004 and December 31, 2006. Increment 2 will require any additional control measures necessary to provide for attainment of the PM_{10} NAAQS by December 31, 2006.

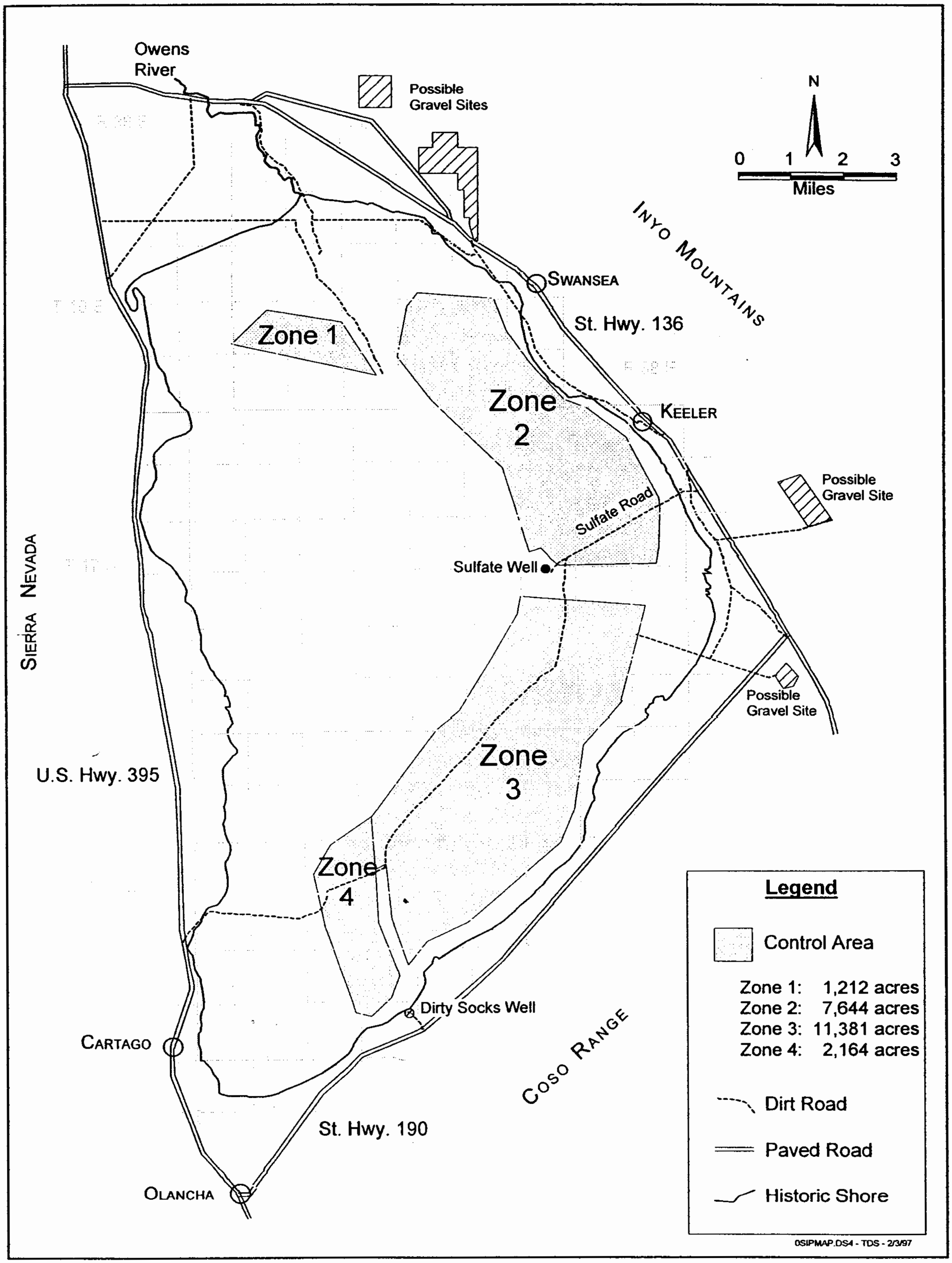

Figure 7: Control area.

S-6.1 Increment 1 Requirements

Increment 1 control measures will be implemented in three phases. Phase 1 will be to complete implementation of control measures on ten (10) square miles of lake bed by December 31, 2001. Phase 2 will be to complete implementation of control measures on an additional three and one-half (3.5) square miles of lake bed (for a total of 13.5 sq. mi. controlled) by December 31, 2002, unless the District determines that the NAAQS can be met by December 31, 2006 without implementing additional controls. Phase 3 will be to complete implementation of control measures on an additional three (3) square miles of lake bed (for a total of 16.5 sq. mi. controlled) by December 31, 2003, unless the District determines that the NAAQS can be met by December 31, 2006 without implementing additional controls.

The Increment 1 control strategy will use one or more of the three control measures discussed above (shallow flooding, managed vegetation and gravel) and unspecified control measures, to control PM_{10} emissions from the Owens Lake bed (Figure 7). The 35-square mile control area is divided into four sub-areas or "zones." Zone 1 or the "Delta Zone" is a 1,212-acre area on the north end of the lake bed west of the Owens River delta. Zone 2 or the "Keeler Zone" is a 7,644-acre area east of the Owens River delta in the northeast corner of the lake bed. Zone 3 or the "Coso Zone" is an 11,381-acre area along the southeast portion of the lake bed. Zone 4 or the "Dirty Socks Zone" is a 2,163-acre area north of the Dirty Socks Well on the southern portion of the lake bed. The District and the City may jointly agree to modify the control area identified in Figure 7.

The proposed control strategy allows the City to use any combination of the three allowable control measures, shallow flooding, managed vegetation or gravel, in Zones 1, 2 and 3. The City is encouraged to develop refinements to these three control measures and to develop additional effective control measures. The District and the City may jointly agree to modify the proposed control measures or to add one or more control measures to the list of allowable control measures.

In the Dirty Socks Zone (Zone 4) the City has the authority to implement one or more control measures of its choosing. The control measures installed in this area do not need to be approved by the District.

S-6.2 Increment 2 Requirements

Increment 2 of the control strategy will take place between January 1, 2004 and December 31, 2006. Increment 2 requires the implementation of any additional control measures necessary to provide for attainment of the PM_{10} NAAQS.

This SIP and its incorporated Board Order (SIP and Order) require the City to continue to implement control measures on an additional two (2) square miles of lake bed in 2004, 2005 and 2006 (Phases 4, 5 and 6). If the NAAQS have not been attained by 2006, as a contingency measure, this SIP and Order require the City to implement control measures on an additional two (2) square miles of the lake bed every year until the PM_{10} NAAQS is attained.

The District commits to revise this SIP and Order in 2003 (2003 SIP) to incorporate new knowledge and provide for attainment of the PM_{10} NAAQS by December 31, 2006, if attainment has not occurred sooner. The City has committed to fully participate in the SIP revision public review process. If the District determines that either additional or fewer controls are required to meet the NAAQS by the statutory deadline, the 2003 SIP will provide for implementation of the appropriate control measures for Increment 2 of the control strategy. Increment 2 may require more or less controls than the two (2) square miles per year required by this SIP and Order.

In the event of a 2003 SIP legal challenge by the City, this SIP and Order require the City to continue to annually complete implementation and begin operation of control measures on an additional two (2) square miles of the Owens Lake bed by December 31 of each calendar year after 2003. The implementation of these additional control measures will continue unless the District determines on or before December 31 of the previous year, that the OVPA will attain the PM_{10} NAAQS by the statutory deadline without implementation of further controls. This requirement is automatic; it is incorporated into this SIP and Order and requires no further action by the District or any other agency.

Upon State of California approval of the 2003 SIP pursuant to Health & Safety Code §41650, the City shall make up any control measure shortfall caused by the City SIP challenge, if any, or shall be provided credit for control measure installation beyond the state approved SIP, if any. Any required control measure shortfall will be made up within one (1) year of the approval of the 2003 SIP by the state.

S-7 MODELED ATTAINMENT DEMONSTRATION

An air quality modeling analysis was performed to show that the proposed control strategy would reduce the PM_{10} emissions to a level that will bring the areas around Owens Lake into compliance with the PM_{10} NAAQS. Air quality modeling utilized the USEPA approved guideline model, Industrial Source Complex - Short-term Version 3. After the proposed control strategy is implemented, ambient PM_{10} levels are expected to be below the 24-hour PM_{10} NAAQS of 150 $\mu g/m^3$. The highest impact area is expected to occur in the area near the southeast shoreline (see Figure 8).

S-8 CONCLUSION

The proposed control strategy using a combination of shallow flooding, managed vegetation, gravel covering or other effective control measures can reasonably be expected to be implemented in eight years to meet the federal attainment deadline of December 31, 2006. Investigations performed on the lake bed show that the three control measures developed by the District, in cooperation with the City, will prove to be feasible and that they will significantly reduce PM_{10} emissions. Air quality modeling has shown that this strategy can reduce PM_{10} impacts at sites around the historic lake shore to below the federal 24-hr PM_{10} standard.

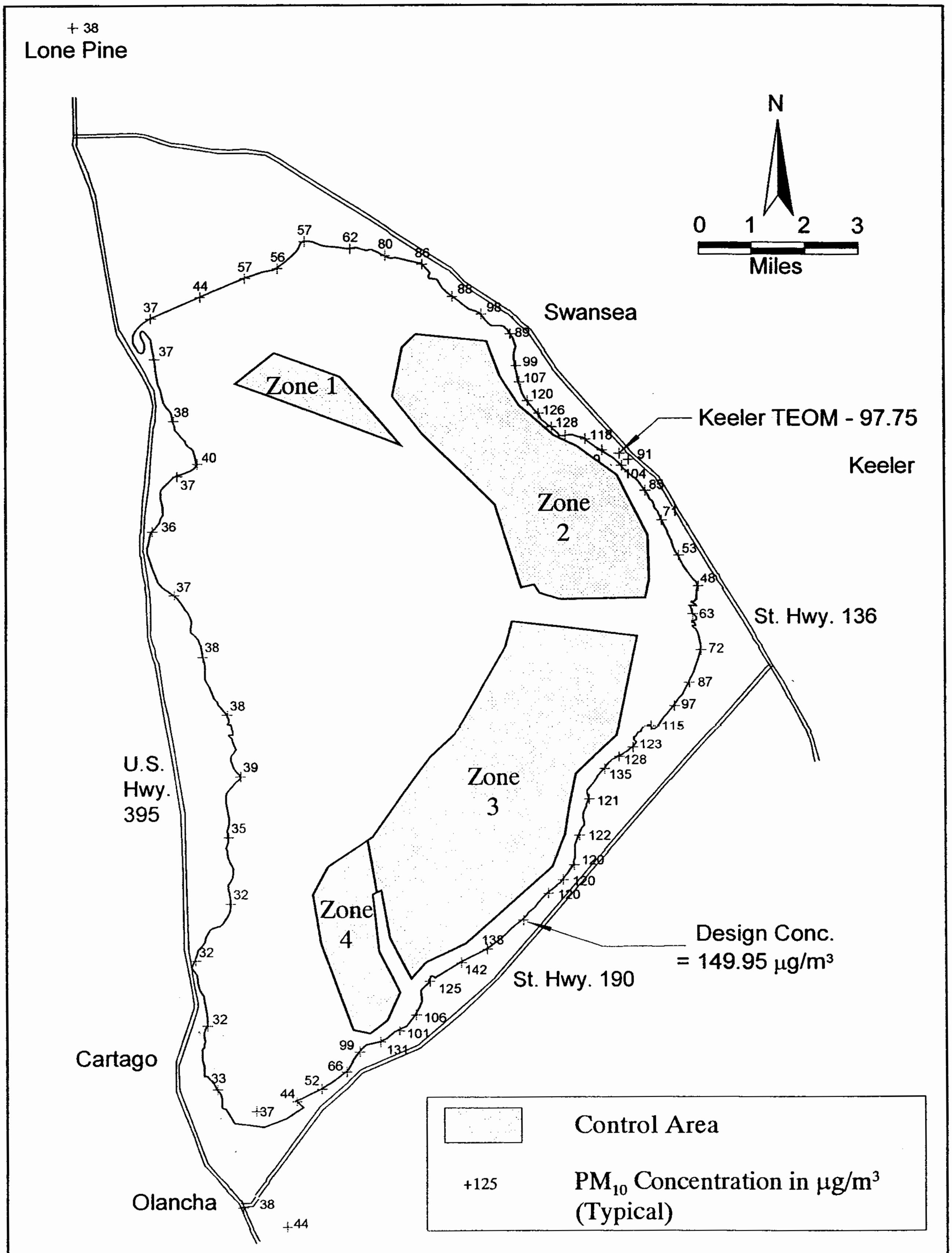

Figure 8: Air quality model: third highest 24-hour PM_{10} concentrations for 1994-95 with controls in place.

CHAPTER 1

Introduction

This State Implementation Plan (SIP) has been prepared by the Great Basin Unified Air Pollution Control District to meet federal requirements in the Clean Air Act Amendments of 1990 (CAAA). The SIP includes an analysis of the particulate matter air pollution problem in the Owens Valley and provides a control strategy to bring the area into attainment with the National Ambient Air Quality Standards (NAAQS) for particulate matter by December 31, 2006.

1-1 FEDERAL CLEAN AIR ACT AND THE SIP

On July 1, 1987, the US Environmental Protection Agency (USEPA) revised the NAAQS, replacing total suspended particulates (TSP) as the indicator for particulate matter with a new indicator called PM_{10} (i.e., particulate matter less than or equal to 10 microns in diameter). The intent of the new, health-based standard for particulate matter was to prevent concentrations of suspended particles in the air that are injurious to human health. PM_{10} can penetrate deep into the respiratory tract, and lead to a variety of respiratory problems and illnesses. On August 7, 1987, the USEPA designated the southern Owens Valley (known as the Owens Valley Planning Area) as one of the areas in the nation that violated the new PM_{10} NAAQS. Subsequent air quality monitoring by the District has shown that the bed of Owens Lake – most of which is owned by the State of California and managed by the California State Lands Commission (SLC) – is the major source of PM_{10} emissions contributing to air quality violations in the Owens Valley Planning Area. In January 1993, the southern Owens Valley was reclassified as "serious non-attainment" for PM_{10}.

The USEPA required the State of California to prepare a SIP for the Owens Valley Planning Area that demonstrates how PM_{10} emissions will be decreased to prevent exceedances of the NAAQS. The District is the agency delegated by the State to fulfill this requirement. In accordance with Section 189(b) of the CAAA, an Attainment SIP that demonstrates conformance with the federal air quality standards through the implementation of a program of control measures was required to be submitted to the USEPA by February 8, 1997. In August 1997 the USEPA made findings that the SIP had not been timely submitted. These findings started the two-year process of preparing a Federal Implementation Plan. By statute, attainment of the NAAQS for PM_{10} must be accomplished by December 31, 2001 unless the USEPA grants a one-time maximum five-year extension. The District concludes that a five-year extension is both necessary and justified in these circumstances.

1-2 DEMONSTRATION OF ATTAINMENT SIP

This document was prepared to satisfy the requirements for a SIP that demonstrates attainment with the PM_{10} NAAQS. This SIP includes a PM_{10} control strategy to reduce wind-blown PM_{10} emissions from the exposed playa at Owens Lake such that the PM_{10} NAAQS will be attained in the Owens Valley. The control strategy permits using gravel coverings, managed vegetation, shallow flooding and other effective control measures to accomplish PM_{10} emission reductions at Owens Lake. It is anticipated that the control strategy can be implemented in eight years and bring the area into attainment by December 31, 2006 as required by the CAAA. Upon adoption by the District, this SIP will be sent to the California Air Resources Board for review and approval. If approval is granted by the

State, it will then be officially submitted to the USEPA in compliance with federal requirements.

1-3 ELEMENTS OF THE SIP

The SIP includes an analysis of the air quality impacts caused by the wind blown PM_{10} from Owens Lake, estimates of the quantity of PM_{10} emitted, a discussion of control measures, and an air quality modeling analysis that demonstrates that it is possible to attain the PM_{10} standard with the proposed control measures. The following is a brief description of the contents of the SIP:

- Chapter 2 describes the Owens Valley planning area and provides a history of Owens Lake and the air pollution problem.
- Chapter 3 includes summarized information on the PM_{10} air pollution measurements taken in the Owens Lake area, sensitive air sheds in the area, and an assessment of how air quality compares to the federal standards.
- Chapter 4 contains the annual and peak 24-hour PM_{10} emission summary from wind erosion and other sources in the Owens Lake area.
- Chapter 5 describes the three control measures that the District, in cooperation with the City, has developed and that it has found will prove to be feasible and effective on Owens Lake: shallow flooding, managed vegetation, and gravel covering.
- Chapter 6 covers the air quality modeling method that was used to show that the proposed control strategy would bring the Owens Valley into attainment with the PM_{10} NAAQS.
- Chapter 7 describes how the control measures will be placed on the lake bed and how they will be phased to accomplish the overall level of control that is needed upon completion.
- Chapter 8 contains the Board Order that will be issued to the City of Los Angeles to implement the SIP control strategy.
- References are listed at the end of each chapter, and are summarized in a composite list in Chapter 9.
- Terms, acronyms and measurement units are defined in a glossary in Chapter 10.
- The declaration of the Board Clerk and associated resolutions are contained in Chapter 11.
- Appendices to the SIP include daily PM_{10} data summaries, air quality dispersion modeling results, an example of an industrial source permit issued by the District and additional SIP support documents (see List of Appendices in the Table of Contents).

CHAPTER 2

Owens Valley Planning Area

FIGURES

2-1 PROJECT LOCATION AND LAND OWNERSHIP

2-1.1 Location

Owens Lake is located in Inyo County in eastern-central California. It is situated at the south end of the long, narrow Owens Valley with the Sierra Nevada to the west, the Inyo Mountains to the east, and the Coso Range to the south (Figure 2.1). The predominantly dry, alkaline Owens Lake bed is approximately eight miles south of the community of Lone Pine on Highway 395, 65 miles north of the city of Ridgecrest, and 35 miles west of Death Valley. The communities of Olancha and Keeler are located on the southwestern and eastern shores of the lake bed, respectively. The lake bed extends about seventeen miles north and south and ten miles east and west and covers an area of approximately 110 square miles (70,000 acres).

Owens Lake and its surrounding dry playa are depicted on the following seven USGS 7.5 minute series topographic quadrangle maps: Lone Pine, Dolomite, Bartlett, Owens Lake, Keeler, Olancha and Vermillion Canyon. These maps are available for review in the District's Bishop office. Site specific topographic mapping has been compiled and is shown in Figure 2.2.

The proposed project for the State Implementation Plan will be implemented on about 35 square miles (22,400 acres) of the former lake bed, predominantly in the eastern portion (Figure 2.3). The shaded areas in Figure 2.3 represent PM_{10} source areas that require emission control measures as well as pipeline routes. There is one relatively small emission area, about two miles by ¾ mile in size, located immediately west of the Owens River delta, and one long emission area, approximately 2½ miles wide by fourteen miles long, located parallel to the historic eastern shoreline.

Figure 2.3 shows the existing riparian and wetland resources delineated at Owens Lake. These areas were mapped using ground surveys and satellite photos. Riparian vegetation extends onto the largely barren dry lake bed in the area of the Owens River delta. In addition, a narrow band of vegetation consisting of spring mounds and alkaline meadows is present along the edge of the historic shoreline, above the areas that are the primary sources of PM_{10} emissions.

2-1.2 Land Ownership

Approximately 68,000 acres, or 95%, of the Owens Lake bed is owned by the State of California and managed by the State Lands Commission (SLC). Most of this lake bed state-owned land is leased for a variety of purposes. The Owens Lake Soda Ash Company leases 16,120 acres of lake bed for the purposes of extracting trona ore. In addition, there are a few agricultural leases near historic shoreline areas. Most of the remaining lake bed areas are leased from the state by the District for the purposes of developing PM_{10} control measures. The remaining 5% of the lake bed, or approximately 2,800 acres, is owned by the City of Los Angeles. The City's lands are in the Owens River delta and on the lake bed west of Keeler. Areas above the historic shoreline are owned by the U.S. Bureau of Land Management

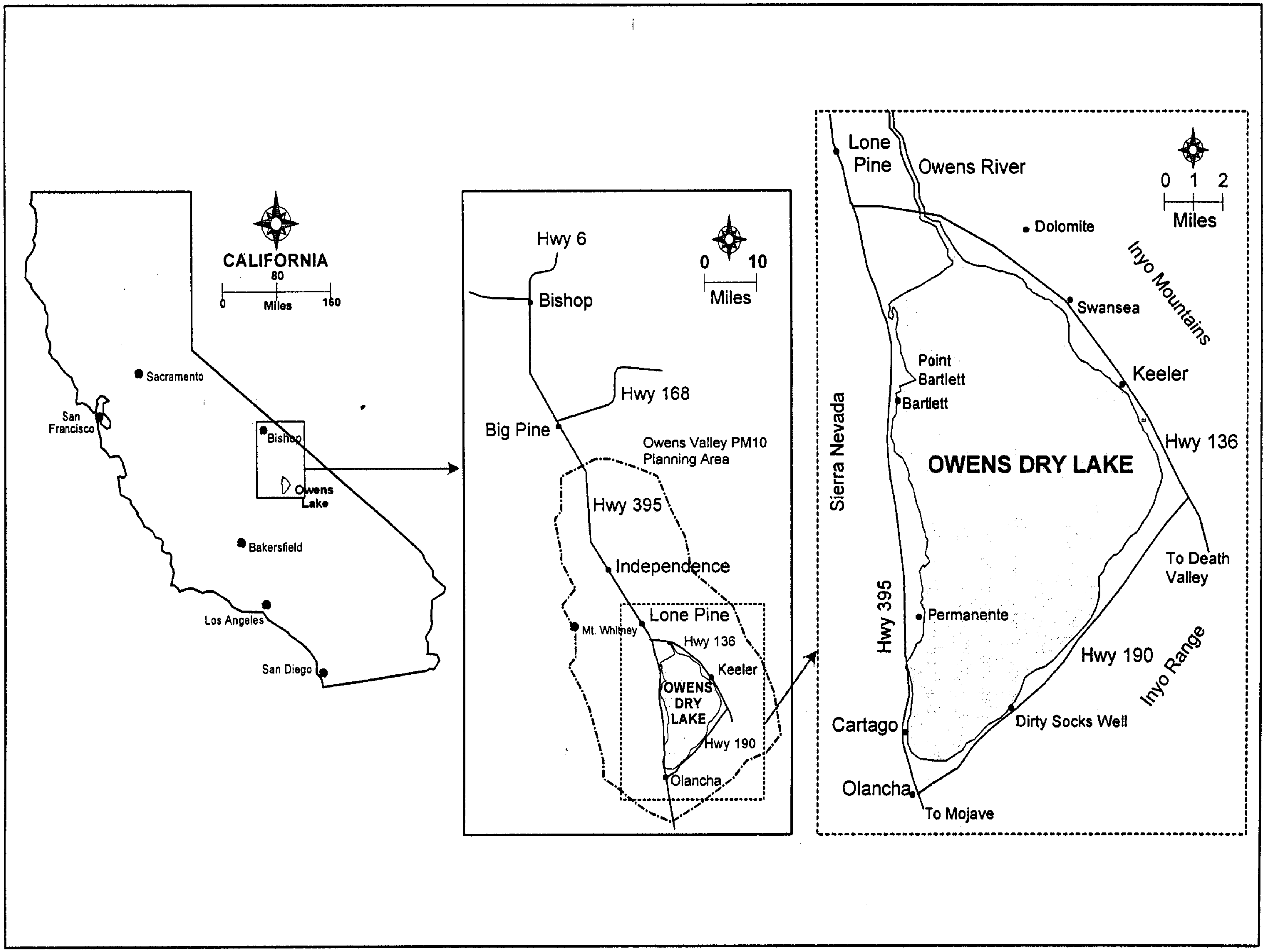

Figure 2.1: Vicinity map.

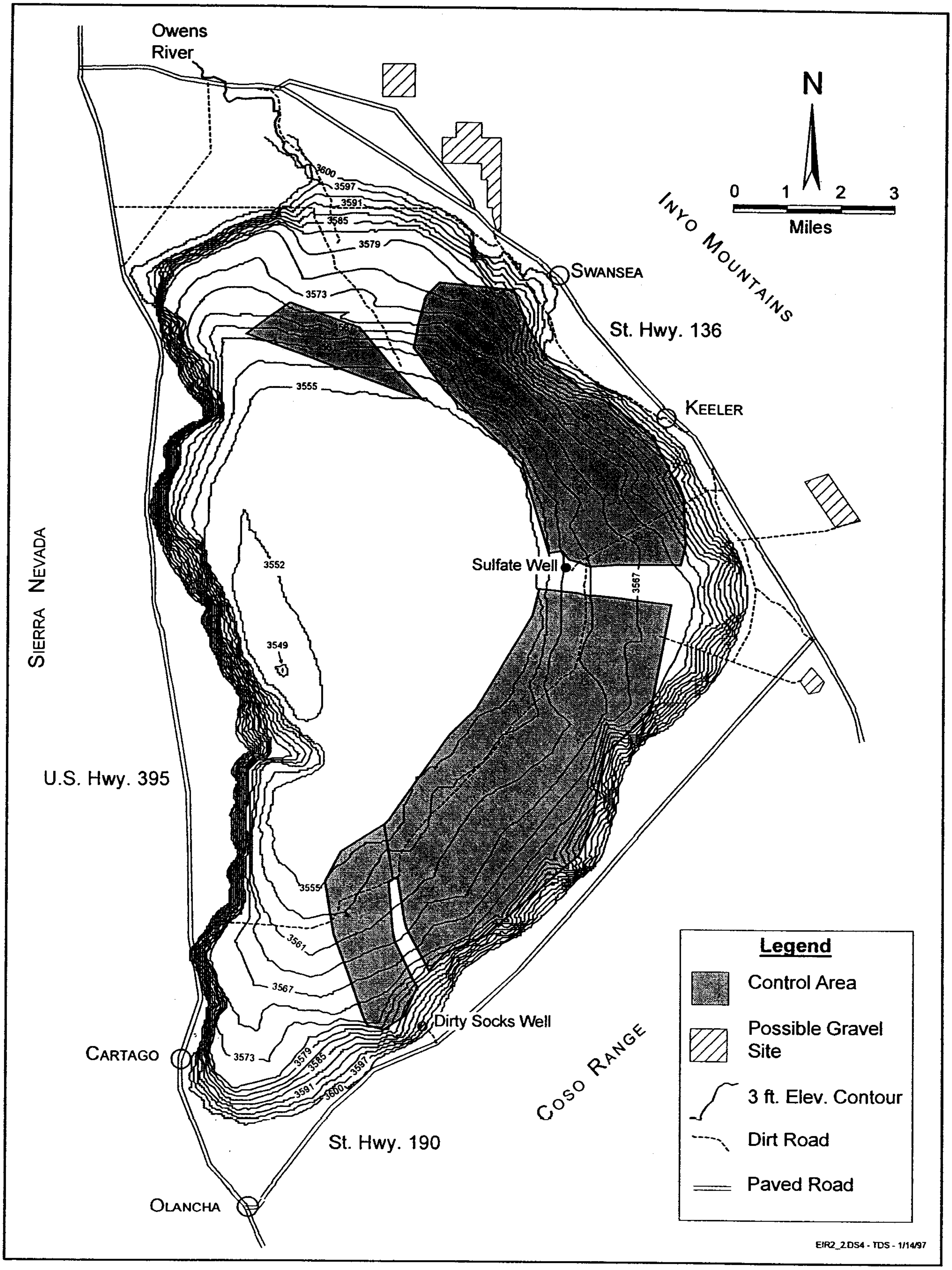

Figure 2.2: Topographic site map.

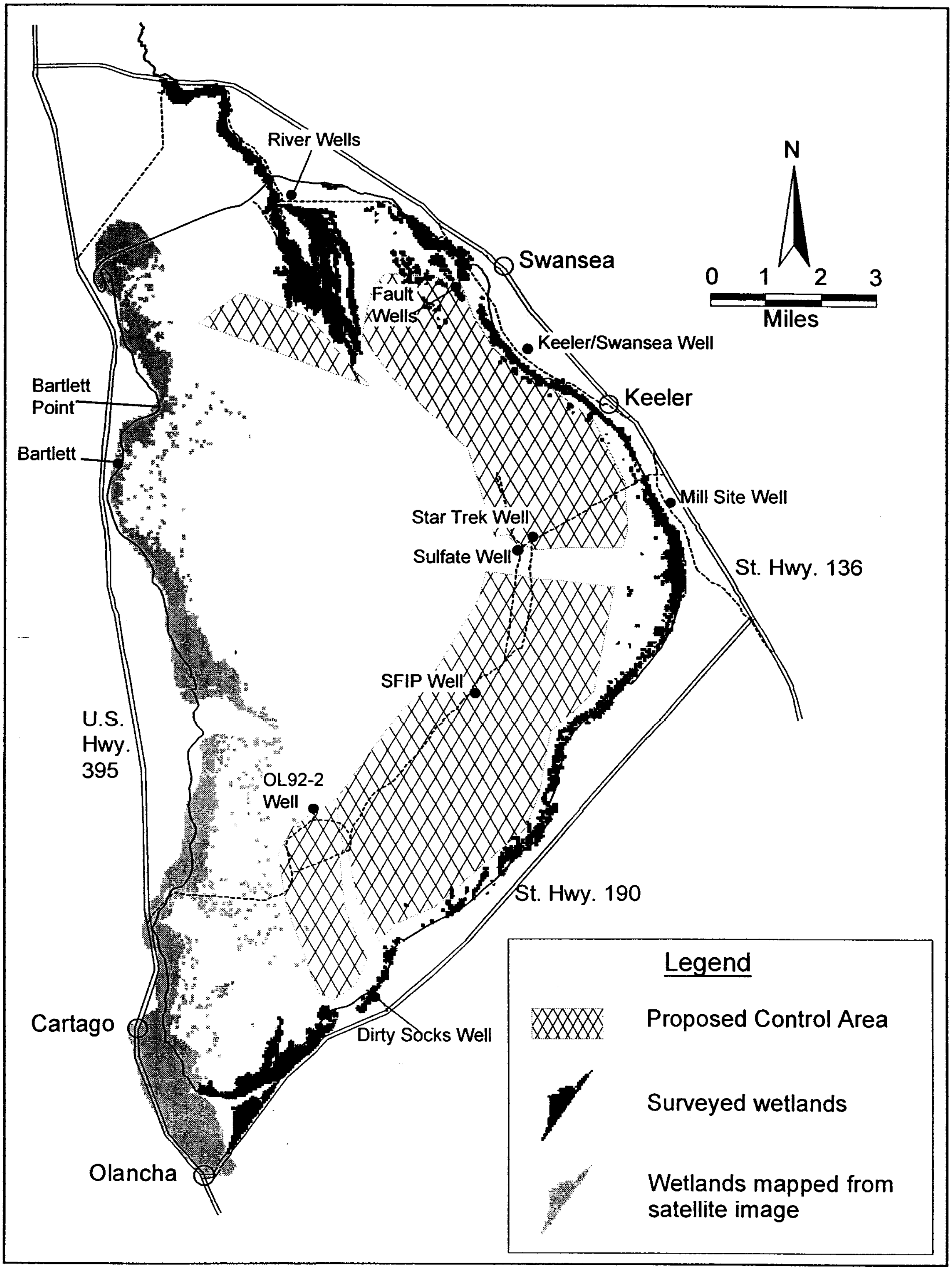

Figure 2.3: Control area and existing riparian and wetland resources.

(BLM), the state, the City of Los Angeles and private owners. All control measures and supporting infrastructure are expected to be owned by the City of Los Angeles on property owned by the City or on leases or easements from other underlying owners.

2-2 PROJECT HISTORY

2-2.1 Environmental Setting and Effects of Diversions on Owens Lake

2-2.1.1 Geologic History

Owens Lake is part of a chain of lakes formed during the late Pleistocene epoch, about 1.8 million years ago. The lakes spanned from Mono Lake (previously a much larger lake known as Lake Russell) in the north to Manley Lake, the southeasternmost of the chain, in what is now known as Death Valley. During much of this time, water from the Owens Valley basin flowed out of Owens Lake through Rose Valley and into China Lake. The high stand of the lake that produced the shorelines at an elevation of 3,880 feet above mean sea level (all elevations will be given in feet above mean sea level) is estimated to have occurred 15,000-16,000 years ago. Since that time, the surface extent of the water of Owens Lake has been diminishing – although two deep cores on the lake bed have failed to identify any previous episodes of complete desiccation (Saint-Amand, *et al.*, 1986, Smith and Bischoff, 1993). Uplift processes in the Coso Range, combined with a post-glacial drying trend, eliminated overland outflow from the basin about 3,000 years ago. As a result, the lake basin became closed, losing water only through surface evaporation and transpiration. This internal drainage, combined with the arid environment, created the highly saline condition of remaining surface waters and playa soils at the bottom of the Owens Lake basin. Even during historic periods in the 1800's when it was used as a navigable waterway, Owens Lake was an alkali lake.

2-2.1.2 Historic Lake Levels

Although, historic lake levels were as high as 3,597 feet in 1878 (Lee, 1915), surface water diversions over the last 130 years have reduced the lake to less than one-third of its original size and about 5 percent of its original volume (Mihevc and Cochran, 1992). From the 1860's to the early 1900's, withdrawals from the Owens River for agricultural purposes substantially reduced surface water inflow to the lake. Extensive irrigation projects compounded by drought caused the lake level to drop as low as 3,565 feet in 1906. However, as the drought ended, by 1912 the level had risen to 3,579 feet (Lee, 1915). In 1913, the Los Angeles Department of Water and Power (LADWP) completed a fresh water aqueduct system and began diverting waters of the Owens River south to the City of Los Angeles. Demand for exported water increased as Los Angeles grew, and diversions for irrigation continued in the Owens Valley (mainly on City-owned property). These factors resulted in Owens Lake becoming virtually dry by 1930; its level having dropped to an elevation of 3,554 feet (Saint-Amand, *et al.*, 1986 and LADWP, 1966).

A former or stranded shoreline was left behind at an approximate elevation of 3,600 feet. The former shoreline bounds the lake bed playa in aerial photographs and on most maps. Today, a small permanent brine pool is present in the lowest portion of the basin, surrounded by dry playa soils and crusts. The ordinary high water mark of this remnant brine pool has been defined by the U.S. Army Corps of Engineers to be that portion of the lake basin below 3,553.55 feet. Evaporite deposits and brines cover much of the playa area; the concentration of dissolved solids (salts) can be as high as 91 percent by weight (Holder, 1997).

2-2.1.3 *Flora and Fauna*

Although limited in distribution at Owens Dry Lake, the Owens Valley has been described as having a very rich variety of plants with over 2000 species represented in the region (DeDecker, 1984). Riparian, alkaline meadow, and alkali seep plant communities which circumscribe Owens Dry Lake provide important habitat for resident and migratory wildlife species. Many of the diverse wildlife resources that are characteristic of the Sierra Nevada, Inyo, and Coso mountain ranges surrounding Owens Dry Lake will occasionally be found on the Valley floor, particularly during winter. Heindel and Heindel (1995) report as many as 320 bird species for the Owens Valley floor including permanent residents, summer residents, winter residents, and migrants. Ephemerally flooded areas in the vicinity of Owens Dry Lake provide excellent resting and foraging habitat for winter migrants and prime opportunities for bird watching. Several sensitive wildlife resources are known from Owens Dry Lake.

2-2.1.4 *Cultural History*

The Owens Valley has attracted the interest of archeologists since at least the 1930's. The Riddells (Riddell, H. 1951; and Riddell and Riddell 1956) conducted the major work in the region in the 1940s and 1950s, recording several sites on the perimeter of Owens Lake including important sites at Cottonwood Creek and Rose Spring. Two California State Historic Landmarks and two California Points of Historic Interest are located in the vicinity of Owens Lake. Ethnographic data indicate that the east shore of Owens Lake was used by Native American groups. Historic resources related to mining and transportation have been identified along the stranded shoreline.

2-2.2 Legal History

2-2.2.1 *Natural Soda Products Co. vs. City of Los Angeles*

By the late 1920's, the majority of the lake bed was dry and remained so until 1937. Valuable mineral deposits of trona ore were exposed and became available for extraction. In 1937, 1938, and 1939, the LADWP released large quantities of water onto the lake bed, causing extensive damage to the mineral deposits and chemical processing plants. In 1937, Natural Soda Products Company, a lessee of mineral rights from the State of California, sued the City of Los Angeles for damages to its chemical plant and business caused by the flooding of Owens Lake. The court decided the case in 1943 and a judgment for damages was awarded. Natural Soda Products Co. vs. City of Los Angeles 23 Cal.2d 193 [143 P.2d 12] established that "the city, by its long continued diversion of the waters of the Owens River, incurred an obligation to continue that diversion...at least so long as it continued to maintain its aqueduct." In 1939, the state, as owner of the lake bed, brought an action in People vs. the City of Los Angeles 34 Cal.2d 695 [214 P.2d 1] to define whether the City's obligation could be enforced by injunction, and if so, to determine the extent of the injunction. The trial court, citing the principles set forth in the Natural Soda Products case, later granted an injunction and prohibited the City from: (a) diverting any waters from the Mono Basin watershed into or onto Owens Lake, and (b) diverting any waters of the Owens River and its tributaries into or onto Owens Lake "which are not in excess of an amount equal to the reasonable capacity of [LADWP's] aqueduct system and all of its component facilities reasonably operated." The City of Los Angeles appealed the trial court's injunction.

In 1950, the appeal of People vs. the City of Los Angeles was finally resolved. The appellate court modified and affirmed the lower court's decision regarding the injunction. The two significant modifications were as follows. First, since waters of the Mono Basin watershed and Owens Valley waters become mixed, the first part of the injunction was technically unenforceable. It was, therefore, amended to prohibit increasing the natural flow of the Owens River, by diverting into it waters of the Mono Basin, if such a diversion would necessitate the release of water into or onto Owens Lake. Second, the LADWP was found to be under no obligation to spread surplus water onto land owned in the Owens Valley in excess of amounts that could reasonably be used on such land or stored underground for future beneficial use. Importantly, it also reaffirmed that portion of the injunction regarding "diverting any waters out of [LADWP's] aqueduct system onto Owens Lake, or in any way releasing any waters to be deposited into or onto Owens Lake at any time, unless the flow of water of the Owens Valley watershed is in excess of an amount equal to the reasonable capacity of [LADWP's] aqueduct system and all of its component facilities reasonably operated."

Although the SIP control measures are not expected to interfere with mining interests, the shallow flooding and managed vegetation control measures involve releasing water onto Owens Lake, which is an action that may conflict with the injunction. To address this concern, the State Lands Commission informed the District that if the measures ordered by the Board are acceptable to the Commission, they would work with interested parties to find a method to allay any concerns about compliance, or they may request a modification to the injunction to allow control measures to be implemented (Valentine, 1997).

2-2.2.2 Senate Bill 270

In 1982, the LADWP applied for a permit with the District to construct and operate a geothermal electric generating plant in the Coso Known Geothermal Resource Area. The permit was denied based on the assertion that LADWP was in violation of air pollution rules and regulations elsewhere in the region. Specifically, District Rule 200 considered the water-gathering operations of LADWP to be a "facility" responsible for the particulate emissions from Owens Lake and concluded that an air quality permit was required.

After failure of efforts to petition the action, a negotiated settlement emerged in Senate Bill 270 (SB 270) sponsored by Senator Dills in 1983. SB 270 (California Health and Safety Code §42316) exempted water-gathering operations from state air quality permit regulations. It provided that the City of Los Angeles must fund control measure development and must implement reasonable measures ordered by the District to attain compliance with the state and federal ambient air quality standards at Owens Lake. By law, the District mandated control measures may not affect the City's right to produce, divert store or convey water. Chapter 8 of this document includes additional information on the applicability of CH&SC §42316 as it applies to the Board order to implement control measures.

2-2.3 Regulatory History

2-2.3.1 PM_{10} Nonattainment Designation

In 1987, the US Environmental Protection Agency (USEPA) revised the National Ambient Air Quality Standards, replacing total suspended particulates (TSP) as the indicator for particulate matter with a new indicator called PM_{10}. PM_{10} is defined as particulate matter that has an average aerodynamic diameter less than or equal to 10 microns. The standards for PM_{10} were set at 150 micrograms per cubic meter ($\mu g/m^3$) for 24 hours and 50 $\mu g/m^3$ for an annual average. At the same time, USEPA set forth regulations for implementing the revised NAAQS, and announced the policy for development of SIPs and supporting control strategies. Also in 1987, USEPA identified the southern Owens Valley (known as the Owens Valley Planning Area) as one of the areas in the nation that violated the PM_{10} NAAQS. Subsequent air quality monitoring by the District showed that the lake bed of Owens Lake is the major source of PM_{10} emissions contributing to air quality violations in the Owens Valley Planning Area. Extremely high PM_{10} concentrations (as much as 25 times the standard) have been verified downwind of Owens Lake. Inter-basin transport of PM_{10} into the southern Owens Valley is inconsequential.

Consequently, the USEPA has required the State of California to prepare a SIP for the Owens Valley Planning Area that demonstrates how PM_{10} emissions will be decreased to comply with the NAAQS. The District is the agency delegated by the state to fulfill this requirement. An initial SIP was prepared by the District in 1988, approved by the California Air Resources Board (CARB), and forwarded to the USEPA. No action was taken to approve or disapprove.

2-2.3.2 1990 Clean Air Act Amendments

In November 1990, the federal Clean Air Act Amendments (CAAA) were signed into law, setting into motion new statutory requirements for attaining the PM_{10} NAAQS. All areas in the United States that were previously classified as federal non-attainment areas for PM_{10}, including the southern Owens Valley, were designated as "moderate" PM_{10} non-attainment areas. In response to a request through the CAAA, in November 1991, the District prepared an addendum to the 1988 SIP that updated the air quality information and the work performed since 1988.

Section 188(b) of the CAAA specified that any area that cannot attain the NAAQS by December 1994 would subsequently be reclassified as a "serious" non-attainment area. In January 1993, USEPA completed its initial reclassification process, and included the southern Owens Valley among five nationwide areas reclassified as "serious" effective February 8, 1993. Section 189(b) of the CAAA further specified that a SIP revision is due within eighteen months of the reclassification (August 8, 1994). Said revision must assure that implementation of "best available control measures" (BACM), including "best available control technology" (BACT), will be effective within four years of the reclassification date. A Best Available Control Measures SIP was prepared in June 1994 and approved by CARB.

The CAAA require that by February 8, 1997, a PM_{10} Attainment SIP must be submitted to the USEPA that (a) includes preferred and contingency PM_{10} control strategies, (b) provides air quality modeling that demonstrates attainment of the federal air quality standards from the implementation of these controls, and (c) provides quantitative milestones for "reasonable further progress" reporting to the USEPA. The CAAA further require that the PM_{10} NAAQS be attained by December 31, 2001.

2-2.3.3 Natural Events Policy.

In May 1996 the USEPA issued a new policy with regard to areas that would be in compliance with the PM_{10} NAAQS but for impacts caused by natural events (USEPA, 1996a). The new policy allows the Administrator to exclude PM_{10} monitoring data affected by natural events, such as wildfires, volcanic and seismic activities, and unusually high wind events, in designating or re-designating an area as attainment or non-attainment, including the moderate and serious designations for PM_{10} non-attainment.

The policy allows Natural Event Action Plans (NEAP) to be developed in lieu of SIP revisions. A NEAP would include a public health advisory program to alert the public when PM_{10} levels are affected by natural events and a schedule to implement Best Available Control Measures (BACM) if anthropogenic sources of wind blown dust are the cause of the violation. For a high wind event from an anthropogenic source to qualify as a "natural event" it must meet two separate and independent tests:

1) that BACM for wind erosion was in place and being properly maintained at the time of the event and
2) that unusually high winds were the cause of the exceedance.

The definition and determination of what constitutes an unusually high wind are completely independent of what has been determined to be BACM (Hardebeck, 1998, Howekamp, 1998 and Appendix J). In 2006, the District will apply the EPA Natural Events Policy in a determination of whether the Owens Valley Planning Area has attained the PM_{10} NAAQS. In this process the District will consider the views of the City and other interested parties.

If a PM_{10} violation occurs as a result of other natural events, such as a forest fire or volcanic eruption, a NEAP will be developed and implemented to deal with air pollution impacts from future related natural events.

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CHAPTER 3

Air Quality Setting

FIGURES & TABLES

3-1 CLIMATE AND METEOROLOGY

The Owens Lake project area is located in the southern end of the Owens Valley in Inyo County. Owens Lake is bounded by the Inyo Mountains to the east and the Sierra Nevada to the west which rise over 10,000 feet (3,000 m) above the lake bed surface. Because it is in the rain shadow of the Sierra Nevada, annual rainfall is very low in the project area. Owens Lake averages around 4 inches (10 cm) of rainfall per year with the greatest amount falling from November through April. Temperatures range from around 18° F (-8 ° C) to 70° F (21° C) during the winter, and 45° F (6.6° C) to 103° F (39° C) during the summer. Winds in the area can exceed hourly average speeds of 40 mph (18 m/s) as measured at a 33 foot (10 m) height. These winds are generally associated with the counter-clockwise rotating storm systems that pass through the area. Strong southern winds usually occur as the storm front approaches the Owens Valley and strong northerly winds result from the passing of the storm. These general wind directions are sometimes complicated by local eddy effects that can cause 180 degree differences in the wind direction from the west to east side of the valley.

3-2 AIR QUALITY AND AREA DESIGNATIONS

Air quality is regulated through federal, state and local requirements and standards in the project area. Under the Federal Clean Air Act, the U.S. Environmental Protection Agency (USEPA) has set ambient air quality standards to protect public health and welfare. Air quality standards have been set for the following criteria pollutants; particulate matter less than 10 microns (PM_{10}), ozone, carbon monoxide, oxides of nitrogen, sulfur dioxide, and lead. In addition, California has set air quality standards for these pollutants which are usually more stringent, and has added to this list standards for vinyl chloride, hydrogen sulfide, sulfates and visibility reducing particles. Table 3.1 shows the current state and federal ambient air quality standards.

The southern Owens Valley has been designated by the state and the USEPA as non-attainment for the state and federal 24-hour average PM_{10} standards. The boundaries of the federal PM_{10} nonattainment area are shown in Figure 3.1. The area is designated as "attainment" or "unclassified" for all other ambient air quality standards. Wind blown dust from the dry lake bed of Owens Lake is the dominant cause of National Ambient Air Quality Standard (NAAQS) violations for PM_{10} in the non-attainment area.

The USEPA designated the Owens Valley as a "serious" non-attainment area due to the frequent violations of the NAAQS for PM_{10} and the inability of the area to attain the standard by December 31, 1995. For serious PM_{10} non-attainment areas, the federal Clean Air Act Amendments of 1990 (CAAA) require the submittal of a State Implementation Plan (SIP) by February 8, 1997 that will bring the area into attainment with the NAAQS by December 31, 2001, if practicable. This SIP, which includes the plan for the dust control project, is intended to satisfy those CAAA requirements.

Table 3.1 California and National Ambient Air Quality Standards.

Pollutant	Averaging Time	California Standards(a)	National Standards(b)	
		Concentration(c)	**Primary(c,d)**	**Secondary(c,e)**
Ozone	1 hour	0.09 ppm (180 $\mu g/m^3$)	0.12 ppm (235 $\mu g/m^3$)	Same as primary.
Carbon monoxide	8 hours	9.0 ppm (10 $\mu g/m^3$)	9.0 ppm (10 $\mu g/m^3$)	Same as primary.
	1 hour	20 ppm (23 $\mu g/m^3$)	35 ppm (40 $\mu g/m^3$)	Same as primary.
Nitrogen dioxide	Annual average	~	0.053 ppm (100 $\mu g/m^3$)	Same as primary.
	1 hour	0.25 ppm (470 $\mu g/m^3$)	~	Same as primary.
Sulfur dioxide	Annual average	~	0.03 ppm (80 $\mu g/m^3$)	~
	24 hours	0.05 ppm(f) (131 $\mu g/m^3$)	0.14 ppm (365 $\mu g/m^3$)	~
	3 hours	~	~	0.5 ppm (1300 $\mu g/m^3$)
	1 hour	0.25 ppm (655 $\mu g/m^3$)	~	~
Suspended particulate matter (PM_{10})	Annual geometric mean	30 $\mu g/m^3$	~	~
	24 hours	50 $\mu g/m^3$	150 $\mu g/m^3$	Same as primary.
	Annual arithmetic mean	~	50 $\mu g/m^3$	Same as primary.
Sulfates	24 hours	25 $\mu g/m^3$	~	~
Lead	30-day average	1.5 $\mu g/m^3$	~	~
	Calendar quarter		1.5 $\mu g/m^3$	Same as primary.
Hydrogen sulfide	1 hour	0.03 ppm (42 $\mu g/m^3$)	~	~
Vinyl chloride (chloroethene)	24 hours	0.010 ppm (26 $\mu g/m^3$)	~	~
Visibility reducing particles	1 Observation	In sufficient amount to reduce the prevailing visibility to less than 10 miles when the relative humidity is less than 70%(g)	~	~

(a) California standards for ozone, carbon monoxide, sulfur dioxide (1 hour), nitrogen dioxide and particulate matter (PM_{10}) are values that are not to be exceeded. The sulfates, lead, hydrogen sulfide, vinyl chloride and visibility reducing particles standards are not to be equaled or exceeded.

(b) National standards, other than ozone and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.

(c) Concentration expressed first in units in which it was promulgated. Equivalent units given in parenthesis are based upon a reference temperature of 25°C and a reference pressure of 760 mm of mercury. All measurements of air quality area to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of mercury (1013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

(d) National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the pubic health. Each state must a attain the primary standards no later than three years after, that state's implementation plan is approved by the Environmental Protection Agency.

(e) National Secondary Standards: The level of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after the EPA approves the implementation plan.

(f) At locations where the state standards for ozone and/or suspended particulate matter are violated. National standards apply elsewhere.

(g) Prevailing visibility is defined as the greatest visibility that is attained or surpassed around at least hall of the horizon circle, but not necessarily in continuous sectors.

Source: ARB Fact Sheet 38 (revised 7/88)

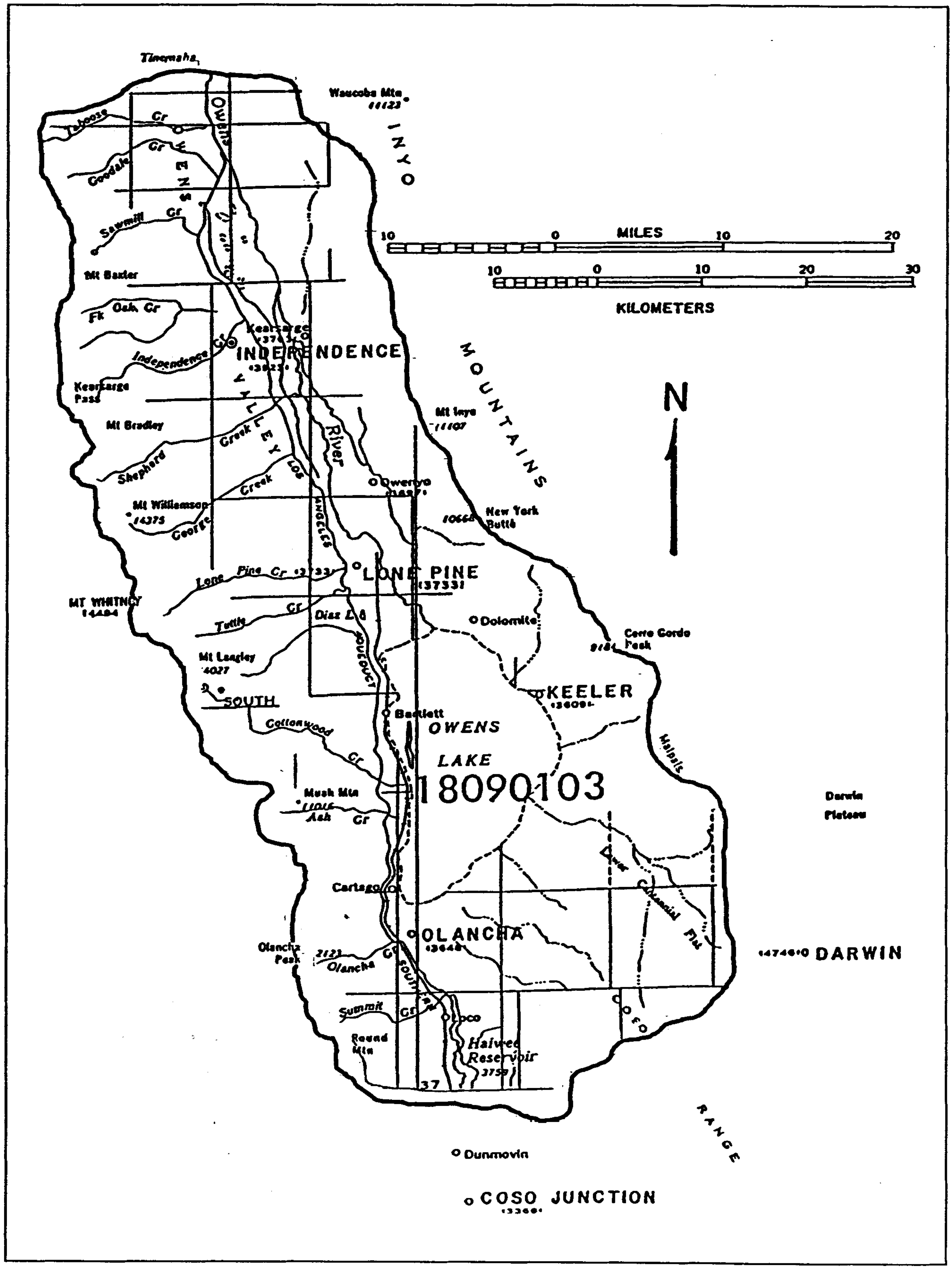

Figure 3.1: Boundaries of the federal PM_{10} non-attainment area.

3-3 PM_{10} AIR QUALITY

3-3.1 Health Impacts of PM_{10}

Particulate pollution is generally associated with dust, smoke and haze and is measured as PM_{10}, which stands for particulate matter less than 10 microns in diameter. These particles are extremely small, less than a tenth the diameter of a human hair. Because of their small size they can easily penetrate into the lungs. Breathing PM_{10} can cause a variety of health problems. It can increase the number and severity of asthma and bronchitis attacks. It can cause breathing difficulties in people with heart or lung disease, and it can increase the risk for, or complicate existing respiratory infections. Children, the elderly and people with existing heart and lung problems are especially sensitive to elevated levels of PM_{10}. At extremely high concentrations of PM_{10}, even otherwise healthy individuals can be adversely affected by the dust. The USEPA has set an episode level of 600 $\mu g/m^3$ (averaged over 24 hours) as the level that can pose a significant risk of harm to the health of the general public (40 CFR 51.151).

3-3.2 Owens Lake Health Advisory Program

The National Ambient Air Quality Standard for PM_{10} is frequently violated in the planning area because of wind blown dust from Owens Lake. Wind speeds greater than about 17 mph (7.6 m/s) have the potential to cause wind erosion from the barren lake bed. Ambient PM_{10} readings are the highest measured in the country. One PM_{10} reading from Keeler on April 13, 1995 reached 3,929 $\mu g/m^3$, more than 25 times higher than the PM_{10} NAAQS of 150 $\mu g/m^3$ for a 24-hour average. From 1987 through 1995 the PM_{10} NAAQS was violated about 19 times per year in Keeler, 5 times per year in Olancha and 2 times per year in Lone Pine.

In 1995, the District instituted a program to advise the public when unhealthful levels of particulate pollution occur in the Owens Lake area. Under this program, the District issues air pollution health advisories when dust storms from Owens Lake cause PM_{10} concentrations to exceed selected trigger levels. Health advisory notices are FAXed to schools in the affected downwind communities and to the local radio stations.

A stage 1 air pollution health advisory is issued when hourly PM_{10} levels exceed 400 $\mu g/m^3$. The stage 1 health advisory recommends that children, the elderly and people with heart or lung problems refrain from strenuous outdoor activities in the impacted area. A stage 2 air pollution advisory is issued when hourly PM_{10} levels exceed 800 $\mu g/m^3$, and recommends that everyone refrain from strenuous outdoor activities in the impacted area.

The Owens Lake air pollution health advisory program is not intended to replace the need to control the dust problem at Owens Lake, but it is intended to help reduce adverse health effects until dust control measures are in place. This health advisory program will remain in effect until dust control measures are implemented at Owens Lake and the PM_{10} levels do not violate the NAAQS.

3-3.3 Monitoring Sites and Data Collection

3-3.3.1 *Permanent PM_{10} Monitoring Network*

Ambient PM_{10} measurements to determine compliance with the federal PM_{10} standard have been taken at Keeler, Olancha, and Lone Pine for about 10 years. Meteorological data are also collected at each of these permanent monitoring sites to provide wind speed, wind direction, and temperature data. Precipitation data are also collected at the Keeler site. Figure 3.2 shows the location of these three sites. Other permanent sites that are equipped with PM_{10} samplers are Coso Junction and Navy 1, which also monitor violations from Owens Lake dust that is transported to the south.

3-3.3.2 *Dust Transport Study*

Historically, the permanent stations have normally operated on a one-in-six day schedule to sample PM_{10}, and do not sample on the five of six off-schedule days. This was changed for a period from March 1993 to June 1995 to collect data to assess the PM_{10} impacts down wind from Owens Lake toward Ridgecrest. A special purpose monitoring network was set up as shown in Figure 3.2, adding Pearsonville, Inyokern and Ridgecrest. During the special purpose monitoring period samplers were operated remotely to start sampling at approximately the same time on the day Owens Lake dust events were forecasted to impact the southern sites. The results of this study showed that the Owens Lake dust plume caused exceedances of the PM_{10} NAAQS as far south as Ridgecrest, 50 miles away. Appendix A includes the monitoring data from this episode monitoring program. Based on observations of dust plumes prior to conducting this study (Cahill, *et al.*, 1994 and GBUAPCD, 1988) and the results of this study, the District believes that Figure 3.3 is a reasonable estimate of the extent of PM_{10} transport from Owens Lake.

About 40,000 permanent residents between Ridgecrest and Bishop are annually affected by the dust from Owens Lake. In addition, many visitors spend time in the dust impacted area, to enjoy the many recreational opportunities the Eastern Sierra and high desert have to offer. Lone Pine annually hosts the Lone Pine film festival which draws thousands of visitors from outside the area. The National Park Service is concerned about the health hazard posed to an estimated 250,000 to 350,000 visitors that are expected to annually visit the Manzanar National Historic Site, 15 miles north of Owens Lake. The Park Service is concerned because a high percentage of the visitors to Manzanar will be older visitors who are more prone to airborne respiratory threats, and that they will spend 3 to 4 hours outdoors in a potentially harmful environment (Hopkins, 1997).

3-3.3.3 *Daily PM_{10} Monitors*

In 1994, the District installed TEOM (Tapered Element Oscillating Microbalance) continuous PM_{10} monitors at Keeler, Olancha and Lone Pine to sample hourly PM_{10} concentrations and to generate daily PM_{10} data. This information was used for air quality planning purposes and to provide hourly concentrations for the health advisory program.

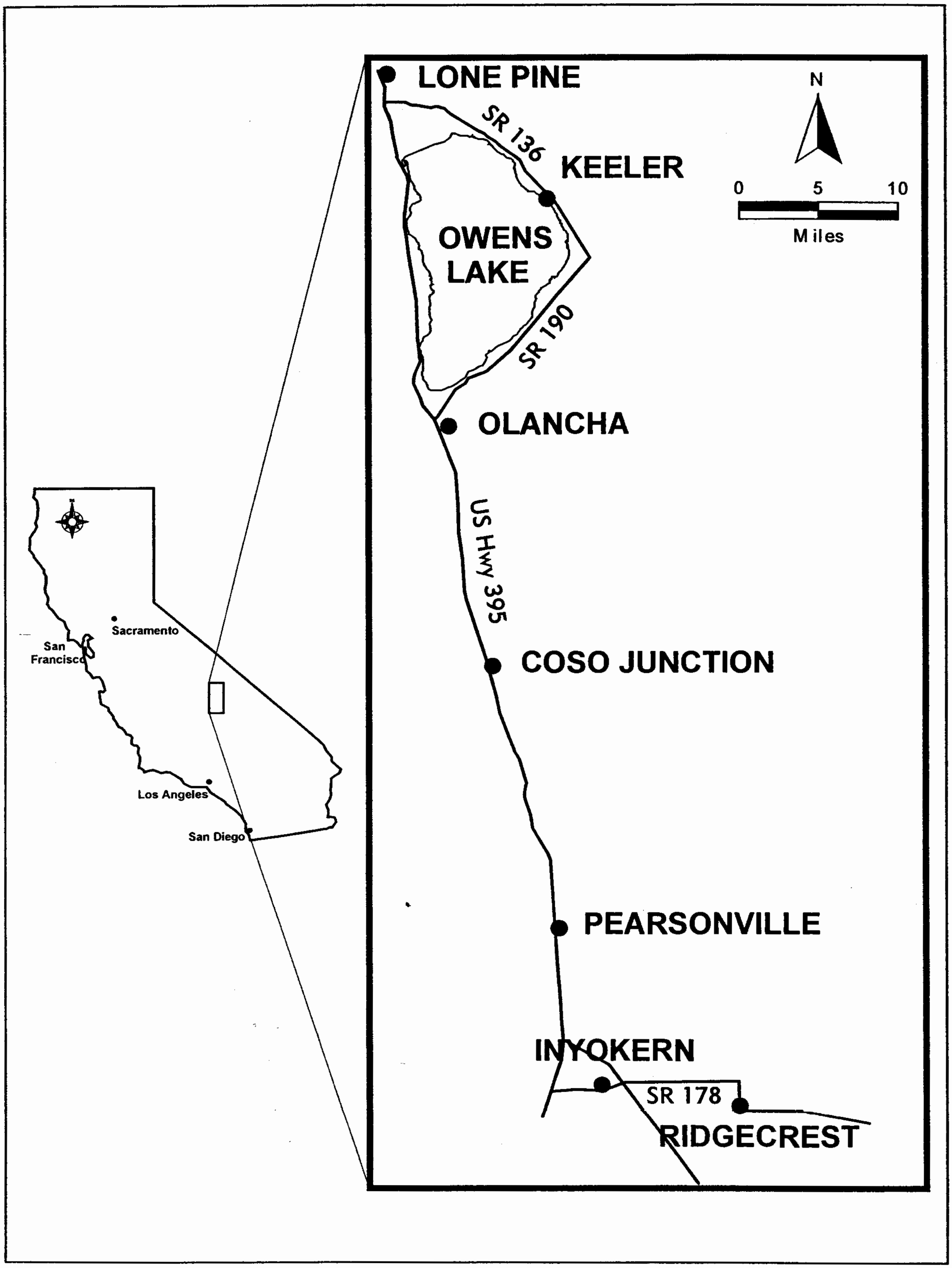

Figure 3.2: Location of PM_{10} monitor sites near Owens Lake.

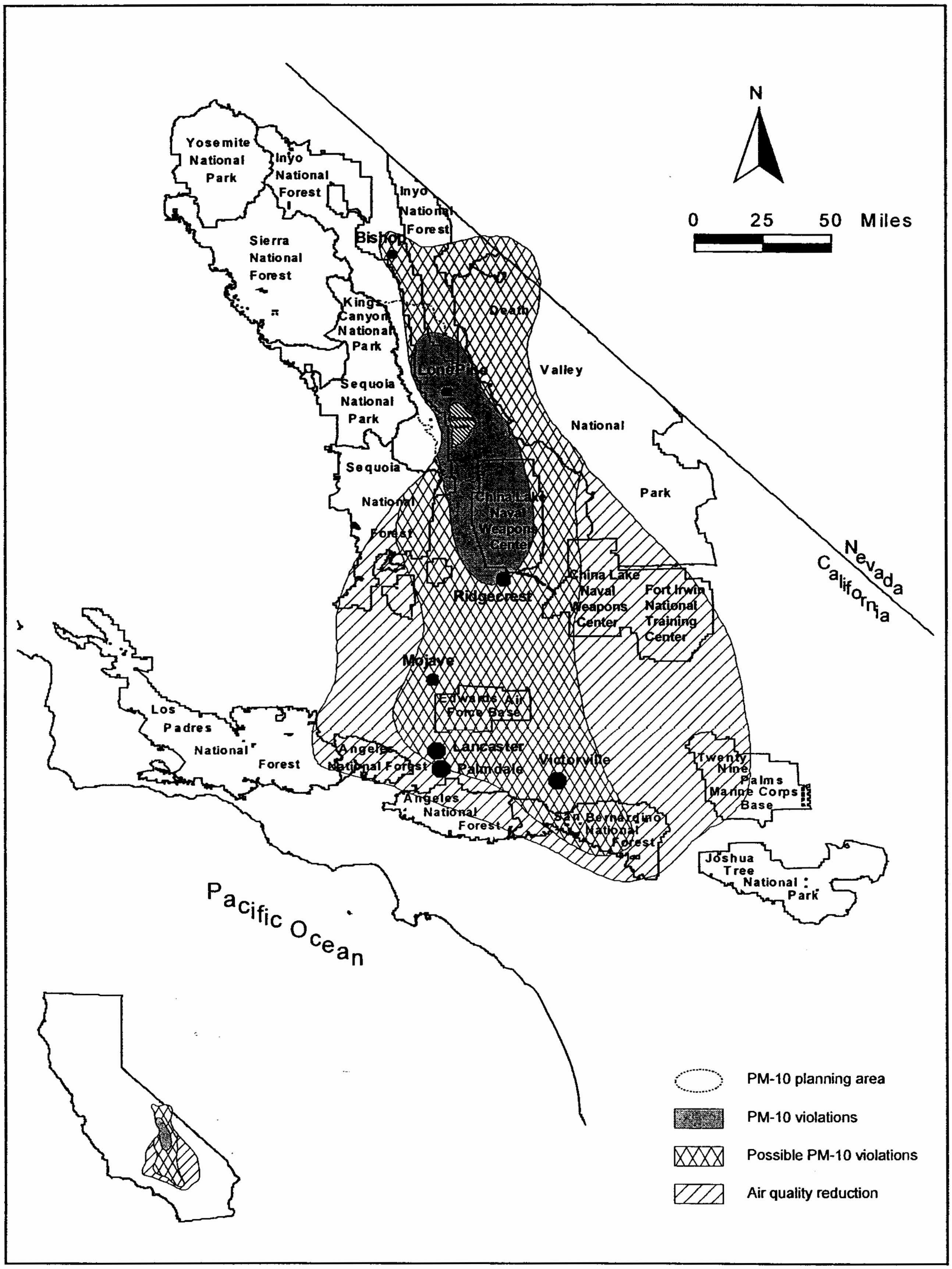

Figure 3.3: Projected area affected by dust from Owens Lake.

3-3.4 PM_{10} Data Summary

3-3.4.1 Number of 24-hour Violations and Peak Concentrations

An estimate for the expected number of violations of the PM_{10} standard can be derived from the one in six day sampling, using size selective inlet samplers (SSI), that was done at the three monitoring sites around Owens Lake. Because the one in six day schedule provides a random sample of daily PM_{10} data, a frequency analysis of the data from 1987 through 1995 can be used to estimate the number of exceedances per year that occurred during that period. To be in attainment with the NAAQS, the 24-hour PM_{10} standard of 150 $\mu g/m^3$ cannot be exceeded more than 1.0 time per year on average. Figures 3.4, 3.5 and 3.6 show that Keeler would be expected to exceed 150 $\mu g/m^3$ about 19 times per year, Olancha 5 times per year and Lone Pine 2 times per year. These graphs were generated by arranging the data at each site in order from the highest to lowest concentration and then dividing the rank number for each data point by the number of samples to determine the fraction of samples with concentrations equal to or greater than a given concentration. For instance, 693 $\mu g/m^3$ is the 4^{th} highest SSI measurement for Keeler between 1987 and 1995. Dividing 4 by the number of SSI samples taken, in this case 490, yields a fraction of 0.008. This fraction is then multiplied by 365 to determine the expected number of days per year that a given concentration would be exceeded. In this example, 3 days per year on average would be expected to exceed 693 $\mu g/m^3$, and is plotted on the graph. Doing the same calculation for each SSI sample provides the points to generate the frequency distribution curves, which are displayed on a semi-log curve. This procedure follows the exponential tail distribution method in the USEPA's PM_{10} SIP Development Guidelines (USEPA, 1987). The peak concentrations measured at each site using all of the PM_{10} data for this same period are summarized in Table 3.2. The peak concentrations in Table 3.2 are measured using the TEOM PM_{10} monitor, while the expected number of exceedances are estimated using size selective inlet PM_{10} sampling data. A complete PM_{10} data summary for Keeler, Olancha and Lone Pine is included in Appendix A. A separate summary of the sampling days from 1987 through 1995 that exceeded 150 $\mu g/m^3$ is also included in Appendix A.

Table 3.2 Number of PM_{10} violations per year and peak concentrations in the Owens Valley Planning Area, 1987-1995.

Monitoring Site	Peak PM_{10} Concentration (Date of peak)[1]	Expected Number of Exceedances Per Year[2]
Keeler	3,929 $\mu g/m^3$ (4/13/95)	19
Lone Pine	499 $\mu g/m^3$ (3/18/94)	2
Olancha	2,252 $\mu g/m^3$ (4/9/95)	5

[1] From TEOM PM_{10} monitor data.
[2] From every sixth day SSI PM_{10} monitor data (1987-95).

For the days when the 24-hour PM_{10} standard is violated, the peak hourly wind speed at the Owens Lake monitoring sites have been measured up to 46 mph. Violations have also been recorded when the hourly wind speed peaked at a more modest 20 mph, See Appendix A. The daily average wind speed when the 24-hour PM_{10} standard is violated ranges from 5 to 33 mph.

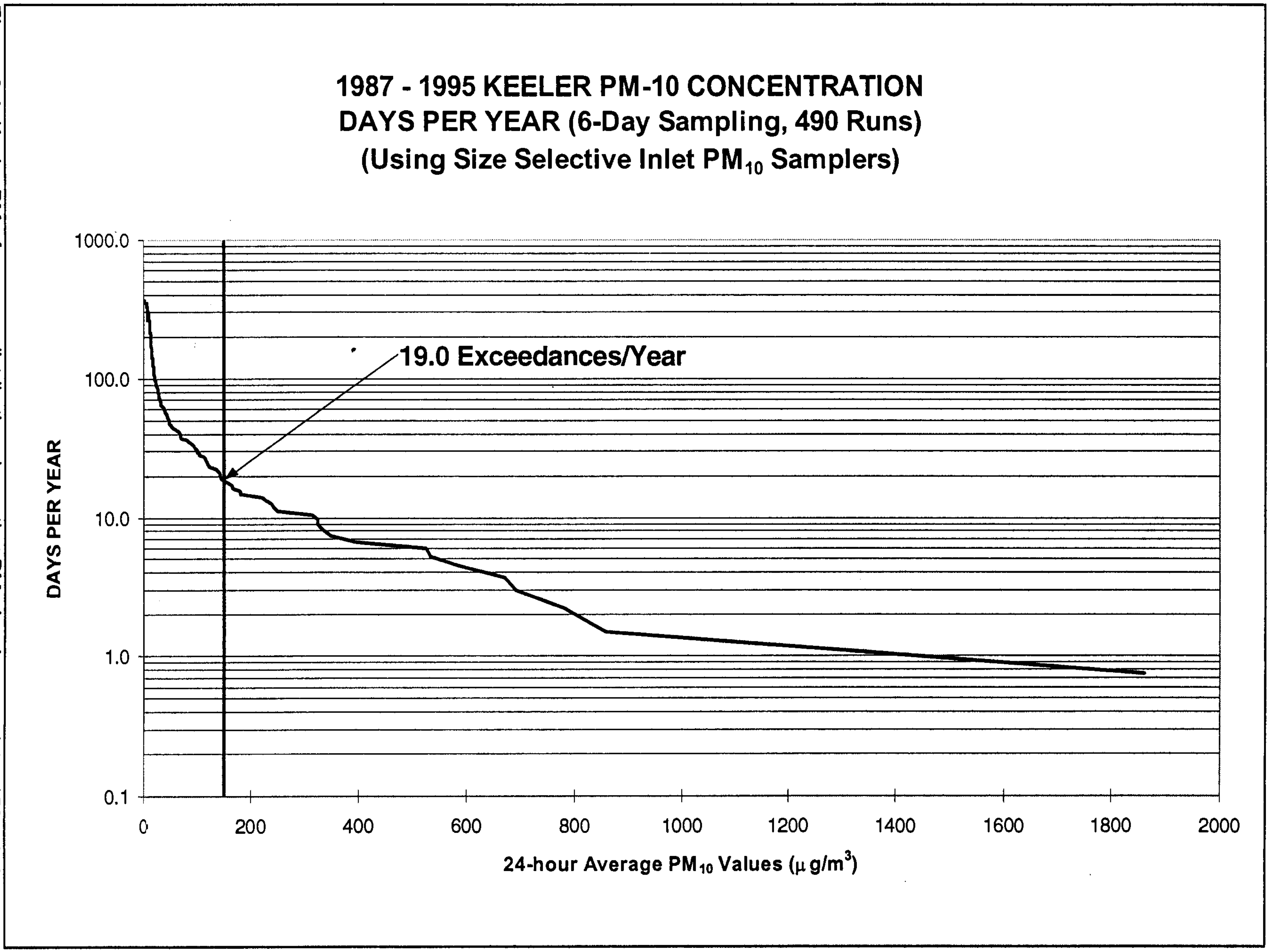

Figure 3.4: Keeler PM_{10} frequency distribution shows that PM_{10} levels exceed the 150µg/m³ 24-hour NAAQS about 19 days per year.

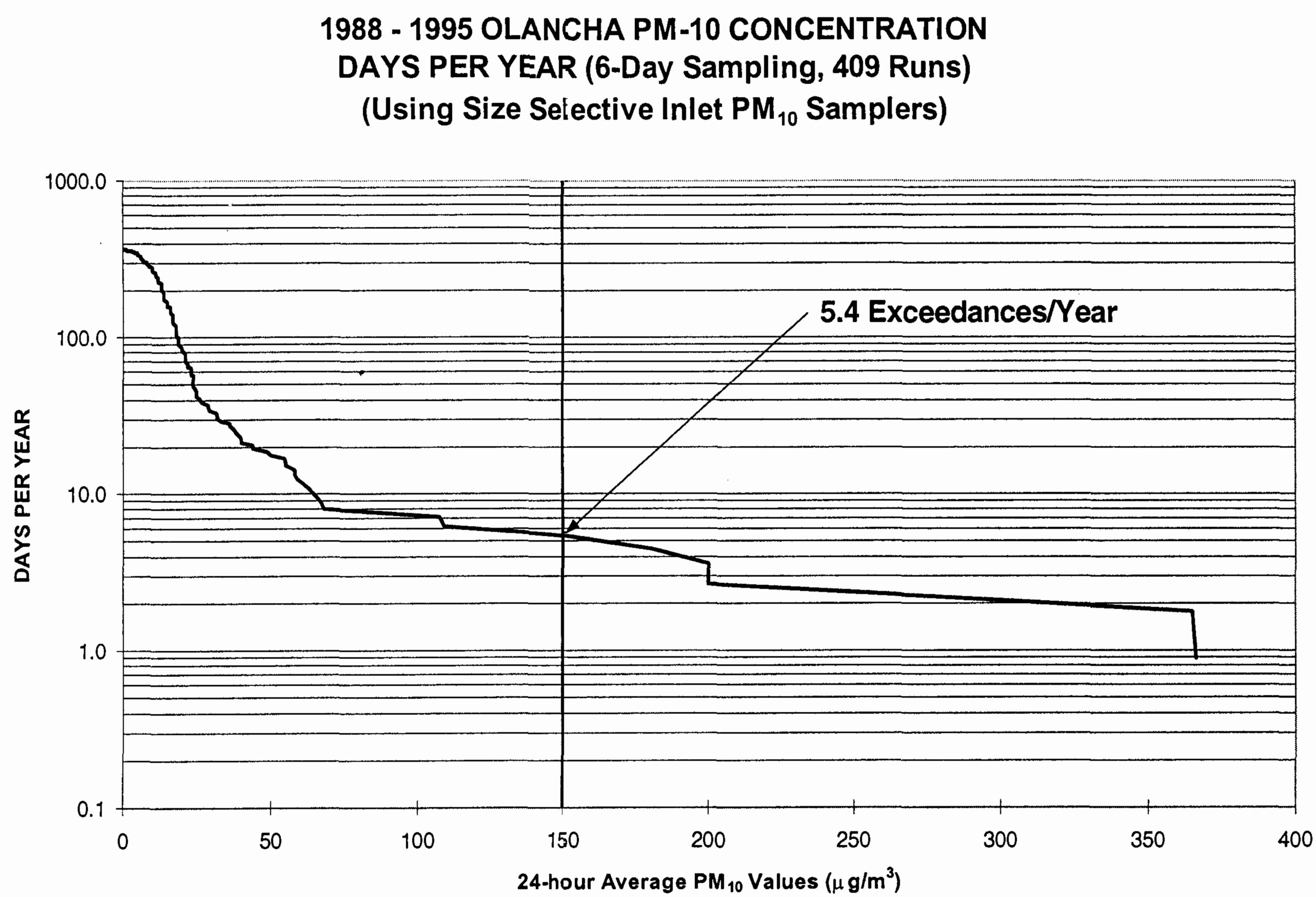

Figure 3.5: Olancha PM_{10} frequency distribution shows that PM_{10} levels exceed the 150µg/m^3 24-hour NAAQS about 5 days per year.

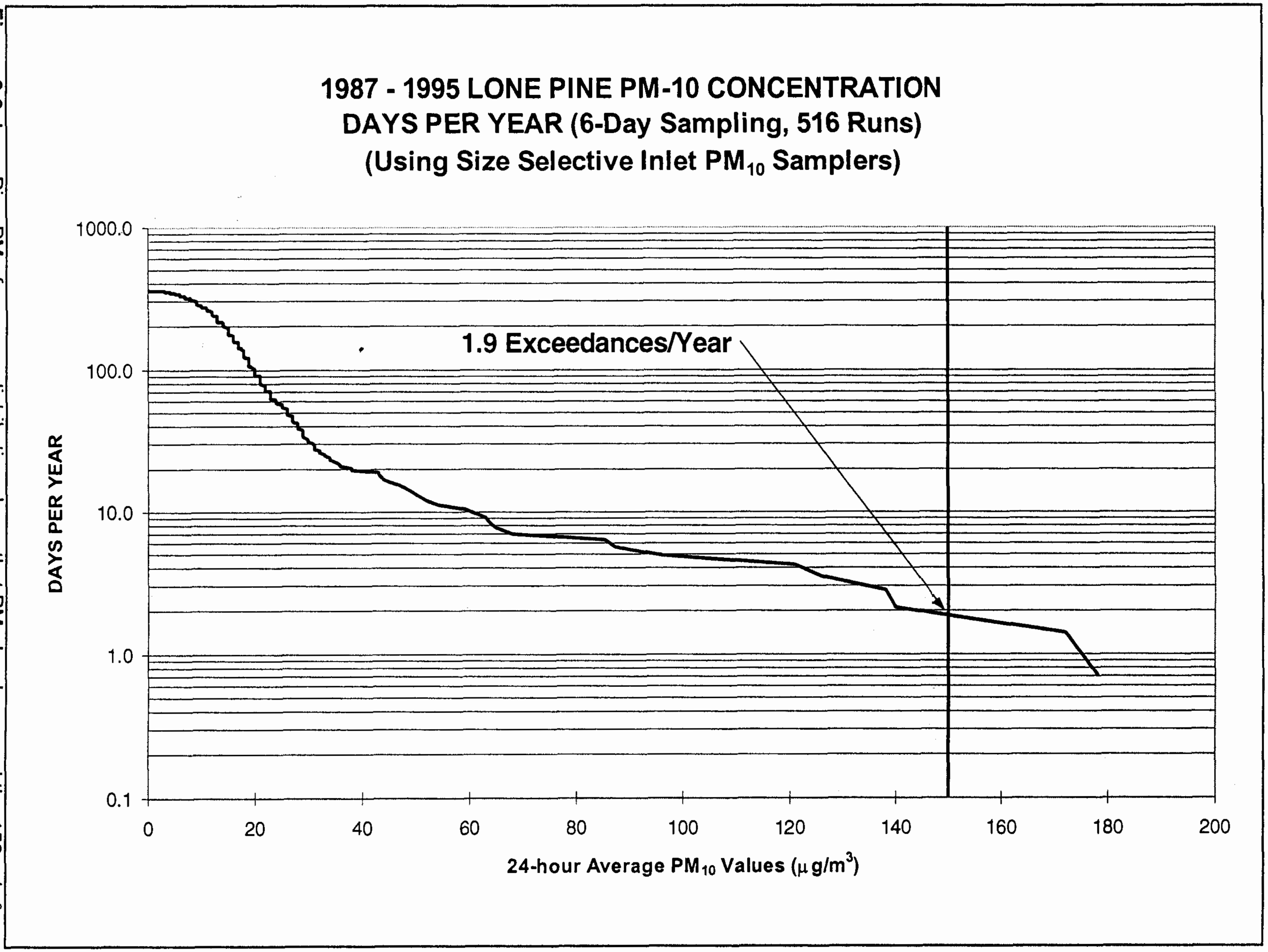

Figure 3.6: Lone Pine PM_{10} frequency distribution shows that PM_{10} levels exceed the 150μg/m³ 24-hour NAAQS about 2 days per year.

3-3.4.2 Annual Average PM_{10} Concentrations

The Owens Valley Planning Area currently attains the annual PM_{10} NAAQS at all sites. The annual average PM_{10} concentration for the Owens Valley Planning Area is determined from the one-in-six day data from Keeler. Although a 9 year record is available, the annual average is based on air quality for the last three years. Using the last three years of data from 1993 through 1995, and using the federal method for determining the annual average, the value for Keeler is 43.3 $\mu g/m^3$ (40 CFR 50, Appendix K). This is below the PM_{10} NAAQS, which is set at 50 $\mu g/m^3$. It is expected that implementation of the control strategy will reduce this value. A summary of the quarterly and annual average values used to determine the annual average is included in Appendix A.

3-4 CANCER RISK DUE TO OWENS LAKE DUST STORMS

Owens Lake dust contains cadmium, arsenic and other toxic metals that are at levels above the natural concentrations in soils in the Owens Valley. These metals pose a significant risk for additional cancer cases in the highest dust impacted areas. Table 3.3 shows that the cancer risk at Keeler associated with cadmium and arsenic in the Owens Lake dust is over 20 in a million. This is based on an annual concentration average of 50 $\mu g/m^3$ from the dust storms for a 70 year period. The value of 50 $\mu g/m^3$ is taken from the nine-year average of PM_{10} concentrations at Keeler.

Under the District's adopted air toxics policy, a toxic risk greater than 1 in a million additional cancer cases is considered to be significant. This policy requires that sources that pose a risk greater than 1 in a million implement controls to reduce the risk, and it prohibits the issuance of a permit to sources that exceed a risk of 10 in a million. (GBUAPCD, 1987)

Table 3.3 Cancer risk at Keeler due to Owens Lake dust storms.

Risk Toxic Metal	Metal Level $(\mu g/m^3)^{-1}$	Concentration (parts per million)	Additional Cancer Risk
Cadmium	4.2×10^{-3}	29	6 per million
Arsenic	3.3×10^{-3}	107	18 per million

Lifetime Cancer Risk = 24 per million

- *Risk levels from the California Air Toxics Program (CAPCOA, 1993).*
- *Dust samples are taken from Keeler PM_{10} filters, with concentrations measured by x-ray fluorescence (Chester LabNet, 1996).*
- *70-year cancer risk at PM_{10} = 50 $\mu g/m^3$ (Keeler annual average from 1987-1995).*

3-5 VISIBILITY AND SENSITIVE AIRSHEDS

Visibility in the Owens Valley generally ranges from 37 to 93 miles, with the best visibility occurring during the winter. Visibility is most limited from May through September and during days when Owens Lake dust storms occur. Owens Lake dust storms can reduce visibility to near zero at Owens Lake and obscure visibility 150 miles away. The main cause of visibility degradation in the Owens Valley is fine particles in the atmosphere. In addition to dust from Owens Lake, visibility degradation results from transport of air pollutants from the San Joaquin Valley and South Coast air basins, and forest fires. Most of the visibility degradation can be attributed to inter-basin transport of air pollutants. On days when Owens Lake dust storms do not occur, emissions of fine particulate matter from gasoline and diesel fueled vehicles and equipment within the Owens Valley are local man-made contributors to visibility degradation, however, these local sources have an insignificant impact on the area's visibility. Nitrogen dioxide, a light absorbing gas formed during fuel combustion, contributes less than 5% to the overall visibility degradation. Other man-made sources of visibility degrading emissions represent less than 5% of the overall reduction in visibility (Trijonis, *et al.*, 1988).

There are 11 sensitive airsheds in the region, including wilderness areas, national parks, national forests, a national historic site, and the R-2508 military airspace. Figure 3.7 shows the locations of these sensitive airsheds. Four of these airsheds are designated as Class I PSD (Prevention of Significant Deterioration) areas, which are afforded more stringent protection from visibility degradation and for impacts from air pollutants: John Muir and Domeland Wilderness Areas, Kings Canyon and Sequoia National Parks. These sensitive areas and their classifications are shown in Table 3.4.

The R-2508 military air space, which includes the China Lake Naval Air Weapons Station, is a sensitive site for visibility impacts from Owens Lake dust events. Good visibility is needed for some military operations, such as an air-to-air test (an air-launched target whose target is also in the air), which relies on high-speed cameras to record time, space and position information. Owens Lake events can reduce the visibility to less than 1 to 2 miles at China Lake. The Department of the Navy has stated that cancellation of a test costs the Range and/or its customer approximately $10,000 to $50,000. Owens Lake dust events can lead to cancellations of several tests per day and can last for one to two days, or occasionally longer (Stevenson, 1996).

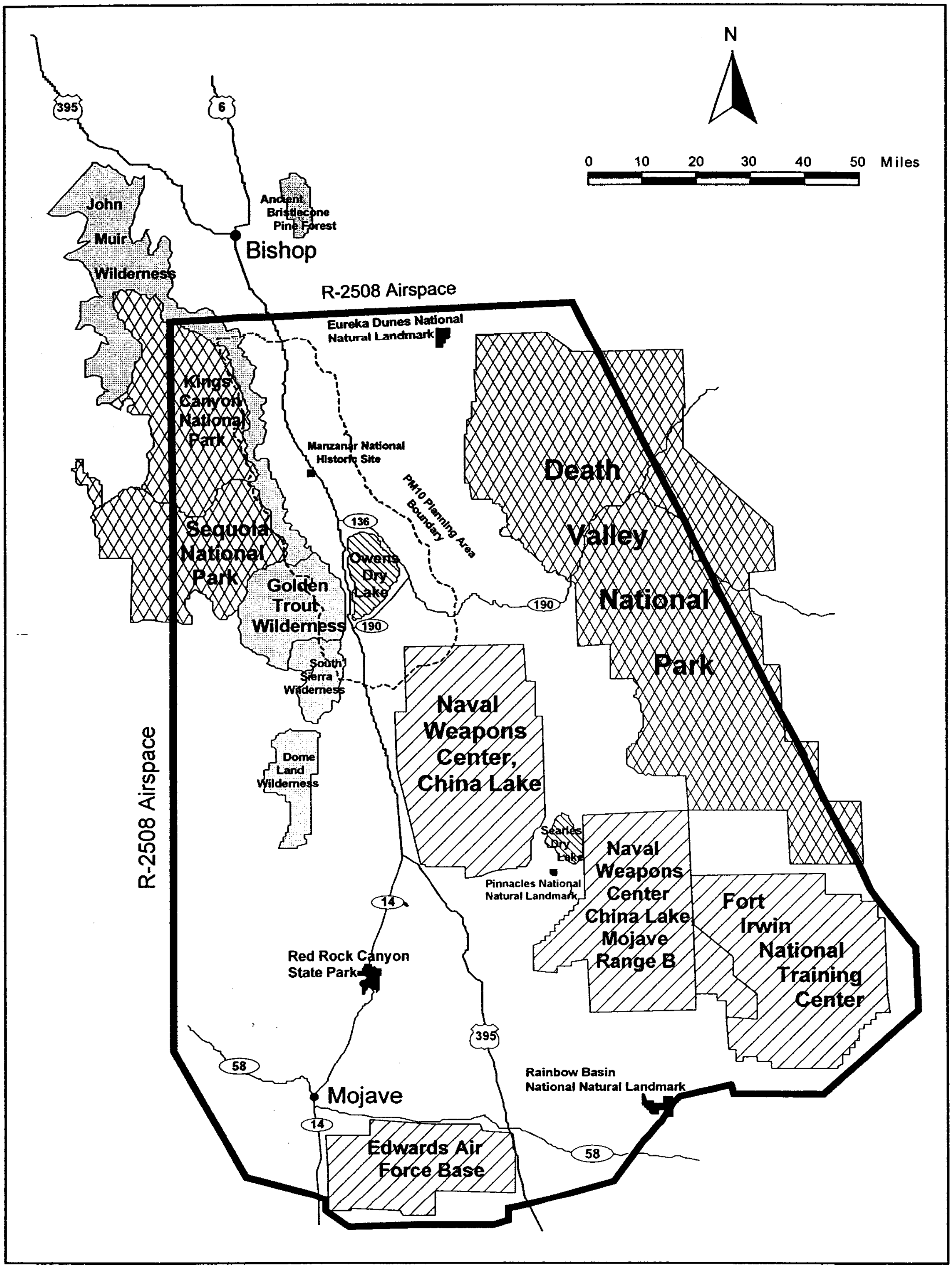

Figure 3.7: Location of sensitive airsheds near Owens Lake.

Table 3.4: Sensitive airsheds and their PSD classifications.

	Sensitive Airshed	PSD Airshed Classification
*	Wilderness Areas in National Forests:	
	Domeland	Class I
	Golden Trout	Class II
	John Muir	Class I
	South Sierra	Class II
*	National Parks:	
	Death Valley	Class II
	Kings Canyon	Class I
	Sequoia	Class I
*	National Historic Site:	
	Manzanar	Class II
*	National Forests:	
	Inyo	Class I&II
	Sequoia	Class I&II
*	Military Base:	
	China Lake NAWS	Class II

Source: MHA Environmental Consulting, Inc., 1994.

3-6 REFERENCES

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CHAPTER 4

PM_{10} Emission Inventory

FIGURES & TABLES

4-1 INTRODUCTION

Criteria pollutant emissions in the Owens Valley PM_{10} nonattainment area are dominated by PM_{10} emissions from wind erosion on the exposed Owens Lake playa. Other wind erosion sources in the nonattainment area include; off-lake sources of lake bed dust, small mining facilities and some areas near Lone Pine and Independence that have been disturbed by human activity. There is a lack of large industrial sources in the Owens Valley and the only other sources of criteria pollutant emissions are wood stoves, fireplaces, unpaved and paved road dust and vehicle tailpipe emissions. In the future, the USDA Forest Service will also be emitting PM_{10} from prescribed burning activities in and around the nonattainment area. The prescribed burning activity, however, is not expected to be conducted on windy days when the Owens Lake dust storms occur. Predicted high wind days are avoided when doing prescribed burns for fire safety reasons.

The emissions inventory includes the sources within the expected control area for the plan. This covers the southern half of the designated nonattainment area, which includes the community of Lone Pine on the control area's northern boundary. Areas outside of this control area are significantly impacted by Owens Lake dust, but there are no sources outside of this control area that have been found to cause, or could reasonably be expected to cause, a violation of the NAAQS for PM_{10}.

The future emissions inventory is not expected to grow significantly from the current inventory. Changes to future population and traffic related emissions are expected to be insignificant in comparison to the wind blown PM_{10} from Owens Lake. The future inventory will be kept constant for planning purposes.

The annual and 24-hour PM_{10} emissions for the Owens Valley PM_{10} Planning Area are summarized in Table 4.1 for the 1995 base year and discussed in this chapter for each source category. For planning purposes to attain the 24-hour National Ambient Air Quality Standard for PM_{10} the 24-hour peak inventory is used. The annual emission estimates are provided for comparative information.

4-2 NON-OWENS LAKE PM_{10} EMISSIONS

4-2.1 Entrained Paved Road Dust and Tail Pipe Emissions for Mobile Sources

Entrained paved road dust PM_{10} emissions are based on revised estimates from the California Air Resources Board for the 1995 emissions inventory, which estimates annual PM_{10} emissions of 268 tons of PM_{10} per year (0.7 tons per day) in Inyo County. The emission factors used are: freeways - 0.57 pounds of PM_{10} per thousand vehicle miles traveled (VMT); major roads and collectors - 0.83 lbs. PM_{10}/1000 VMT; and local roads - 3.4 lbs. PM_{10}/1000 VMT. The overall composite emission factor for the county is 1.16 lbs. PM_{10}/1000 VMT, which is based on the county traffic mix of 0% freeway, 74% major roads, 13% collectors, and 13% local roads (CARB, 1997). PM_{10} emissions from vehicle exhaust were estimated at 0.3 tons per day (T/d) in Inyo County for 1994 (CARB, 1996).

Table 4.1 Annual and 24-Hour PM_{10} Emissions in the Owens Valley PM_{10} Planning Area for the 1995 Emissions Inventory Base Year.

	PM_{10} Peak 24-Hour (Tons/Day)	PM_{10} Annual (Tons/Year)
Area and Mobile Sources		
Owens Lake Primary Wind Erosion	8,346	279,900
Owens Lake Secondary Wind Erosion	516	11,200
Vehicle Tailpipe	0.08	29
Unpaved Road Dust	0.15	53
Paved Road Dust	0.19	69
Residential Wood Burning	0.24	36
Prescribed Burning	42	2,532
Agricultural Operations	0.00	1
Industrial Facilities		
Big Pine Distributors	0.06	21
Pacific Lightweight Prod.	0.09	32
Federal White Aggregate	0.08	28
Owens Lake Soda Ash*	0.51	179
Total Emissions	8,905.40	294,080

(*Proposed project)

Assuming for estimation purposes that vehicle traffic in the control area is primarily on Highway US 395, a simple proportion of the mileage in the control area to the length of US 395 in Inyo County yields a good estimate of the PM_{10} 24-hour and annual emissions from mobile sources.

Entrained Road Dust:

(30 miles/115 miles) x 0.7 T/d = 0.19 tons of PM_{10} per day

0.19 T/d x 365 days = 69 tons of PM_{10} per year

Vehicle Exhaust:

(30 miles/115 miles) x 0.3 T/d = 0.08 Tons of PM_{10} per day

0.08 T/d x 365 days = 29 tons of PM_{10} per year

4-2.2 Entrained Unpaved Road Dust

An estimate of entrained PM_{10} emissions from traffic on unpaved roads in the control area is based on emission factors found in the USEPA's Compilation of Air Pollution Emission Factors, AP-42 (USEPA, 1985).

$$PM_{10} = 2.1\ (s/12)\ (S/30)\ (W/3)^{0.7}(w/4)^{0.5}\ [(365\text{-}p)/365]$$

Where: PM_{10} = PM_{10} emissions in pound per vehicle mile traveled

s = silt content of road surface material (5 percent)

S = mean vehicle speed (20 miles per hour)
W = mean vehicle weight (3 tons)
w = mean number of wheels (4 wheels)
p = number of days per year with precipitation greater than 0.01 inches (assume zero for daily and worst-case annual emissions)

The Owens Valley values for each variable in the emission estimate are shown in parenthesis. The 5% silt content value is based on samples taken in the Owens Lake area from the Cerro Gordo Road and Keeler, which showed the silt content ranged from 1 to 6% (Murphy, 1997). Assuming 50 vehicles per day, with an average trip length of 10 miles, yields 0.15 tons of PM_{10} per day, or 53 tons of PM_{10} per year.

4-2.3 Residential Wood Combustion

The AP-42 emission factor for wood stoves is 15 grams of PM_{10} per kilogram of wood burned. An estimate of residential wood combustion emissions from the control area can be made by using the wood usage estimate of 2 cords of pine per year (density = 800 kg/cord) for Bishop, which is 60 miles north of the control area. The heating season is about 150 days per year. The population estimate for the control area is 2,745. A high end estimate for the number of wood stoves is one for every two people (1,372.5 stoves). This yields an estimate of 0.24 tons of PM_{10} per day and 36.3 tons of PM_{10} per year for residential wood combustion in the control area.

4-2.4 Prescribed Burning Emissions and Regulations

The US Forest Service provided air pollution emission estimates for historic pre-settlement smoke emissions in the Owens Valley PM_{10} nonattainment area (McKee, 1996). The US Forest Service plans to increase prescribed burning activities in the national forest to a level that is comparable to historic natural forest fire cycles in the Eastern Sierra. Based on the Forest Service's fuel models and the historic fire return rate to forest land in the Owens Valley PM_{10} nonattainment area, an annual average estimate of 2,532 tons per year of PM_{10} is determined. As the burn season for prescribed burning is expected to last about 60 days per year, daily average emissions will be about 42.2 tons per day.

The inclusion of these emission estimates for prescribed burning is for SIP conformity purposes to ensure that prescribed burning activities in the nonattainment area have been considered in the Owens Valley PM_{10} SIP attainment demonstration. General conformity requirements contained in District Regulation XIII, require that federal actions and federally funded projects conform to SIP rules and that they do not interfere with efforts to attain federal air quality standards. Prescribed burning activities are not expected to be conducted on windy days when the Owens Lake dust storms occur. Predicted high wind days are avoided when performing prescription burns for fire safety reasons. In addition, prescribed burning is regulated through District Rules 410 and 411 for wildland and forest management burning. These rules require that a burn plan be submitted to the Air Pollution Control Officer prior to conducting the burn, and that burning will not cause or contribute to violations of the air quality standards. If prescribed burning is done in a manner that complies with District rules, burning activities are not expected to interfere with attainment of the PM_{10} NAAQS in the Owens Valley.

4-2.5 Industrial Facilities

Emissions from industrial facilities are based on permitted emissions under each facility's daily permit limit for throughput or operating hours. Annual emissions are extrapolated from peak daily emissions over a 351 day work year. Total PM_{10} emissions from industrial facilities are 0.74 tons of PM_{10} per day and 260 tons per year. This includes potential emissions from the Owens Lake Soda Ash Company, which is a proposed project and is included for future planning purposes. Table 4.1 lists the individual industrial facilities that are located in the control area. There are no other significant sources of PM_{10} foreseen for the planning area.

4-2.6 Agricultural Operations

There are very few agricultural operations near Owens Lake. In the control area, south of Lone Pine and North of Haiwee reservoir, there are about 200 acres of pasture land and 20 acres of alfalfa. The estimated emissions for agricultural operations is less than 1 ton of PM_{10} per year using estimates provided by the California Air Resources Board. (CARB, 1997 and Keisler, 1997).

4-3 WIND EROSION

4-3.1 Wind Erosion Source Areas

Wind erosion at Owens Lake is the dominant source of PM_{10} in the control area, comprising more than 99% of the 24-hour and annual emission inventories. Wind erosion emissions can be separated into on-lake and off-lake source areas. The on-lake source areas are the wind erosion areas on the historic playa of Owens Lake. Figure 4.1 shows the identified source areas that have been used for the attainment demonstration. Off-lake sources of wind blown dust are caused by dust that was initially entrained from the exposed playa and then deposited in areas off the lake bed (Holder, 1997a). These dust deposition areas, which are located adjacent to the lake bed from Keeler to Olancha, become secondary sources of dust that can be entrained under windy conditions. After the on-lake source areas are controlled, PM_{10} from the off-lake source areas will be minimal (Niemeyer, 1996).

The locations of on-lake source areas were determined by field mapping of eroded areas after storms. The boundaries of the eroded areas were mapped using a global positioning system (GPS). These data were transferred to the Geographic Information System (GIS) to map the boundaries and determine the area size (Cox, 1996). Off-lake source area locations are based on observations of dust storms by Niemeyer and Niemeyer and by use of aerial photos of deposition areas. This information was mapped in the GIS. From fall 1994 through summer 1995, Niemeyer and Niemeyer observed the location and size of many of the dust storms at Owens Lake. These source areas were mapped and sun photometry was used for some storms to quantify the PM_{10} emissions lofted from Owens Lake (Niemeyer and Niemeyer, 1995). The results of this study are discussed in Section 4-3.3.

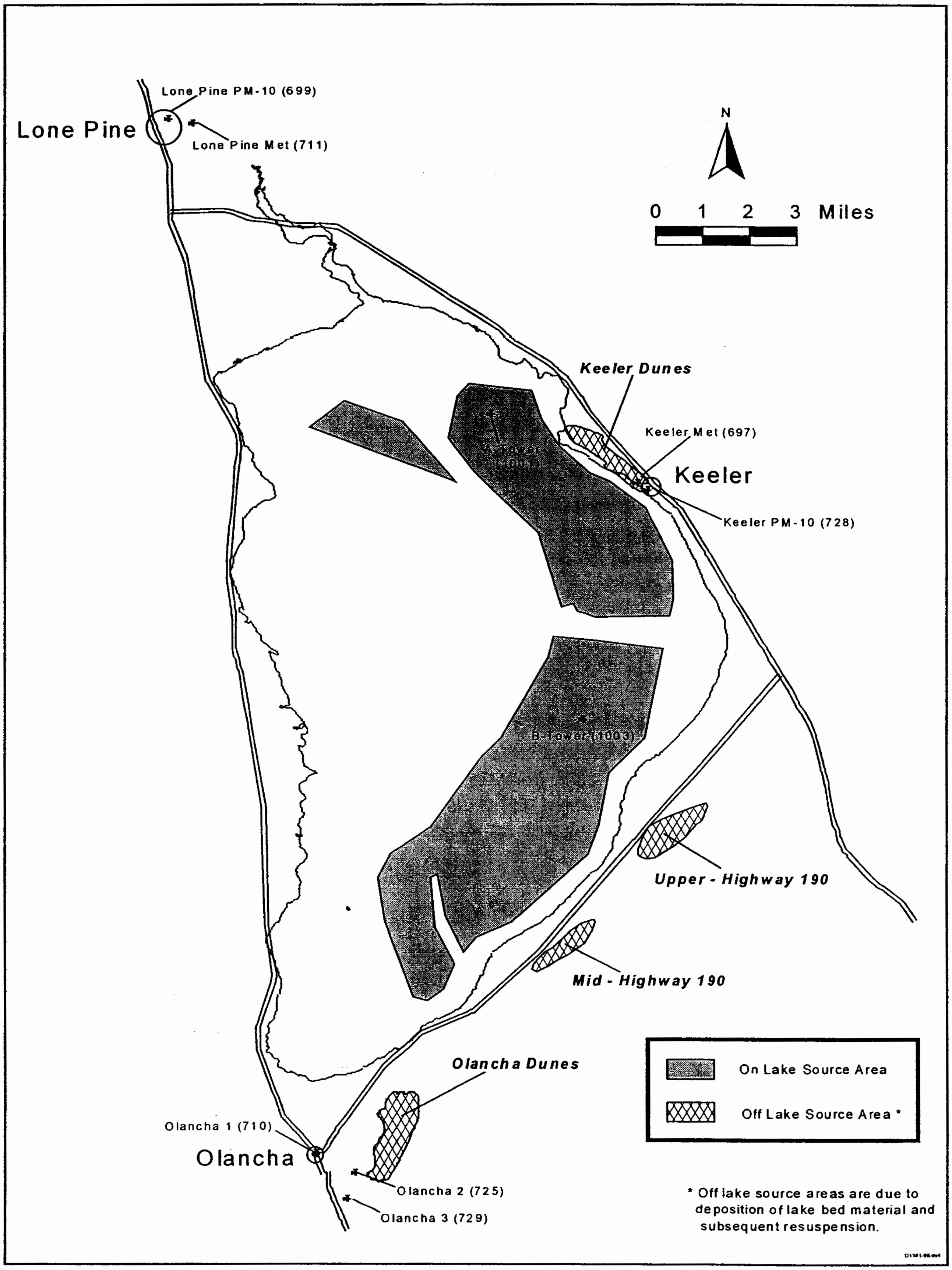

Figure 4.1: Owens Lake dust source areas for PM_{10} wind erosion.

A number of methods have been used to estimate PM_{10} emissions from Owens Lake dust storms including sun photometry and portable wind tunnel measurements. A range of annual emissions from around 130,000 to over 400,000 tons of PM_{10} per year was estimated using these methods. The BACM SIP (GBUAPCD, 1994) discussed these estimation methods, except for sun photometry which was not completed until 1995. Recent studies have refined the estimation methods using the portable wind tunnel and sun photometry, which provided a direct method of PM_{10} measurement during storms (Ono, 1997 and Niemeyer, 1995).

4-3.2 Portable Wind Tunnel Method for PM_{10} Emissions

4-3.2.1 1993 through 1995 Seasonal PM_{10} Emission Algorithm

Wind tunnel tests were performed on many areas of the lake bed to determine the PM_{10} emission factors for air quality modeling purposes. The tests showed that the PM_{10} emission rates from late fall through winter were generally lower than during the spring season, when the PM_{10} emissions were about 2 to 3 times higher.

Although there are obvious surface differences across the playa, the wind tunnel-generated PM_{10} emission data showed that the highest PM_{10} emission rates in each area were similar for a given season. Northern test sites in sand dominated areas showed the same range of PM_{10} emission potential as sites in the southern clay and sand areas during the same season. These seasonal differences in the PM_{10} data were used to generated PM_{10} emission algorithms for fall and spring that could be applied for all the wind erosion areas on the playa. Figure 4.2 shows a comparison of the seasonal emission algorithms. Figures 4.3 and 4.4 show the data points used to generate the PM_{10} emissions and wind speed relationship.

The fall and winter data include data from October through February and the spring data include data collected from March through June. The wind tunnel data at Owens Lake were collected from 1993 through 1995 from the erodible portions of the playa. Equations 4-1 and 4-2 are the emission algorithms that are used with the air quality model to predict worst-case ambient PM_{10} impacts (equations are shown for wind speed in units of meters per second and miles per hour).

Fall/Winter (Non-Spring) - July through January

$$PM_{10}\ (g/m^2/s) = 1.34 \times 10^{-5} \exp[0.25 * u(m/s)] \qquad \text{Equation 4-1}$$
$$PM_{10}\ (g/m^2/s) = 1.34 \times 10^{-5} \exp[0.11 * u(mph)]$$

Spring - February through June

$$PM_{10}\ (g/m^2/s) = 1.9 \times 10^{-4} \exp[0.13 * u(m/s)] \qquad \text{Equation 4-2}$$
$$PM_{10}\ (g/m^2/s) = 1.9 \times 10^{-4} \exp(0.057 * u(mph))]$$

Where u is the hourly average wind speed in meters per second at a 10 meter anemometer height for wind speeds greater than 7.6 meters per second (17 miles per hour). Below this wind speed it is assumed that PM_{10} emission rates are zero or insignificant as compared to emissions at higher wind speeds. Although the threshold wind speed is not constant and may be higher during many dust storms, this threshold wind speed provides a lower threshold for modeling worst case conditions.

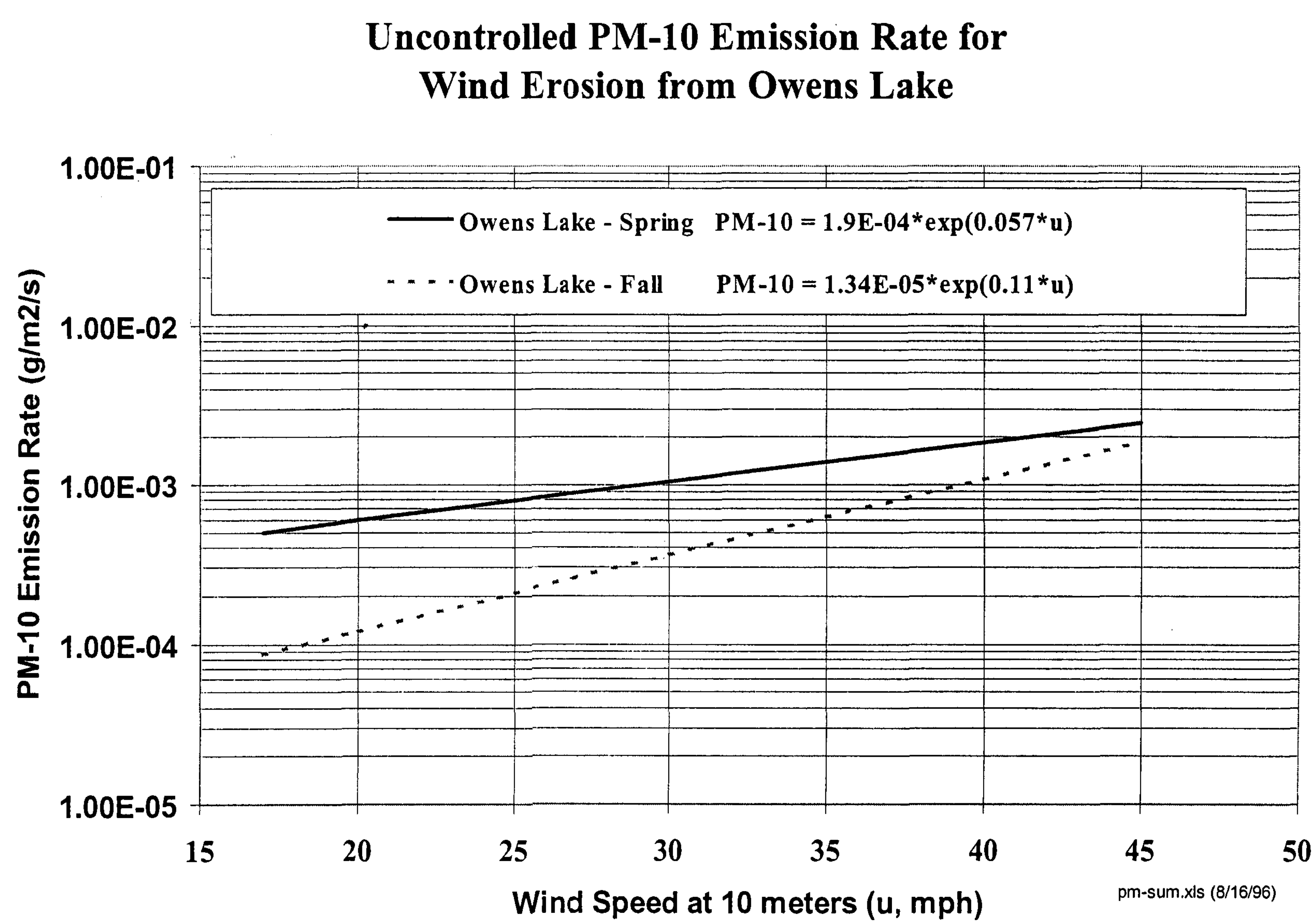

Figure 4.2: A comparison of wind tunnel generated seasonal PM_{10} wind erosion emissions as a function of wind speed for Owens Lake.

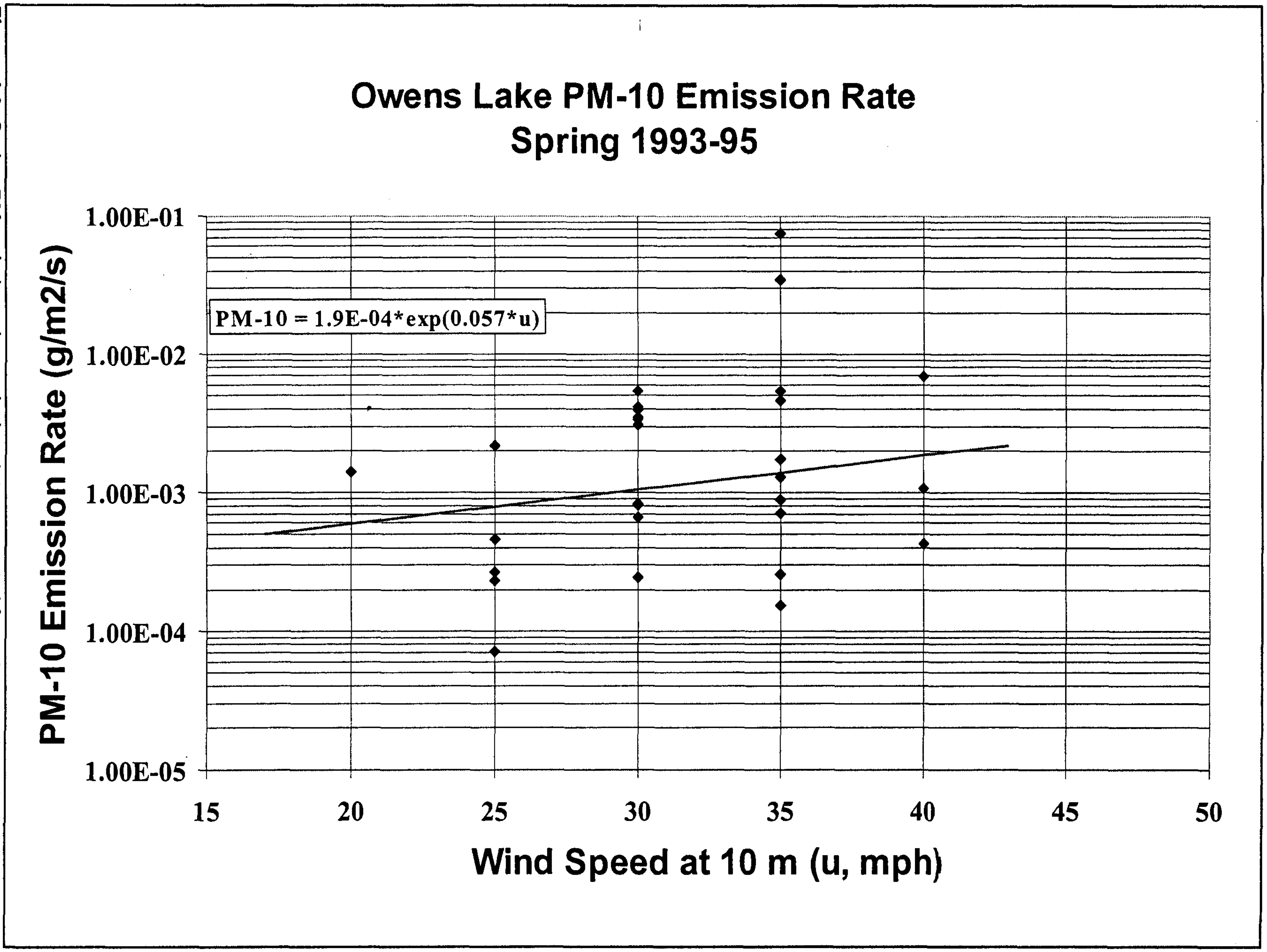

Figure 4.3: Spring PM_{10} wind erosion emission data generated from the portable wind tunnel at Owens Lake.

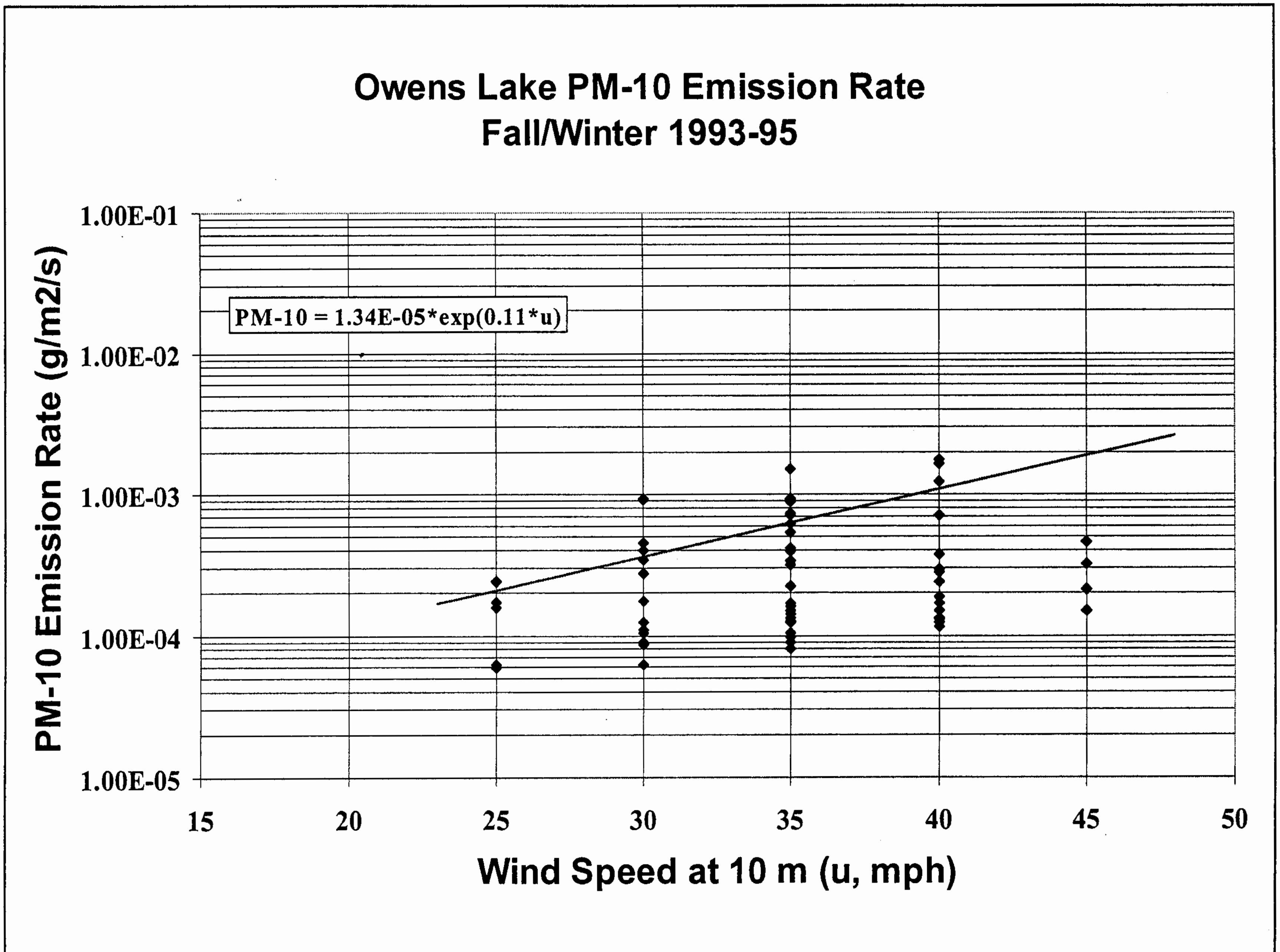

Figure 4.4: Fall/winter PM_{10} wind erosion emission data generated from the portable wind tunnel at Owens Lake.

The seasonal change from winter and fall conditions to spring erosion conditions generally occurs around February or March when cold wet weather brings salts to the surface, with the subsequent drying creating a very erodible surface. The end of the spring season generally occurs in May or June when warmer temperatures cause the surface to start forming a wind resistant crust. Some areas of the playa, however, will remain erodible throughout the summer and into the fall and winter. In the fall and early winter the surface crust starts to deteriorate on large parts of the playa, creating more erosive surface conditions.

4-3.2.2 Model Validation Emission Algorithms

The ISC3 dispersion model was validated against PM_{10} monitoring data on dust storm days in 1994 and 1995 (MFG, 1996b and MFG, 1997a). The emission algorithms for these model validation runs were derived from wind tunnel data collected at Owens Lake around the time of the storms. Data for the model validation runs were collected from two fall dust storms in 1994 and four spring dust storm days in 1995. Equations 4-3 and 4-4 were generated using all the data points from the wind tunnel runs during those periods. The fall 1994 algorithm closely matches the 1993 through 1995 algorithm in equation 4-1, while the Spring 1995 validation algorithm generates PM_{10} emissions that are two to three times lower than the Spring 1993 through 1995 algorithm in equation 4-2.

Fall 1994 Model Validation Algorithm

$$PM_{10}\ (g/m^2/s) = 1.2 \times 10^{-5} \exp[0.27*u(m/s)] \qquad \text{Equation 4-3}$$
$$PM_{10}\ (g/m^2/s) = 1.2 \times 10^{-5} \exp[0.12*u(mph)]$$

Spring 1995 Model Validation Algorithm

$$PM_{10}\ (g/m^2/s) = 4.0 \times 10^{-6} \exp[0.36*u\ (m/s)] \qquad \text{Equation 4-4}$$
$$PM_{10}\ (g/m^2/s) = 4.0 \times 10^{-6} \exp[0.16*u(mph)]$$

Where u is the hourly average wind speed in meters per second at a 10 meter anemometer height for wind speeds above 7.6 meters per second (17 mph). For wind speed less than this threshold it is assumed that the PM_{10} emission rate is negligible.

4-3.2.3 Controlled Emissions for Shallow Flooding

An emission factor was determined for areas adjacent to the water on the North Flood Irrigation Project. Almost all the valid runs performed in these areas had non-detectable PM_{10} emissions. A PM_{10} emission flux rate of 4.1×10^{-6} $g/m^2/s$ was determined by averaging all the runs together including those runs with non-detectable amounts of PM_{10} emissions. As shown in Figure 4.5 there is no apparent wind speed relationship to the data. This emission rate is constant when wind speeds are greater than 25 miles per hour (11 m/s) at 10 meters and does not increase with wind speed.

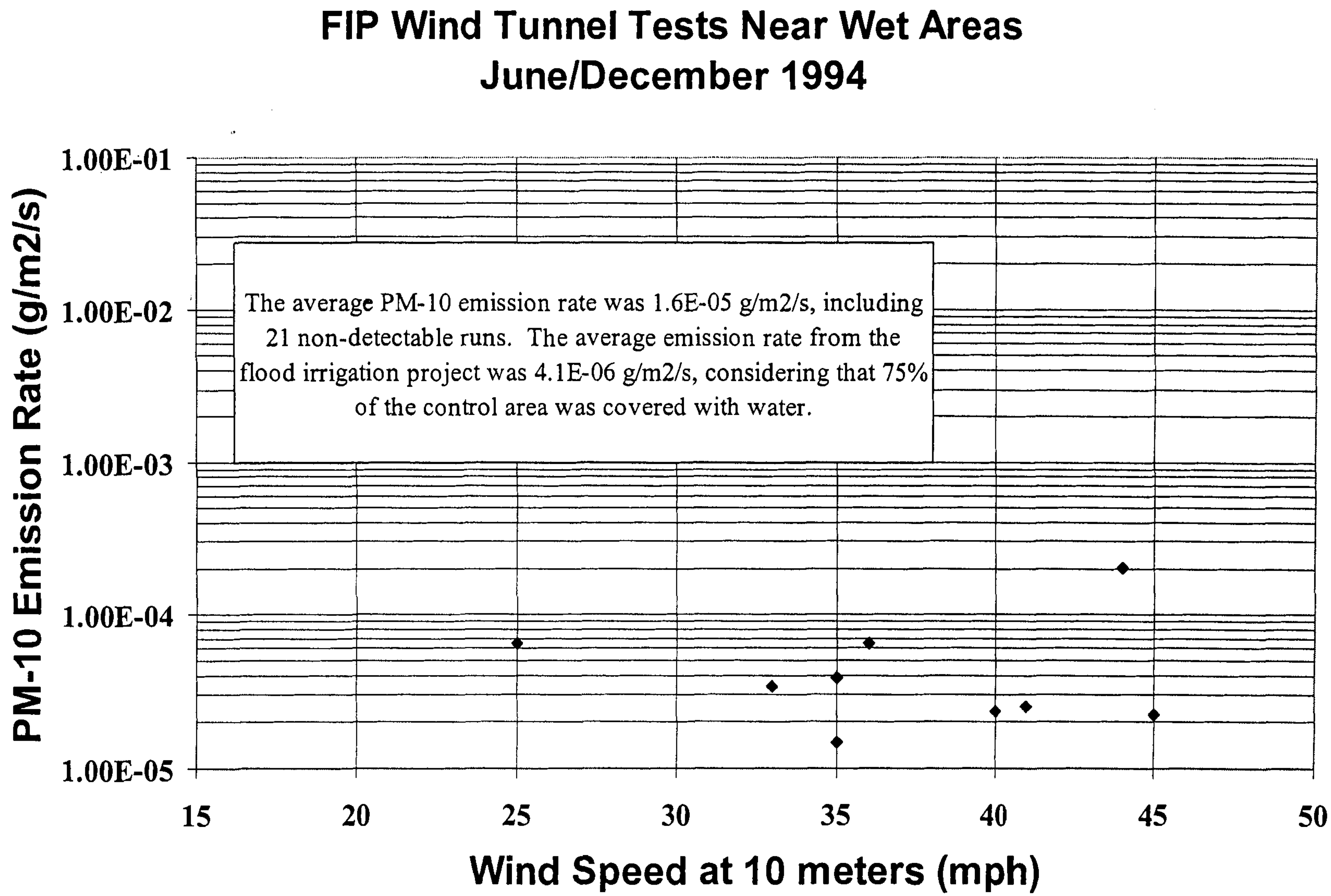

Figure 4.5: PM_{10} emissions from the North Flood Irrigation Project determined with the portable wind tunnel.

4-3.2.4 24-Hour and Annual PM_{10} Emissions Using the Wind Tunnel Data

The wind tunnel based emission algorithms for Owens Lake were used to estimate the emissions per unit area from the erodible areas on and off the lake bed. The emissions were estimated as a function of wind speed. Lake bed emissions were based on "B" Tower wind speeds, while off-lake emissions from the Keeler Dunes, Olancha Dunes and areas near highway 190 were based on wind speeds at Keeler or Olancha which are lower than the "B" Tower wind speeds due to rougher terrain. See the source area map in Figure 4.1. The off-lake areas between Keeler and Olancha use the Keeler wind speed data. Based on the number of observed dust events, these areas are less active than the Keeler Dunes and much less active than the Olancha Dunes (Niemeyer and Niemeyer, 1995). This may indicate that the off-lake winds for this area are more similar to Keeler than to Olancha. Table 4.2 summarizes the PM_{10} emission estimates for 1995 using equations 4-1 and 4-2 for wind tunnel data collected from 1993 through 1995. The annual PM_{10} emissions from on-lake and off-lake source areas was 291,100 tons in 1995, while the peak 24-hour emissions were estimated for April 9, 1995 at 8,862 tons of PM_{10}. Using the validation modeling equations 4-3 and 4-4 for 1995 yields lower values for 1995, of 4,456 tons for 24-hours and 129,900 tons for the annual emissions (Ono, 1997). These results are summarized in Table 4.3.

Because more than twice as many emission runs were used to characterize the 1993 to 1995 emissions equation (n = 102), and because they represent three years of sampling instead of one, equations 4-1 and 4-2, may provide a better estimate for the PM_{10} emission potential for any given year and are used for the Owens Lake primary and secondary wind erosion estimates in Table 4.1. The model validation equations, 4-3 and 4-4, used emission data from fall 1994 and spring 1995, so it is more appropriate for use in predicting the ambient impacts in the model validation analysis which was also done for 1994 and 1995.

4-3.3 Sun Photometry Method for PM_{10} Emissions

The sun photometry emission estimation method allows the observer to measure the total amount of PM_{10} in a vertical column of air using the sun as a source of light to measure light scattering. With a known size distribution for the dust particles, a measurement of the change in scattered light from the sun can be used to determine the amount of suspended PM_{10} in the vertical column. A number of measurements across the dust plume's path are used to estimate the total vertical flux of PM_{10} that is entrained from the source area where the dust was generated. The sizes of the dust generation areas were concurrently mapped for the vertical flux calculation. This methodology and the results of measurements are included in the report "Characterization of Source Areas, Size and Emission Rates for Lake Owens, CA, October 94 to October 95, Optical Depth, Columnar Mass, Concentration and Flux of PM_{10}," (Niemeyer, 1995).

For this study, Niemeyer mapped the source area locations and boundaries by observing dust storms from Cerro Gordo, 10 to 15 miles from the lake bed. Plumes were seen when lake level winds were as low as 5 m/s (11 mph). Niemeyer's PM_{10} emission flux readings using the sun photometer measured a range of values from 2.7×10^{-3} to 7.62×10^{-2} g/m^2-s, with an average value of 2.64×10^{-2} g/m^2-s for nine storms.

Table 4.2 PM_{10} emission estimates for 1995 using portable wind tunnel data from 1993 - 1995 for Equations 4-1 and 4-2.

Erosion Area	Size (m^2)	24-hr Emissions on 4/9/95 ($g/m^2/day$)	24-hr Emissions on 4/9/95 (tons/day)	Annual Emissions ($g/m^2/yr$)	Annual Emissions (tons/yr)
Lake Bed	90.68×10^6	83.5	8,346	2,800	279,900
Keeler Dunes	1.84×10^6	52.8	107	951	1,900
Upper Hwy 190	2.17×10^6	52.8	126	951	2,300
Mid-Hwy 190	1.25×10^6	52.8	73	951	1,300
Olancha Dunes	3.04×10^6	62.8	210	1,692	5,700
TOTALS	98.98×10^6		8,862		291,100

Table 4.3 PM_{10} emission estimates for 1995 using portable wind tunnel data from fall 1994 & spring 1995 for Equations 4-3 and 4-4.

Erosion Area	Size (m^2)	24-hr Emissions on 4/9/95 ($g/m^2/day$)	24-hr Emissions on 4/9/95 (tons/day)	Annual Emissions ($g/m^2/yr$)	Annual Emissions (tons/yr)
Lake Bed	90.68×10^6	43.2	4,318	1,262	126,150
Keeler Dunes	1.84×10^6	13.2	27	282	570
Upper Hwy 190	2.17×10^6	13.2	32	282	670
Mid-Hwy 190	1.25×10^6	13.2	18	282	390
Olancha Dunes	3.04×10^6	18.2	61	632	2,120
TOTALS	98.98×10^6		4,456		129,900

Although Niemeyer did not make an estimate of the annual PM_{10} emissions from the sun photometry method, Sahu used her observations to estimate the average source area size of the dust plumes and estimated the duration of wind events (McCarley, 1996). Sahu estimated that 915 hours of wind events occurred that were above a 5 m/s threshold during the observation period, and that the average source area size for each event was 4,388,451 m^2. Using Niemeyer's average flux, this yields an annual PM_{10} estimate of 420,672 tons for the period from October 1994 to October 1995. For days with winds above the threshold, that lasted for 24 hours, such as those that occurred in spring 1995, the peak 24-hour PM_{10} emissions estimate is 11,034 tons.

4-3.4 Reconciliation of the Portable Wind Tunnel and Sun Photometry Methods of PM_{10} Estimates for Wind Erosion

Although the portable wind tunnel method yields a single emission rate that is applied to a large area, it is not correct to assume that dust plumes and emissions within the area are homogenous. Like the visual observations, some areas may have very visible dust plumes and should have high emission rates, while other areas appear to emit nothing. As shown by the graph of wind tunnel data for spring emission rates in Figure 4.3, at 35 miles per hour, the (geometric best fit curve) "average" is composed of runs that have emission rates that are an order of magnitude higher and lower than the average. It is likely that this entire range of emission rates is occurring simultaneously from different locations within a large source area. A large source area may have sub-areas that are emitting in the order of 10^{-2} g/m^2-s, another area at 10^{-3}, other areas at 10^{-4}, and some areas are not emitting at all. The emissions algorithm generated by the wind tunnel incorporates this heterogeneous source mix into an average emission rate as a function of wind speed. Although this methodology yields a single emission rate for a large area, it also reflects the heterogeneity in dust plumes that are observed. This includes averaging in portions of the source area that may not be emitting, which reduces the area-wide average emission flux rate. (Ono, 1996)

In contrast to the portable wind tunnel method, the sun photometry method is based on observing and mapping individual dust plume source areas and measuring the PM_{10} emission flux from a smaller area. Although the source area size is smaller, the PM_{10} flux rates are generally larger than those estimated with the portable wind tunnel. These differences tend to balance when comparing overall emissions with the portable wind tunnel. The product of the two variables results in a 20 to 30% higher estimate of PM_{10} using the sun photometry method than with the wind tunnel method (Equations 4-1 and 4-2).

Table 4.4 summarizes the results for the different methods of estimating annual and 24-hour PM_{10} emissions from wind erosion at Owens Lake. Note that the 1995 base year emission inventory shown in Table 4.1 utilizes a mid-range value from the wind tunnel based method for 1993 to 1995 sampling runs.

Table 4.4 Summary of results for different methods of estimating annual and 24-hour PM_{10} emissions from wind erosion at Owens Lake.

	PM_{10} Emissions	
Method	Peak 24-hour Tons/Day	Annual Tons/year
Wind Tunnel (1993-95)	8,862 (4/9/95)	291,100
Wind Tunnel (Fall '94, Spring '95)	4,456 (4/9/95)	129,900
Sun Photometer	11,034 (4/9/95)	420,672

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CHAPTER 5

Control Measures

FIGURES & TABLES

5-1 INTRODUCTION

Control measures are defined as those methods of PM_{10} abatement that could be placed onto portions of the Owens Lake playa and when in place are effective in reducing the PM_{10} emissions from the surface of the playa. Since 1980 the District and other researchers have been involved with the study of the lake environment and the mechanisms that cause Owens Lake's severe dust storms. Since 1989 the District has pursued a comprehensive research and testing program to develop PM_{10} control measures that are effective in the unique Owens Lake playa environment. Control measures that were tested on the lake, but have not been shown to be effective dust control measures for the SIP, include the use of sprinklers, chemical dust suppressants, surface compaction, sand fences and brush fences. These measures were discussed in the Owens Valley PM_{10} Planning Area Demonstration of Attainment SIP Projects Alternatives Analysis document (GBUAPCD, 1996) and in the Final Environmental Impact Report (FEIR) (GBUAPCD, 1997) and FEIR Addendum Number 1 (GBUAPCD, 1998) for the SIP. For the attainment demonstration included in Chapters 6 and 7, the District assumed that the PM_{10} control measures used would be shallow flooding, managed vegetation, gravel or other measures that result in control sufficient to reduce emissions to below the limit necessary to meet the PM_{10} NAAQS.

This section includes: a brief description of each control measure, a discussion of the PM_{10} emissions after the control measure is implemented and the conditions that need to be met to achieve the necessary level of control. These descriptions contain both mandatory and conceptual elements and are provided to illustrate how the control strategy mandated by this SIP may be feasibly implemented. The mandatory elements of the control strategy are set forth in the Board Order in Section 8-2. Control strategy elements not mandated by this SIP are left to the discretion of the City of Los Angeles. Chapter 7 of this document will show where these controls will be used on the playa to achieve the National Ambient Air Quality Standard for PM_{10}.

5-2 SHALLOW FLOODING

5-2.1 Description of Shallow Flooding for PM_{10} Control

The surfaces of naturally wet areas on the lake bed (i.e., those areas typically associated with seeps and springs) are resistant to wind erosion that causes dust. Shallow flooding mimics the physical and chemical processes that occur at and around natural springs and wetlands (Figure 5.1). In these areas, water discharges across the flat lake bed surface by raising the level of the shallow groundwater table to the surface. The areal extent of wetting is dependent upon the amount of water discharged to the surface, evaporation rate and lake bed topography. The size of the wetted area is less dependent on soil type because, once the water table is raised to the playa surface, surface evaporation is soil-type independent. Shallow flooding provides dust control over large areas with minimal infrastructure and it requires minimal ongoing operation, maintenance and lake bed access.

This control measure consists of releasing water along the upper edge of the PM_{10} emissive area elevation contour lines and allowing it to spread and flow down-gradient toward the

Figure 5.1: Shallow flooding - test site photograph.

center of the lake. To attain the required PM_{10} control efficiency, at least 75 percent of each square mile of the control area must be wetted (i.e., standing water or surface saturated soil) between September 15 and June 15 each year. This coverage can be determined by aerial photography (Hardebeck, *et al.*, 1996).

To maximize project water use efficiency, flows to the control area will be regulated at the outlets so that only sufficient water is released to keep the soil wet. Although the quantity of excess water will be minimized through system operation, any water that does reach the lower end of the control area will be collected and recirculated through the system. At the lower end of the flood area, or at intermediate locations along lower elevation contours, excess water will be collected along collection berms keyed into lake bed sediments and pumped back up to the outlets to be reused (Figure 5.2). The District estimates that a maximum of four acre-feet of water is required annually to control PM_{10} emissions from an acre of lake bed.

Due to the generally flat, uniform nature of the lake bed, the outlet water would spread over wide areas to create a random pattern of shallow pools. These pools would be generally less than a few inches deep. Pooled areas will produce no PM_{10} and will act as sand traps to prevent crust abrasion and dust generation. Damp and saturated soils also resist wind erosion. Locally high areas or "islands" of non-wetted soil tend to self-level; the soil blows off the higher islands and is captured in the pools. Thus, over time the high areas would become lower and the low areas would become higher. This leveling process can be expected to occur over a period of a few years. In some limited cases, it may be necessary to mechanically level high areas. This would occur primarily where previous earthwork performed on the lake bed prevents natural uniform spreading of PM_{10} control waters.

Shallow flooding will require a water transmission, distribution and outlet infrastructure and the construction of electrical power lines, access roads and water control berms as discussed in the Draft EIR for the SIP.

Prior to testing shallow flooding on a large scale on Owens Lake, there was concern that the addition of water over large areas sufficient to raise the shallow groundwater table to the surface would create new areas of salt efflorescence. The results of the large-scale tests indicated that salt efflorescence caused by shallow flooding was insignificant, between zero to one percent of the test area (Hardebeck, *et al.*, 1996).

5-2.2 PM_{10} Control Effectiveness for Shallow Flooding

Shallow flooding has been shown to be effective for controlling wind blown dust and PM_{10} on sand dominated soils on the lake bed. Between 1993 and 1996 a 600-acre test was conducted on the sand sheet between Swansea and Keeler. Effectiveness was evaluated in four ways; a) from aerial photographs assuming that flooded areas provided 100% control, b) from portable wind tunnel measurements of test and control areas, c) from fetch transect (2-dimensional) analysis of sand motion measurements; and d) from areal (3-dimensional) analysis of sand motion measurements. The average control effectiveness was 99% after the surface water covered 75% of the test area. Wind tunnel tests showed an area-wide PM_{10} emission rate of $4.1x10^{-6}$ g/m^2-s, for the shallow flood site when 75% of the surface area was

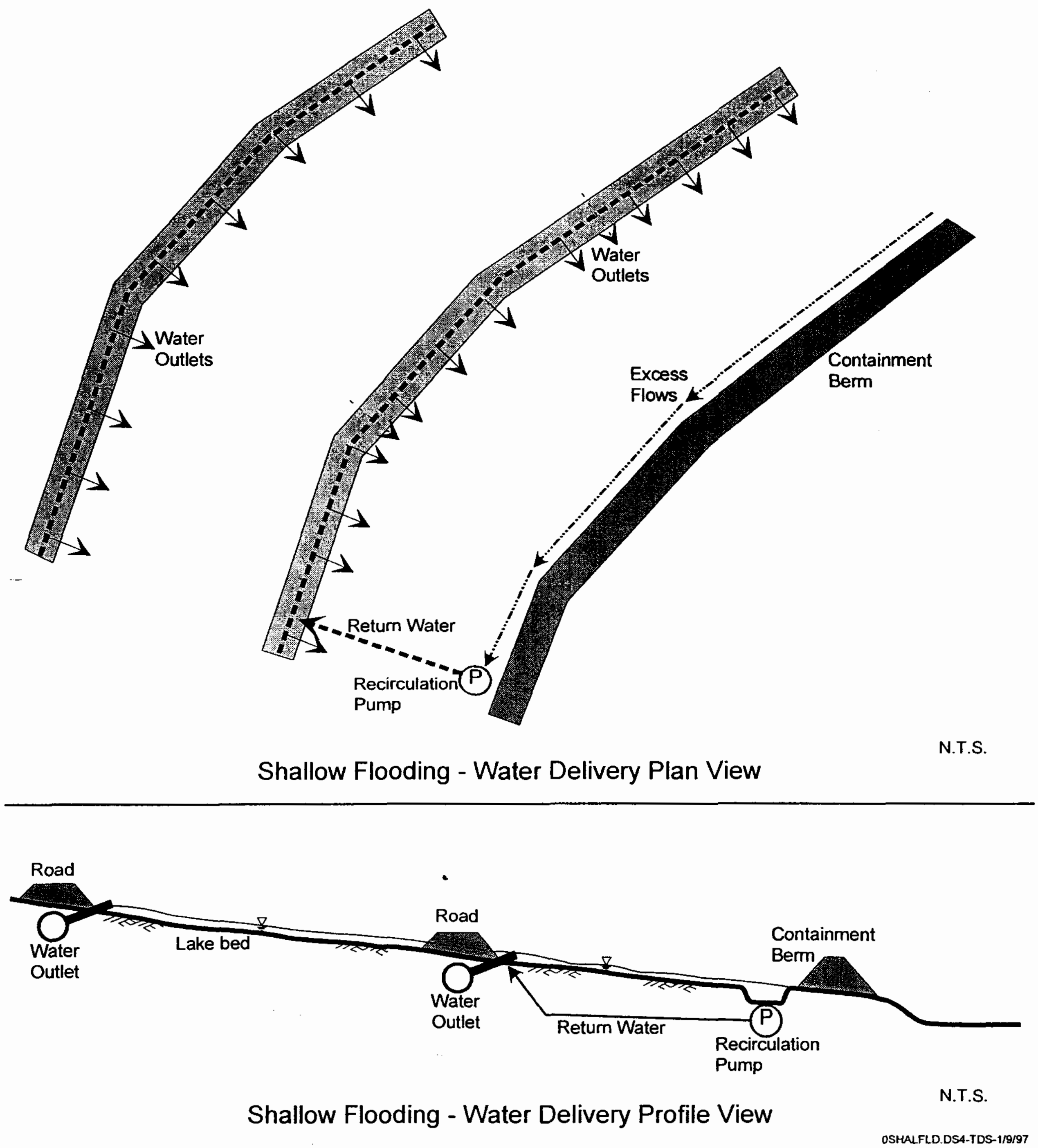

Figure 5.2: Shallow flooding - water delivery schematic.

covered with water. This emission rate, which is used for the attainment demonstration modeling, applies to periods when the hourly average wind speed is greater than 25 miles per hour at 10 meters. (Hardebeck, *et al.*, 1996, See Appendix D)

5-2.3 Shallow Flooding Habitat

Where shallow flood water is distributed across the playa, opportunistic plant species are expected to establish themselves where conditions are favorable. Limited stands of cattails (*Typha* sp.), sedges (*Carex* sp.), saltgrass (*Distichlis spicata*) and other species associated with saturated alkaline meadows of the region colonized the immediate vicinity of the water outlets on the flood irrigation project. Based on testing performed by the District at the North Flood Irrigation Project test area, naturally established vegetation can be expected to immediately occur on about 0.5 percent of the area that is controlled with shallow flooding. This percentage may increase over time.

The expansive shallow flooded areas and the naturally established vegetation provide ephemeral resting and foraging habitat for wildlife use. Figure 5.1 is a photo of the District's North Flood Irrigation Project during a shallow flooding testing project. A large flock of shorebirds can be seen using the wetted area. Figure 5.3 is a photo of cattail vegetation that naturally established near the water outlets on the shallow flooding test site. Insect and shorebird utilization of wet areas created by District testing on the lake bed was common during control measure testing. Based on these previous experiences, it is anticipated that shallow flooding will create large areas of plant and wildlife habitat in areas where very little previously existed. Due to the initially hostile environment for plants on Owens Lake and the desire to vegetate as much of the lake bed as possible in order to provide for effective PM_{10} control, livestock grazing will be prohibited in areas where shallow flooding will be used as a PM_{10} control measure.

In addition to desirable plant species, such as those listed above, that may invade and help to control PM_{10} emissions, there is the possibility that undesirable non-native salt cedar (*Tamarix ramosissima*) may invade wet playa areas. A mandatory element of this project will be a program to remove any salt cedar that invades PM_{10} control areas. Salt cedar on the lake bed will be controlled independently or through annexation into Inyo County's control program. Annexation into the County's program would require a cooperative agreement with Inyo County.

Every effort will be made to limit the potential for introduction of exotic pest plant species into source emission areas that will be controlled through the use of shallow flooding. Fortunately, the existing saline soil conditions inherent to the lake bed are inhospitable to most plants including exotic pest plants such as tamarisk, puncture weed and Russian thistle and noxious grasses such as *Cenchrus*. Exotic pest plants and noxious grasses will be removed from the source emission area (if present) prior to the initiation of shallow flooding. Removal will be accomplished through an appropriate combination of biological, mechanical and chemical control methods.

Figure 5.3: Shallow flooding - photograph of naturally established vegetation.

A key consideration in the design of the Shallow Flooding PM_{10} Control Measure for Owens Lake has been the need to maintain existing breeding population of shorebirds and the western snowy plover in particular. Owens Lake is an important stopover on the Pacific Flyway. Thousands of shorebirds stop at Owens Lake in the spring. The majority of these shorebirds continue northward to breeding areas at Mono Lake, northern California, the Pacific Northwest and Canada. Implementation of the Shallow Flooding PM_{10} Control Measure would be expected to provide suitable nesting and foraging habitat until June 15. A portion of the shorebirds that would have normally continued their migration to northern breeding areas are expected to remain at Owens Lake and utilize nesting and foraging habitat created as a result of the Shallow Flooding PM_{10} Control Measure.

Cessation of the Shallow Flooding PM_{10} Control Measure on June 15, prior to successful fledging of shorebirds is predicted to have a significant adverse impact on these shorebird populations. In order to minimize the potential disruption of breeding activities, the water distribution system (Figure 5.4) has been designed with laterals spaced at one mile intervals. Water delivery may be reduced on June 15 but, if reduced, must be continued at a reduced rate from June 16 until July 31 when most shorebirds have successfully fledged. This design ensures that wetted areas, which provide important resting and foraging habitat, are available within a maximum of one-half mile of dry areas on the playa most likely to be support nesting shorebirds. It is anticipated that the reduced water delivery rate during the summer would use approximately 10 to 20 percent of the water used by the shallow flooding control measure during the September to June period.

Field investigations were performed by mosquito entomologists from the University of California, Davis at District shallow flooding test sites and at natural pond, spring and seep areas around Owens Lake to determine the potential for water-based control measures to create mosquito-breeding habitat (Eldridge, 1995). These investigations concluded that mosquito habitat had limited potential to occur on the lake bed, but could occur when water depths range from 2 to 20 inches and when water had essentially no movement.

To prevent the creation of potential mosquito-breeding habitat, a mandatory element of this project will be detailed design of the site infrastructure that incorporate specific measures to minimize water depths ranging from 2 to 20 inches and to prevent still-water areas from forming. An additional mandatory element of this project will be a program to abate mosquito breeding and swarming. Abatement activities may include application of pesticide or biological controls. These measures are successfully used throughout the Owens Valley. As an alternative to a separate mosquito abatement program, the City of Los Angeles may petition the County of Inyo to annex all water-based control measure areas into the Inyo County Mosquito Abatement Program. Appropriate assessments will be levied to ensure that abatement activities can take place, if necessary.

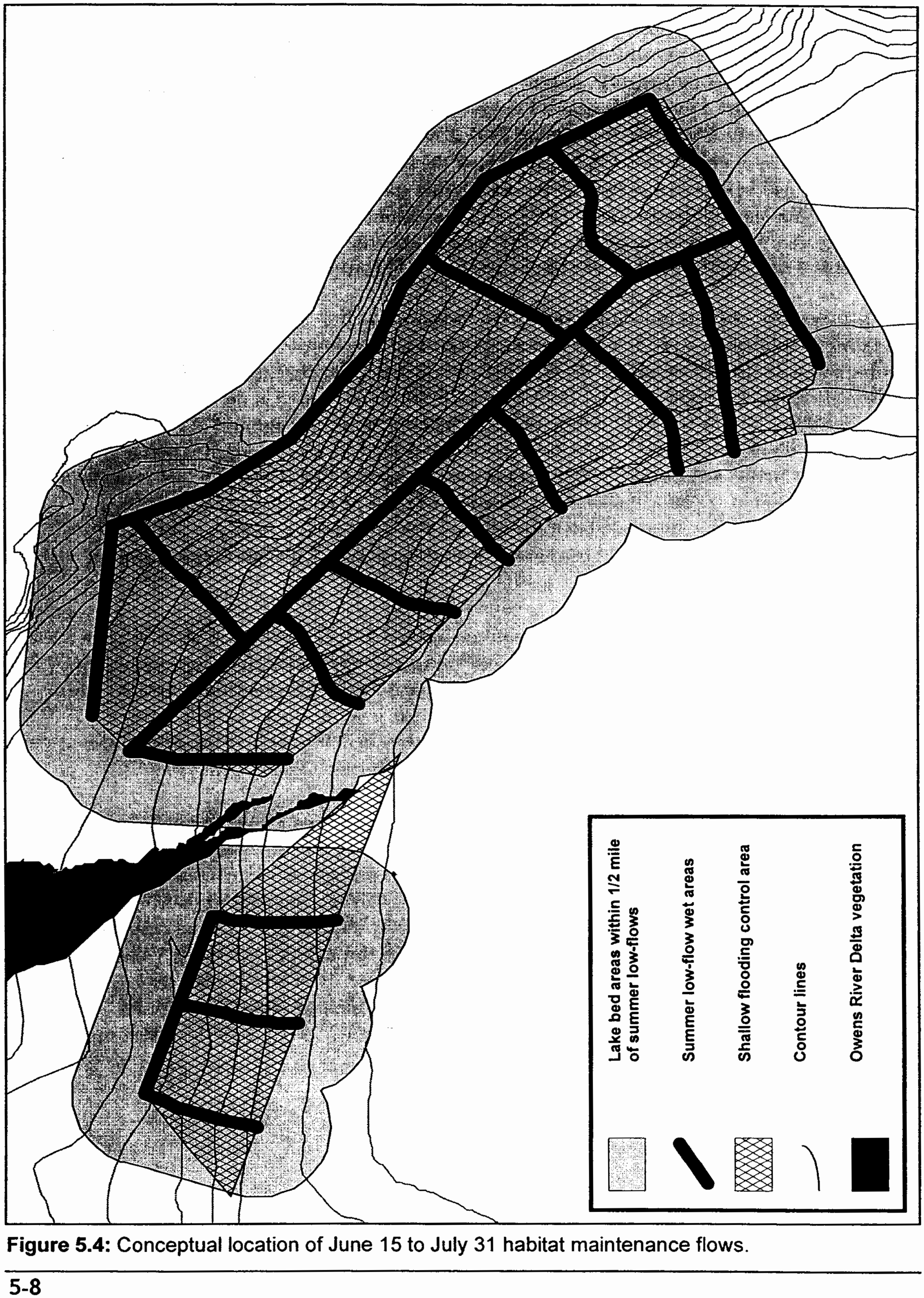

Figure 5.4: Conceptual location of June 15 to July 31 habitat maintenance flows.

In recognition of the location of the source emission control areas in an area that is a stopover location for shorebirds and waterfowl, the mosquito abatement program shall be designed to minimize the potential impacts on the breeding success of western snowy plovers and other birds that use the playa. The program will be designed in accordance with the following parameters:

- Preference will be based on biological control measures;
- Mosquitofish will not be introduced into existing aquatic habitats or areas that are connected to existing aquatic habitats;
- Bat house/roosting structures (designed to preclude raptor perching) will be used as a component of the mosquito abatement program;
- Pesticides that have been identified by the State or Federal Environmental Protection Agencies as being known or expected to cause thinning of eggshells in native avian populations will not be used as part of the mosquito abatement program;
- Representative fragments of failed eggs from native birds in mosquito abatement areas recovered during the course of normal mosquito abatement activities will be subject to analysis by a certified laboratory to assess the influence of mosquito abatement activities on egg failure; and
- Mosquito abatement activities will be conducted in accordance with State-of-the-Practice procedures established by the U.S. Department of Agriculture, Animal Damage Control.

5-2.4 Shallow Flooding Operation and Maintenance

Water flows between September 15 and June 15 will be maintained to provide the required 75 percent of the area in standing water or saturated soil. During cool weather when evaporation rates are low, it may be possible to shut off flows completely for short periods as long as saturated soil conditions are maintained. To maximize water use efficiency, water flows should be minimized during the summer months when PM_{10} standard violations are infrequent and evaporation rates are high. It is a mandatory element of this project that minimal water flows be maintained between June 16 and July 31 to sustain established vegetation and wildlife. Between August 1 and September 14, the District does not require any water to be supplied to areas controlled with shallow flooding. Based on the District's large-scale tests of shallow flooding, operating the shallow flooding control measure in this manner is predicted to use approximately four acre-feet per year (ac-ft/yr) of water per acre controlled. Careful management of shallow flood areas may allow for even less water to be used.

Maintenance activities associated with shallow flooding would consist of minor grading and berming on the control areas to ensure uniform water coverage and prevent water channeling. Staffing requirements for operation and maintenance of the shallow flooding areas are estimated at approximately one full-time equivalent employee (FTEE) per 3,200 acres of flooded area.

5-3 MANAGED VEGETATION

5-3.1 Description of Managed Vegetation for PM_{10} Control

Where water appears on the playa surface with quantity and quality sufficient to leach the salty playa surface and sustain plant growth, vegetation has naturally become established. The saltgrass meadows around the playa margins and the scattered spring mounds found on the playa are examples of such areas. Vegetated surfaces are resistant to soil movement and thus provide protection from PM_{10} emissions. The managed vegetation strategy creates a mosaic of irrigated fields provided with subsurface drainage to create soil conditions suitable for plant growth using a minimum of applied water. An aerial view of a 40-acre test plot using this strategy is shown in Figure 5.5. Because this measure relies on earthen infrastructure for water distribution, it is best suited for use in clay soils that can be used for the construction of ditches, berms, channels and reservoirs that allow for level border irrigation strategies that leach and drain readily through the fractured structure of the soil. The proposed methods of soil reclamation are similar to those used elsewhere in this country and world-wide for desalinization of salt-affected soils, allowing such soils to be useful for plant growth. Feasibility of implementation and effectiveness for PM_{10} control, are detailed in "Vegetation as a Control Strategy: Updated Report" which is included as Appendix E to this document.

This control measure consists of a creating a farm-like environment containing small (approximately 4 to 20 acre) confined fields constructed on contour that are irrigated with shallow pulses of water. The amount of water required to leach the soils to within a level suitable for salt-tolerant species depends on specifics of soil type and of surface treatment. Studies at the test plot indicate that between 2½ and 6 feet of water will be necessary to permanently reclaim a two-foot deep soil profile to a level suitable for planting with saltgrass (Ayars, 1997). This amount of water can be delivered to the fields in 4 to 6 irrigation events, which can take place during a period of about 3 to 4 months. As the salt levels in the leached plots decline, plants can be introduced to the fields and irrigated using the same methods. Therefore, if leaching began during the winter months, saltgrass could be planted during the spring of the same year.

To attain the required PM_{10} control efficiency, a plant cover of 50 percent live or dead cover will be sufficient on the 75 percent of the total managed vegetation control area that will be vegetated. Data from test plots on the lake indicate that such cover can be achieved during the third growing season. Total cover will include both live and dead plant materials, as both function to prevent PM_{10} emissions. Field studies on Owens Lake test plots confirm that the target salt grass cover of 50 percent can be sustained with 2½ acre-feet per year of irrigation water for each acre planted with saltgrass. This results in an overall water requirement of two acre-feet of water per year per total acre of managed vegetation control area. The remaining 25 percent of the total control area will consist of such control measure infrastructure as roads, reservoirs, canals and drains. Percent cover can be measured by the point frame method (Scheidlinger, 1997, see Appendix E).

Figure 5.5: Managed vegetation - test site aerial photograph.

Irrigation leaches the soils of the salts, which are removed from the area using subsurface open drains (Figure 5.6). On the clay dominated soils found in the area designated for managed vegetation, irrigation with fresh water can potentially cause a collapse of the soil structure, preventing water infiltration and salt leaching. However, in field studies on the Owens Lake bed, this has not been observed to occur. The drainage system is constructed, however, to allow for the mixing of fresh water and saline drain water to achieve an ideal irrigation salinity (calculated to be approximately 15 dS/m) (Ayars, 1997). If drain water is not reused for irrigation, the drain water will be discharged to downhill evaporation ponds where a saturated evaporite deposit will be formed and managed in wet condition in order to prevent PM_{10} emissions.

Leaching and irrigation water applied to the managed vegetation also serves to maintain a downward gradient of salts in the rooting column of the soil of the plots in order to prevent salt from the shallow water table from rising into the rooting zone by capillary action. The drain system in the managed vegetation area has the additional function of preventing the rise of the water table into the rooting zone on the fields and the irrigation schedule will maintain the necessary downward gradient within the rooting zone.

Constructing the fields on contour means that the fields are essentially flat and the water spreads evenly over them allowing for very efficient irrigation. The leaching fraction of the irrigation water will be recovered in the drains. During the initial years of the project this drain water will contain sufficient salts to render it useless as irrigation water and it will be discharged for use in shallow flooding or to the low sump locations. As the fields improve in quality, the drain water may be of a quality adequate for recirculation as irrigation water and can be returned to the fields.

The clay soils found on many areas of the lake bed are appropriate for the construction of earthen delivery channels, berms, and open drains that comprise this measure's infrastructure. In addition, the texture and fractured structure of the clay soil makes it well suited for water distribution, leaching, and plant growth. High volumes of water would be delivered over short periods of time to flat confined fields that have been ripped or disced to a depth of at least 24 inches to facilitate infiltration and leaching. Water will travel rapidly over the clay surface to spread in a shallow, even fashion, and will not be immediately lost to percolation as would be the case in the coarse sandy soils elsewhere on the playa. Salty water resulting from the leaching action is rapidly transmitted through the soil profile by the network of existing fractures, allowing for effective drain water collection. The fine clay particles have a very high pore volume (approximately 50%) and therefore retain ample water for a long period of time that can be used by plants between irrigation events (Stradling, 1997 and Ayars, 1997). As soil leaching progresses with time, drain water recovered from the fields may be suitable for recycling onto the fields for continued irrigation, resulting in lower overall water use.

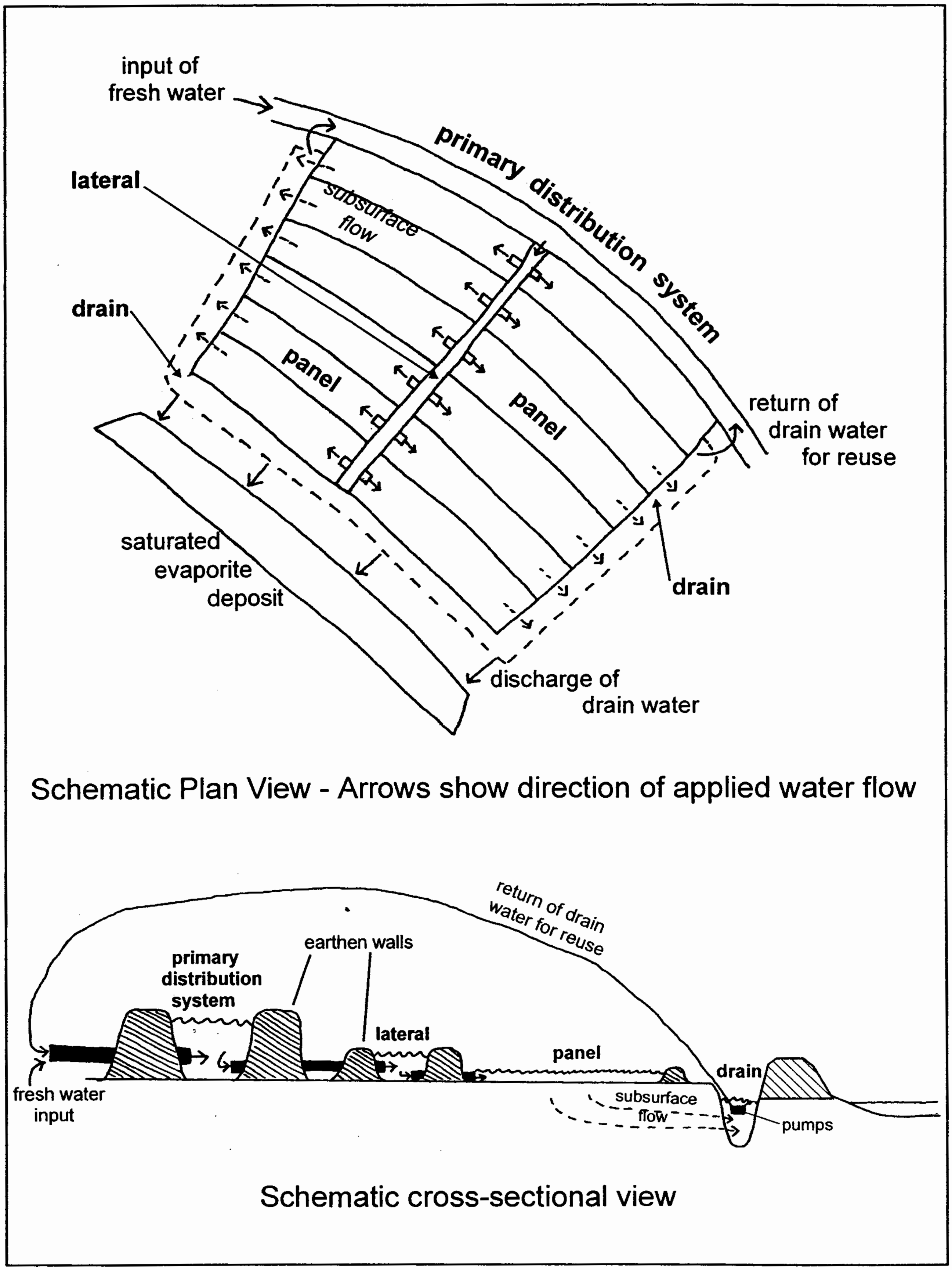

Figure 5.6: Managed vegetation - water delivery schematic.

Managed vegetation will require a water transmission, distribution and drainage infrastructure presented in schematic form in Figure 5.6. It will also require the construction of access roads, recirculation pumps and water and flood control berms.

The sump area saturated evaporite deposits will be located adjacent to the existing evaporite deposit above the brine pool. The deposit areas will be constructed in clay soils. Intrusion into the existing deep groundwater system will be prevented by the high upward hydraulic gradient experienced in this area (approximately 40 feet above the surface in the existing South FIP well). As with many areas of the lake bed, these upward groundwater gradients, in the absence of a drainage system, maintain high soil moisture levels and will help to maintain the deposits in a wet condition. Management of contoured field drainage waters will ensure that the deposits remain wet and non-emissive. As the soils in the contoured fields are leached of salt, their drain water will be able to be recirculated back into the irrigation system.

Saltgrass (*Distichlis spicata*) will be the only plant species considered by this SIP to be introduced to the fields. It is tolerant of relatively high soil salinity, spreads rapidly via rhizomes and provides good protective cover year-round even when dead or dormant. Saltgrass stands can subsist with minimal amounts of applied water during the summer and dust control effectiveness remains undiminished, provided that adequate irrigation has stimulated plant growth and has provided stored water in the plants' rooting zone during the spring months.

5-3.2 PM_{10} Control Effectiveness for Managed Vegetation

Recent field and wind tunnel research using Owens playa sands and actual saltgrass vegetation has been conducted by Lancaster and White (Lancaster, 1996, White, *et al.*, 1996). These studies indicate that even sparse populations of saltgrass function very effectively in reducing sand migration and PM_{10} within the stand. Lancaster concluded that for the coarse sands of the north sand sheet on Owens Lake, 95% reduction in sand movement can be achieved with a saltgrass cover of between 16 to 23%, depending on wind speed and direction. White showed that a vegetation cover of 12 to 23% will significantly reduce the amount of entrained sand and PM_{10}.

Wind tunnel studies were conducted in February 1997 on untreated, leached, vegetated and "simulated" vegetated sites on the Owens Lake clay soils (Nickling, *et al.* 1997). Although the vegetation increased the aerodynamic roughness of the surface, there was no statistically significant difference between PM_{10} emissions from the vegetated and from the control (leached but unvegetated) sites. Both of these sites, however, showed PM_{10} reductions of two orders of magnitude compared to the natural playa surfaces. This indicates that treatment of the clay surfaces at Owens Lake by watering and leaching surface salts can by itself significantly reduce wind erosion without vegetation. However, saltgrass vegetation cover will provide additional surface protection after the initial protection provided by watering decreases (Nickling, *et al.* 1997).

In a companion project, Owens Lake clay soils with saltgrass were subjected to various wind speeds in a wind tunnel at the University of California Davis. Preliminary results (White,

1997) indicate that 54% vegetation cover reduces the emission rate of PM_{10} at wind speed of 45 mph by 99.2% as compared to emissions from the natural playa at Owens Lake.

Control efficiencies were calculated for Owens Lake clay soils in both the field and the laboratory wind tunnels. The field studies showed 99.5% control efficiency with 11% saltgrass cover and the laboratory study demonstrated 99.2% control efficiency at 54% cover as compared to uncontrolled emissions at Owens Lake.

The plan for managed vegetation is to achieve cover values of at least 50%, a value that would include dead or dormant stems that would provide erosion protection without presenting a transpirative surface. This level of cover could be retained with minimal water use during the summer and would function during winter months as well without irrigation. A high control effectiveness for low levels of plant cover in natural agricultural-type soils is supported by field research performed by Buckley and Grantz, *et al.* in places other than Owens Lake, which indicate that a plant cover of even 30% can achieve better than 99% reduction of soil erosion (Buckley, 1987; and Grantz, *et al.*, 1995).

Based on the Buckley and Grantz field studies, the field studies at Lake Texcoco, near Mexico City, other work relating to PM_{10} emissions and vegetation and studies done at Owens Lake, staff believes that more than 99% reduction of soil erosion and PM_{10} will be achieved at Owens Lake with a salt grass cover of 50%. Table 5.1 summarizes research results regarding vegetation cover and control effectiveness. For modeling and emissions inventory purposes the controlled PM_{10} emissions from the vegetation managed area is estimated at one percent of the uncontrolled emissions and emission rate.

5-3.3 Managed Vegetation Habitat

Although saltgrass is the only plant species that will be deliberately introduced to the managed vegetation area, other plant species are expected to establish themselves opportunistically. Plant species observed on saltgrass test plots include alkali sacaton (*Sporobolus airoides*), arrowscale (*Atriplex phyllostegia*), cattail (*Typha latifolia*) parry saltbush (*Atriplex parryi*), rabbitfoot grass (*Polypogon monospeliensis*), seablight (*Sesuvium verrucosum*) and stinkweed (*Cleomella sp.*). The species typical of transmontane alkaline meadows elsewhere in the region, such as inkweed (*Nitrophila occidentalis*), Nevada sedge (*Scirpus nevadensis*), and yerba mansa (*Anemopsis californica*) would also be expected to appear, adding diversity and wildlife habitat value to the fields. On saltgrass test plots established by the District on the playa, evidence of use by rabbits, rodents, insects, spiders and even coyotes was found. The mosquito and salt cedar control programs discussed in Section 5-2.3 would also take place on the managed vegetation control measure.

Table 5.1. **Summary of studies relating the surface cover of vegetation to percent control of PM_{10} emissions.**

SUMMARY OF VEGETATION COVER AND CONTROL EFFECTIVENESS STUDIES

Reference	Surface Cover Characteristics	Wind Speed	% Control
Buckley, 1987	30% ground cover.	NA	99%
Fryrear, 1994	50% canopy cover.	48 mph	96.3%
Grantz, *et al.*, 1995	31% cover on sandy soil.	NA	99.8%
Lancaster, 1996	16-23% salt grass cover at Owens Lake on sandy soil.	39 mph	95%
Musick & Gillette, 1990	25% vegetation lateral cover, 19.4 mph threshold on bare surface. (1)	NA	100%
Nickling, *et al.*, 1997	11-30% saltgrass cover at Owens Lake on clay soil.	$\geq$ 45 mph	99.5%[3]
van de Ven, *et al.*, 1989	4-5 inch high stubble, 30 stems/ sq. ft 19.28 mph threshold on bare surface.	NA	100%
White, *et al.*, 1996	12% cover on loose Owens Lake sand in a wind tunnel.	44 mph	97.1%[2]
White, 1997	54% saltgrass cover in wind tunnel at UC Davis in clay soil	45 mph	99.4%[3]

Notes:

[1] Wind speeds are normalized to an equivalent 10 meter wind speed at Owens Lake. This conversion uses the surface boundary layer equation assuming 0.01 cm surface roughness and the free stream speed for a given height if 10 meter wind speeds are not available.

[2] Measured PM_{10} emission reduction in the wind tunnel.

[3] Use uncontrolled $PM_{10} = 2.6 \times 10^{-3}$ g/m²/s (from EQ. 4-3 for 45 mph)

Every effort will be made to limit the potential for introduction of exotic pest plant species into source emission areas that will be controlled through the use of managed vegetation. Exotic pest plants have not invaded test plots established on the playa. Fortunately, the existing saline soil conditions inherent to the lake bed are inhospitable to most plants including exotic pest plants such as tamarisk, puncture weed and Russian thistle and noxious grasses such as *Cenchrus*. Exotic pest plants and noxious grasses will be removed from the source emission area (if present) prior to planting with saltgrass. Another potential source for the introduction of exotic pest plants would be from the saltgrass stands harvested for rhizomes to vegetate the panels. Exotic pest plants will be removed from the saltgrass stands (if present) prior to harvesting. Removal will be accomplished through an appropriate combination of biological, mechanical and chemical control methods. Berms and other elements of infrastructure will be constructed from lake bed soils, which are not likely to be subject to invasion from these pest plants due to the high levels of salinity.

5-3.4 Managed Vegetation Operation and Maintenance

Managed vegetation is predicted to utilize approximately two ac-ft/yr of water per acre controlled, or 2.5 acre feet per irrigated acre. Non-irrigated acres (roads, berms, water storage, etc. account for approximately 25% of the controlled area. The distribution of the water over the entire vegetated area will be irregular, because at any given time some fields will be irrigated for maximum growth while others will be receive minimal amounts of water allowing for minimal stand maintenance. Water use will be higher during the initial stages of development of this measure, as it will take 3½ to 6 feet of water to leach the top two feet of soil to a salinity level tolerable to saltgrass, depending on surface treatment (Ayars, 1997). Since the later stages of leaching can be accomplished after planting, total water use for the first year of implementation will be seven ac-ft/ac. After the first year, water use will be reduced to at or below 2½ ac-ft/ac/yr.

Operation and maintenance activities for managed vegetation would consist of implementing an irrigation schedule for the fields and necessary maintenance of water transmission structures, water delivery structures, field berms and field ditches. Staffing requirements for operation and maintenance of the managed vegetation area are estimated at approximately one FTEE per 1,500 acres of vegetated area.

5-4 GRAVEL COVER

5-4.1 Description of Gravel Cover for PM_{10} Control

A four-inch layer of coarse gravel laid on the surface of the Owens Lake playa will prevent PM_{10} emissions by: (a) preventing the formation of efflorescent evaporite salt crusts, because the large spaces between the gravel particles interfere with the capillary forces that transport the saline water to the surface where it evaporates and deposits salts; and (b) raising the threshold wind velocity required to lift the large gravel particles (i.e., larger than ⅜-inch diameter) so that transport of the particles is not possible by wind speeds typical of the Owens Lake area. Gravel blankets can work effectively on essentially any type of soil surface. Figure 5.7 is a photograph of one of the District's gravel test plots on Owens Lake. These test plots have been in place for approximately 10 years and continue to completely protect the emissive surfaces beneath. Gravel placed onto the lake bed surface will be durable enough to resist wind and water deterioration and leaching and will be approximately the same color as the existing lake bed.

Under certain limited conditions of sandy soils combined with high groundwater levels, it may be possible for some of the gravel blanket to settle into lake bed soils and thereby lose effectiveness in controlling PM_{10} emissions. To prevent the loss of any protective gravel material into lake bed soils, a permeable geotextile fabric may be placed between the soil and the gravel where necessary. This will prevent the loss of any gravel.

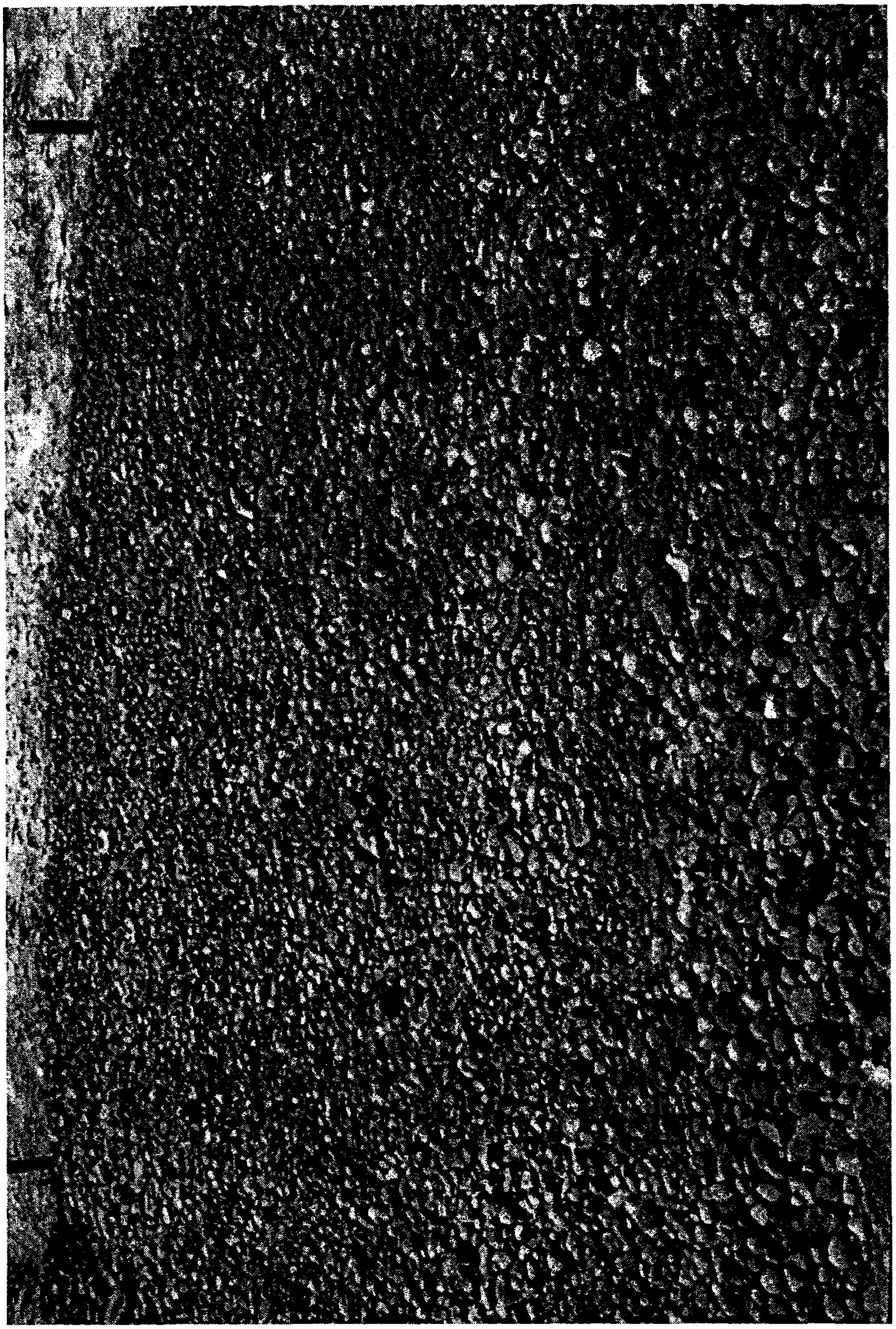

Figure 5.7: Gravel - test site photograph.

Gravel areas must be protected from water- and wind-borne soil and dust. The gravel blanket will be the last control measure to be installed. Therefore, wind-borne depositions will be eliminated. Gravel areas will also be protected from flood deposits with flood control berms, drainage channels and desiltation/retention basins. These measures will ensure that the gravel blanket will remain an effective PM_{10} control measure for many years.

To attain the required PM_{10} control efficiency, 100 percent of all areas designated for gravel must be covered with a layer of gravel four inches thick. All gravel material placed shall be screened to a size greater than ⅜-inch in diameter. The gravel material shall be at least as durable as the rock from the three sources analyzed in the FEIR and FEIR Addendum Number 1 associated with this document. The material shall have no larger concentration of metals than found in the materials analyzed in the FEIR. The color of the material used shall be such that it does not significantly change the color of the lake bed.

5-4.2 PM_{10} Control Effectiveness for Gravel Cover

A gravel cover forms a non-erodible surface when the size of the gravel is large enough that the wind cannot move the surface. If the gravel surface does not move, it protects finer particles from being emitted from the surface. Gravel and rock coverings have been used successfully to prevent wind erosion from mine tailings in Arizona (Chow and Ono, 1992). The potential PM_{10} emissions from a gravel surface can be estimated using the USEPA emission calculation method for industrial wind erosion for wind speeds above the threshold for the surface (USEPA, 1985). PM_{10} will not be emitted if the wind speed is below the threshold speed.

Based on a minimum particle size of ¼ inch, the proposed gravel cover will have a threshold wind speed of 90 miles per hour measured at 10 meters (USEPA, 1992, Ono and Keisler, 1996, see Appendix F). This wind speed is rarely exceeded in the Owens Lake area. A more typical gust for Owens Lake may be around 50 miles per hour.

The proposed 4-inch thick gravel cover is intended to prevent capillary movement of salt and silt particles to the surface. Fine sands and silts that fill in void spaces in the gravel will allow the capillary rise of salts and reduce the effectiveness of a gravel blanket to control PM_{10} at Owens Lake. In addition, finer particles will lower the particle size mode and lower the threshold wind speed for the surface. Gravel blanket tests were performed at two sites on Owens Lake starting in June 1986. These tests showed that four-inch thick gravel blankets composed of 3-inch and larger rocks prevented capillary rise of salts to the surface. Observations of ungraveled test plots in the same area, one with no surface covering and another with local soil, showed that salts would otherwise rise to the surface (Cox, 1996, see Appendix F).

The PM_{10} emissions are expected to be zero for the gravel cover since the threshold wind speed to entrain gravel, and thus PM_{10}, is above the highest expected wind speeds expected for the area. This will result in 100% reduction of PM_{10} from areas that are covered by a gravel blanket.

5-4.3 Gravel Cover Operation and Maintenance

Because fine particles should not be allowed to cover or significantly invade the gravel, the gravel blankets would be the last measure implemented after all other erodible areas are controlled.

Once the gravel cover has been applied to the playa, limited maintenance would be required to preserve the gravel blanket. The gravel would be visually monitored weekly to ensure that the gravel blanket was not filled with sand or dust, or had not been inundated or washed-out from flooding. If any of these conditions were observed over a substantial area, additional gravel would be transported to the playa via truck (unless the conveyor system was still in place and operational) and applied to the playa surface via truck and/or low ground-pressure bulldozer or grader. Operation and maintenance staffing requirements are estimated to be one FTEE per five square miles of gravel and an ongoing maintenance amount of gravel of 3,200 cubic yards per square mile per year.

5-5 STORMWATER MANAGEMENT

The bed of Owens Lake is subject to flooding, alluvial deposits and fluctuating brine pool levels caused by stormwater runoff flows. In order to protect the PM_{10} control measures installed on the lake bed, the City shall design, install, operate and maintain flood and siltation control facilities. Flood and siltation control facilities shall be designed to provide levels of protection appropriate for the PM_{10} control measures being protected. For example, lake bed areas controlled with managed vegetation or gravel would require a higher level of flood protection than areas controlled with shallow flooding. Flood and siltation control facilities shall be integrated into the design and operation of the PM_{10} control measures. All flood and siltation control facilities shall be continually operated and maintained to provide their designed level of protection. All flood and siltation control facilities and PM_{10} control measures damaged by stormwater runoff or flooding shall be promptly repaired and restored to their designed level of protection and effectiveness. All flood and siltation control facilities shall be designed so as not to cause the existing trona mineral deposit lease area (State Lands Commission leases PRC 5464.1, PRC 3511 and PRC 2969.1) to be subjected to any greater threat of alluvial material contamination than would have occurred under natural conditions prior to the installation of PM_{10} control measures.

5-6 ALTERNATIVE CONTROL MEASURES

As discussed above, the District, in cooperation with the City, has developed three control measures that it has found to be feasible and effective for use on the Owens Lake playa: shallow flooding, managed vegetation and gravel. However, additional research, along with the knowledge gained during early implementation of the three current measures, may provide for technological advances of the current measures or may result in the identification of new feasible and effective measures.

In order to incorporate the possibility of new or improved control measures, the District will allow modifications or additions to the three identified measures, if the District and the City jointly agree on the modification or addition. The District will only agree to modifications or additions to the existing three control measures if it determines that the revised or new measures are superior to or improve the control or cost effectiveness of the prescribed control measure and:

1) control PM_{10} emissions to a level less than or equal to the allowed controlled emission rate (Section 6-4), or

2) can be integrated into an entire control strategy that will attain the PM_{10} NAAQS by December 31, 2006.

Methods will be developed to measure emissions from areas on which control measures are in place and operational to ensure that the control areas comply with the allowed controlled emission limit. Methods will also be developed for offsetting ambient impacts due to variations in control measure emissions. These offset methods would allow some areas to exceed the emission allowance, as long as the excess emissions were offset by emissions from other areas that were sufficiently less than the emission allowance such that ambient PM_{10} levels at the historic shoreline did not exceed the PM_{10} NAAQS.

The City is authorized by the terms of this plan to implement one or more control measures of its choosing on three and one-half square miles of the lake bed in the "Dirty Socks" area identified as Zone 4 in Figure 6.2. The controls placed in this area may be one of the three identified measures, modified versions of these measures or other unidentified measures. The control measures placed in this area do not need to be approved by the District. However, the City is responsible for assuring that the PM_{10} emissions from the Dirty Socks area are reduced sufficiently such that the controls implemented in this area can be integrated into an entire control strategy that attains the PM_{10} NAAQS by December 31, 2006.

5-7 CONTROL MEASURE WATER AVAILABILITY AND USE

The SIP and the implementation order do not prescribe the source(s) of water from which the City must supply the water-based control measures. However, the District has determined that an available water source for the control measures is the Los Angeles Aqueduct. The District's analysis indicates that up to approximately 51,000 acre-feet of water annually could be supplied from the Los Angeles Aqueduct without causing significant impacts or water shortages to the City of Los Angeles, or significant indirect impacts to any other area. Fifty-one thousand acre-feet per year represents approximately 13% of the water that the Los Angeles Department of Water and Power exports from the Owens Valley to the City of Los Angeles. Over the last 20 years the Los Angeles Aqueduct's flow to the City has averaged 395,000 ac-ft per year.

5-8 REGULATORY EFFECTIVENESS

Rule effectiveness is a measure of the compliance by the regulated sources with the control measures required under the plan. Since virtually all the PM_{10} emissions in the Planning Area originate from the dry playa of Owens Lake, and since a single operator, the City of Los Angeles, is required to undertake the control measures required under this plan to control those emissions, the District projects a rule effectiveness of 100 percent for the plan's control measures.

The District will enforce the plan's requirements through continual oversight and inspection of the City's efforts to construct and commence operation of the control measures, and through periodic inspection and monitoring, both on a scheduled and random basis, once the control measures are fully implemented. The plan contains milestones for construction and operation of the control measures, and test methods for determining the compliance of the City's control strategy implementation with the performance standards required under this plan.

5-9 REFERENCES

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CHAPTER 6

Air Quality Modeling

FIGURES & TABLES

6-1 INTRODUCTION

Computer based air quality modeling techniques were used to predict concentrations resulting from windblown PM_{10} emissions from the Owens Lake playa. The U.S. Environmental Protection Agency (USEPA) has designated the Owens Lake airshed as a "serious" PM_{10} nonattainment area. Episodes are accompanied by wind events and the most significant source of PM_{10} in the air basin is windblown dust from the Owens Lake playa. Air quality modeling techniques were applied to assess control scenarios developed by the Great Basin Unified Air Pollution Control District (GBUAPCD) to reduce PM_{10} concentrations and bring the airshed into attainment. A performance evaluation was also conducted to assess the uncertainty and reliability of these modeling methods based on a comparison of model predictions with ambient PM_{10} measurements.

This section provides a synopsis of the modeling analysis conducted by McCulley, Frick & Gilman, Inc. (MFG) on behalf of the GBUAPCD. The technical details of the study are described in the *Owens Lake Air Quality Modeling Study* (MFG, 1997a). The study followed the methods outlined in the *Owens Lake Modeling Protocol* (MFG, 1997b) and is based on the results and experience gained in previous modeling investigations (MFG, 1995; MFG, 1996a; MFG 1996b).

The objectives of the air quality modeling were as follows:

- conduct the dispersion modeling in accordance with the regulatory guidance for PM_{10} SIPs using USEPA recommended modeling tools and procedures.

- perform an evaluation of the proposed dispersion modeling techniques using two years of ambient data and focus the evaluation on the higher observed 24-hour PM_{10} concentrations. The performance evaluation was used to assess model uncertainty and aid in the selection of several aspects of the modeling procedures.

- assess and refine control strategies until the modeling approach demonstrates attainment of the PM_{10} National Ambient Air Quality Standards (NAAQS).

The 24-hour NAAQS for PM_{10} is 150 $\mu g/m^3$, not to be exceeded more than once per year at locations accessible to the public. The current modeling analysis is based on two years of meteorological data. Within a two year period, no more than two concentrations higher than the NAAQS are allowed at each receptor location. The NAAQS is attained when the expected third highest 24-hour concentration at each location accessible to the public is less than 150 $\mu g/m^3$.

The remainder of Section 6 summarizes the air quality modeling techniques, model input data, evaluation procedures, and the attainment demonstration. Section 6-2 presents an overview of the air quality modeling methods and emission factors selected for the study. Section 6-3 describes the model evaluation where model predictions are compared to ambient observations. This section contrasts the performance of different modeling assumptions. The modeling procedures are applied to assess a proposed control strategy and demonstrate attainment of the NAAQS in Section 6-4.

6-2 MODELING METHODS AND INPUT PARAMETERS

This section discusses the techniques and input data that were used in the air quality modeling assessment. The basic approach follows MFG's previous studies with refinements suggested by the results of the performance evaluation described in Section 6-3. Features of the modeling approach include:

- the Industrial Source Complex Short-Term model (ISCST3, Version 96113; USEPA, 1995);
- wind speed dependent emission factors for each season and control alternative based on interpretation of wind tunnel data collected by GBUAPCD;
- three modeling sub-regions with receptors placed on the historical shoreline (3600 ft) and at the monitoring stations; and
- two years of meteorological data within the three modeling regions.

Figure 6.1 displays the location of the three modeling regions, monitoring stations, historical shoreline, and an outline of potential emitting source areas considered in the model. The source areas shown in Figure 6.1 include both the on-lake Owens Lake playa and off-lake areas. The off-lake source areas shown were created by historical deposition from the Owens Lake playa.

6-2.1 ISCST3 Air Quality Model

ISCST3 is the USEPA recommended dispersion model for regulatory assessment of fugitive dust sources (40 CFR Part 51, Appendix W; USEPA, 1986). The selection of ISCST3 was based on regulatory precedence and the objectives of the modeling analysis. Model performance during six historical episodes was assessed in a preliminary model evaluation study (MFG, 1996b). Further evaluations involving refined techniques and a larger ambient data set are discussed in Section 6-3.

The required input data for ISCST3 include model options, a receptor network, an emission inventory, a meteorological data set and background concentration estimates. Rural dispersion curves were selected and other optional variables were set by exercising the regulatory default option. In the current study, MFG assumed particles were not significantly removed from the plume by dry deposition during transport to the receptors of interest.

6-2.2 Source Areas and Emission Factors

Air quality model simulations were based on hourly variable emissions predicted for both existing and controlled source areas. Emission rates varied with the size of the source area, wind speed, season, and level of control. The following is a brief description of the methods applied.

The locations of both existing on-lake and off-lake source areas are shown in Figure 6.1. For the ISCST3 simulations, these irregular areas were divided into rectangles. The orientation and size of the rectangles varied depending on the outline of the source area and the proximity of potential receptors. Windblown emissions from on-lake source areas were based on wind velocity data from the B-Tower site (Figure 6.1). B-Tower is centrally located and more representative of winds over these playas than the A-Tower, Keeler, Lone Pine or Olancha meteorological monitoring sites. Emission rates for the Olancha Dunes were calculated using wind data from the Olancha station.

Other off-lake windblown emissions were based on the data collected at Keeler. Wind speeds and predicted emission fluxes were usually lower for the off-lake source areas due to a rougher local surface and more sheltered exposure.

Two different sets of uncontrolled emission factors were considered in the modeling simulations: algorithms from the previous performance evaluation (hereafter Method 1) and the more conservative curves used in *Results of Control Alternative Evaluation* (MFG, 1996a; Method 2). GBUAPCD developed these algorithms based on different interpretations of wind tunnel tests conducted on the playa. The Method 1 set of curves were selected to be representative of actual conditions during the episodes evaluated in the *Owens Lake Model Evaluation* (MFG, 1996b). Using data collected around six historical periods of interest, GBUAPCD suggested area source emissions could be calculated from:

Equation 6-1

$$PM_{10}\ (g/m^2/s) = 1.2 \times 10^{-5} \exp[0.27*u(m/s)] \quad ;\textit{for Fall 1994}$$
$$PM_{10}\ (g/m^2/s) = 4.0 \times 10^{-6} \exp[0.36*u\ (m/s)] \quad ;\textit{for Spring 1995}$$

where PM_{10} is the area source emission flux ($g/m^2/s$) and u is the hourly average wind velocity (m/s) at 10 m. A threshold wind speed of 7.6 m/s (17 mph) was used for Equation 6-1. Emissions for hours with wind velocities less than the threshold were assumed to be negligible. The spring 1995 factors were assumed for the months of February to June. All other months were simulated with the curves developed for November and December 1994.

The wind tunnel data collected by GBUAPCD suggest the erosion potential of the Owens Lake playas can sometimes be higher than predicted by Equation 6-1. Based on wind tunnel data with the higher emission rates, the Method 2 emission factor relationships are given by:

Equation 6-2

$$PM_{10}\ (g/m^2/s) = 1.34 \times 10^{-5} \exp[0.25*u(m/s)] \quad ;\textit{for January, July to December}$$
$$PM_{10}\ (g/m^2/s) = 1.9 \times 10^{-4} \exp[0.13*u(m/s)] \quad ;\textit{for February to June}$$

A threshold wind speed of 7.6 m/s (17 mph) was also used for Equation 6-2. Emission fluxes predicted by Equation 6-2 are higher during spring episodes, especially for wind velocities near the wind suspension threshold.

Uncontrolled emission rates were calculated using both the above equations. Subsequent model predictions were compared to ambient PM_{10} observations and the better performing algorithm selected for the evaluation of control alternatives. The performance evaluation methods and results are discussed in Section 6-3.

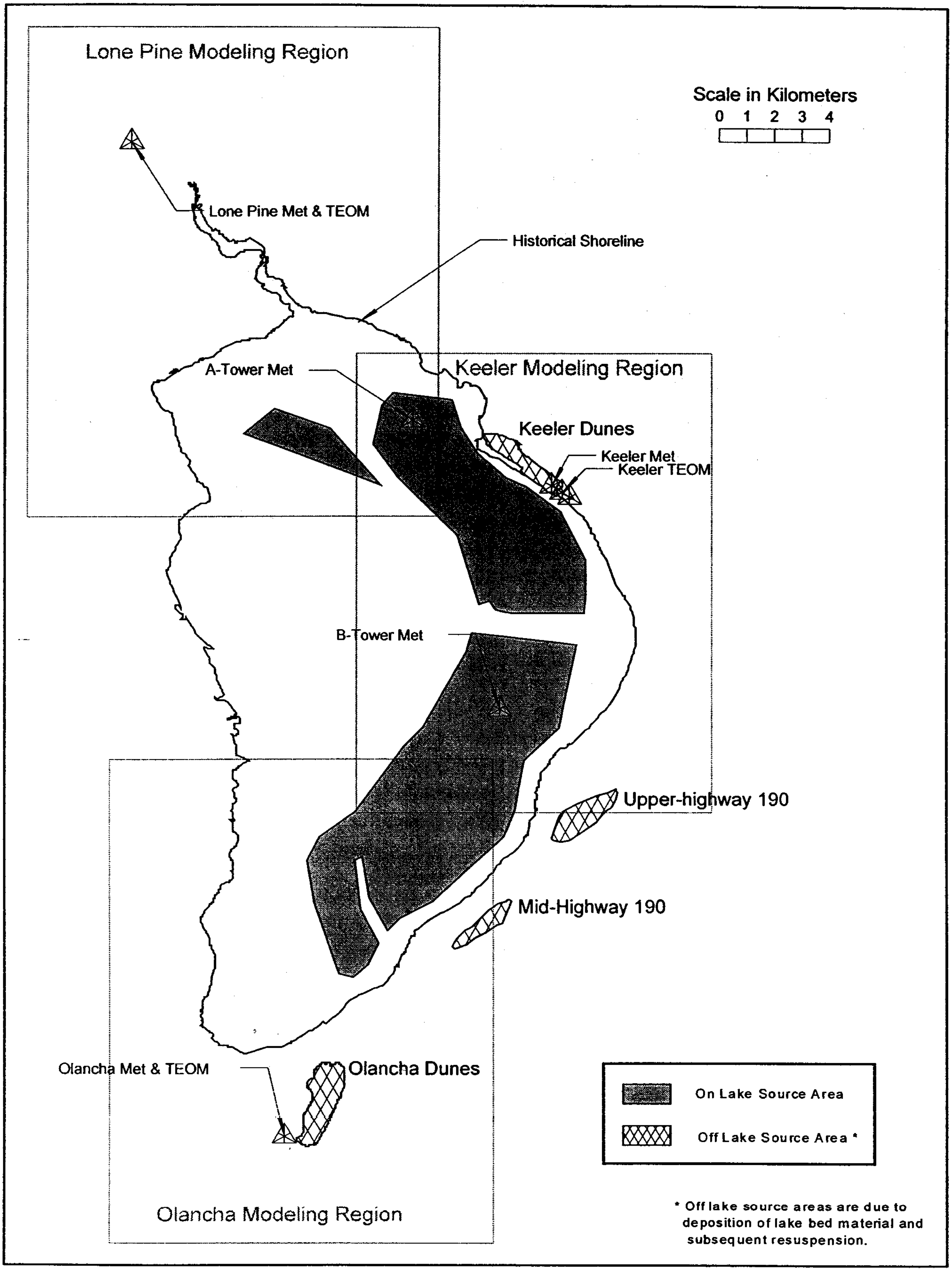

Figure 6.1: Air quality modeling regions, source areas, and monitoring stations.

6-2.3 Meteorological Data

Meteorological monitoring sites within the Owens Lake airshed are shown in Figure 6.1. Two years of meteorological observations from these stations were used to construct air quality modeling input data sets. The period selected was 1994 through 1995. Although longer periods for some of the stations were available, the meteorological data collected during these two years were the most extensive and complete. The two year period also contained many high PM_{10} episodes of interest.

Previous studies found winds within the study area vary spatially in regimes not easily simulated with conventional air quality modeling techniques. The ISCST3 model assumes steady state and spatially homogeneous conditions exist for each simulation hour. For each hour, only one wind speed and direction observation are used by the model to simulate diffusion and transport from source area to receptor over the entire modeling grid. Depending on the actual plume trajectory, biases can be introduced into the modeling at receptors distant from the source areas.

In order to correct for some aspects of the two dimensional wind field within the ISCST3 simulations, the study area was divided into three regions (shown in Figure 6.1). Modeling each region separately allowed the application of different meteorological data sets. The three modeling areas were based on the characteristics of terrain and the proximity of the meteorological monitoring stations.

Within the modeling regions, it was unclear whether source or receptor based meteorological data would be the most representative of transport. Thus, several concepts were assessed by preparing three meteorological files within each region as follows:

Vector average winds for transport and diffusion. These data sets were constructed using a combination of source and receptor based winds. Wind speeds were calculated from the average of the B-Tower data and the monitoring station wind velocity within the modeling region of interest. Wind direction was based on the unit vector average of the B-Tower and the regional monitoring station wind directions.

Local winds for transport and diffusion. Wind data from Keeler, Lone Pine and Olancha were used in the construction of the data sets for three respective modeling regions. This technique was used in each of the previous modeling studies (MFG, 1995, 1996a, and 1996b).

B-Tower winds for transport and diffusion. Wind data from the B-Tower site were also used to construct data sets for the two years of interest and provide the basis for prediction within the three regions.

The three methods for preparing the meteorological data sets have advantages/disadvantages depending on source to receptor relationships and the location of the meteorological station. The performance evaluation described in Section 6-3 was used to guide the selection of the more appropriate data set for assessing the proposed control strategy.

In addition to the wind speed, wind direction, and temperature observations collected at the monitoring sites, ISCST3 requires hourly estimates of atmospheric stability class and the depth of the well-mixed layer. Stability class controls the rate a plume spreads, while the mixing depth can be used by the model to simulate the effects of an elevated temperature inversion. Stability class and mixing depth were calculated from available data using techniques suggested by the USEPA. Further details concerning the replacement of missing data, the calculation of stability class, and other aspects of the data set construction can be found in *Owens Lake Air Quality Modeling Study* (MFG, 1997a).

6-2.4 Background Concentration

The dispersion model simulations include only windblown emissions from the source areas shown in Figure 6.1. During wind events other local and regional sources of fugitive dust also contribute to the PM_{10} concentrations observed at the monitoring locations. A constant of 28 $\mu g/m^3$ was added to all predictions to account for background sources. GBUAPCD derived this value based on an analysis of the 31 periods during 1994 and 1995 when PM_{10} concentrations were above 150 $\mu g/m^3$. The constant background is the average of the upwind values from the Olancha-Lone Pine paired data.

6-3 MODEL PERFORMANCE EVALUATION

6-3.1 Purpose of Model Evaluation

The model performance evaluation compares model predictions to observations in order to assess the uncertainty and reliability of the modeling methods. The performance evaluation was also used to assess different modeling options with the goal of selecting techniques that best characterize the high PM_{10} episodes. The performance evaluation considered the Method 1 versus Method 2 emission factors and the three methods used for specifying the transport and diffusion winds.

6-3.2 Model Evaluation Methods

The modeling approach was designed to address the higher 24-hour PM_{10} concentrations observed at Owens Lake. Thus, the model evaluation focused on comparisons between the higher model predictions and observations. Emission factor relationships that predict the spatial and temporal behavior of the emitting playas for all possible conditions are not available and are unlikely to be developed in the near future. Due to uncertainty and variability in the wind tunnel data, the emission factor relationships are biased toward the higher values in an attempt to capture the more erosive events for regulatory modeling purposes. These emission factor relationships will over-predict average concentrations and model performance may be poor when paired in time and space.

The performance evaluation used PM_{10} observations from the three TEOM (Tapered-element Oscillating Microbalance) monitoring stations shown in Figure 6.1. Twenty-four hour averages were calculated using the hourly data collected at each location during 1994 through 1995. Although high-volume sampling data were also available, the TEOM data are more continuous and complete. All days with valid TEOM observations and at least one hour of

B-Tower wind speed greater than the wind suspension threshold were used for the model comparisons.

Several different statistical performance measures were used during the comparison of the ISCST3 predictions with observations. The measures selected evaluated the ability of the modeling approach to explain the whole range of 24-hour PM_{10} concentrations, but decisions were based on the measures focused at the higher concentrations. The statistical measures were as follows:

- the biases between the mean and standard deviation of the observations and predictions at each location;
- the temporal correlation between predictions and observations at each monitoring location;
- the biases between the predicted versus observed maximum and design concentration at each monitoring site. The design concentration for the analysis was the third highest concentration in two years; and
- the bias of the "robust highest concentration" (RHC).

Calculation of the RHC in the analysis was based on the top 2% of the observed and predicted concentrations. The RHC is a measure designed to be more "robust" in a statistical sense than the maximum value and is recommended by the USEPA for performance evaluations in a regulatory setting (Cox, 1987). Further details regarding the calculation of the RHC and the other performance measures are described in the *Owens Lake Air Quality Modeling Study* (MFG, 1997a).

6-3.3 Model Evaluation Results

The ISCST3 model was applied to simulate 24-hour PM_{10} concentrations during 1994 to 1995. Model predictions within the three modeling regions were obtained using two different emission methods and three different meteorological data sets. Table 6.1 compares these predictions with observations using the performance measures discussed previously.

At the Keeler TEOM site, the higher observations were closely explained by the less conservative Method 1 emission factor relationship. The Method 2 emission factors over-predicted the higher concentrations by about a factor-of-two and performed less well in general. The distinction between the performance of the three meteorological data sets was less clear at this location with the Keeler wind data explaining more of the variance and the vector average data more closely matching the higher PM_{10} concentrations.

Model performance was slightly less favorable for the Lone Pine TEOM site. This site is more removed from the source areas and the selection of the meteorological data set had more influence on the performance statistics. In general the vector average meteorological data performed the best, with a higher correlation coefficient and peak predictions more closely matching observations. Predictions based on the Method 2 emission factors over-predicted the higher 24-hour TEOM data regardless of the meteorological data set employed.

Table 6.1: Model evaluation statistics: 24-Hr. PM_{10} concentrations 1994-95

Data set		num. samples	max ($\mu g/m^3$)	mean ($\mu g/m^3$)	std. dev. ($\mu g/m^3$)	corr. coef.	RHC ($\mu g/m^3$)	design conc ($\mu g/m^3$)
Observed	Keeler TEOM	352	3929	99	348		3678	2204
Method 2	Keeler Met	352	7485	624	890	0.655	6563	4858
	Vector Met	352	7322	655	951	0.609	6745	4855
	B-Tower Met	352	6706	691	1039	0.570	7166	5078
Method 1	Keeler Met	352	3649	251	397	0.737	3347	2700
	Vector Met	352	3681	254	408	0.702	3681	2528
	B-Tower Met	352	3737	263	439	0.649	3875	2774
Observed	L Pine TEOM	416	499	28	43		430	307
Method 2	L Pine Met	416	2744	164	302	0.554	2533	1729
	Vector Met	416	1707	119	216	0.568	1765	1301
	B-Tower Met	416	884	61	100	0.315	1016	769
Method 1	L Pine Met	416	1600	80	124	0.540	1184	769
	Vector Met	416	699	63	74	0.618	569	398
	B-Tower Met	416	284	38	27	0.311	250	190
Observed	Olancha TEOM	127	2252	48	206		1417	558
Method 2	Olancha Met	127	5431	468	982	0.506	5892	4692
	Vector Met	127	1365	177	295	0.384	1387	1283
	B-Tower Met	127	534	51	69	0.244	491	387
Method 1	Olancha Met	127	4704	220	549	0.486	4058	2692
	Vector Met	127	420	82	90	0.344	487	413
	B-Tower Met	127	248	39	35	0.074	276	220

Notes: Number of samples based on valid model prediction-observation pairs during 1994 to 1995. RHC refers to Robust Highest Concentration. Details concerning the data sets and calculation of the statistics can be found in *Owens Lake Air Quality Modeling Study* (MFG, 1997a)

Of the three TEOM sites, model performance was the least favorable at Olancha and the most dependent on the meteorological data set used in the simulations. The predictions based on the vector average winds tended to perform better but had more scatter (lower correlation coefficient) than predictions using the Olancha winds. Over-prediction at the receptor was sometimes coincident with periods when the wind speeds at Olancha were very much lighter than over the Owens Lake playa.

The model performance statistics for Olancha are heavily influenced by the maximum value observed at this location (April 9, 1995; 2,252 $\mu g/m^3$). The design concentration and RHC are much lower and more closely matched by the model predictions. The model predictions for the April 9, 1995 episode based on the vector average winds, was lower than the observed concentration at Olancha because the modeled dust plume missed the monitoring station. However, predicted concentrations near the plume centerline were close to those observed at the monitoring station.

Although model performance varied between the modeling regions depending on the dispersion modeling approach and statistical measure, the following general conclusions can be drawn from the evaluation:

- the Method 1 emission factors performed better than the more conservative Method 2 factors,
- predictions based on vector average winds performed slightly better than those using only the local data. Transport and diffusion calculations based solely on the B-Tower winds performed the least favorably in all modeling regions,
- the modeling was the most reliable near Keeler where source to receptor transport distances are the smallest, and
- although there was considerable scatter between model predictions and observations, the better modeling data sets were able to explain the higher PM_{10} observations.

Based on the results of the performance evaluation, the attainment demonstration was based on the Method 1 emission factor relationships and vector average winds within each modeling region. This approach tended to under-predict the highest concentration at Olancha. However, this was because the predicted plume missed the monitoring station. In the attainment demonstration that follows plume trajectory estimates are not as critical, because more receptors are used and locations of the highest predictions are less important than the magnitudes of the predictions.

6-4 ATTAINMENT DEMONSTRATION

6-4.1 Modeling Procedures

The modeling procedures evaluated in Section 6-3 were applied to simulate controlled windblown emissions from the Owens Lake playas. The ISCST3 model was used to simulate two years of meteorological conditions from 1994 to 1995. Meteorological data sets were prepared for each region using vector average winds for transport and diffusion. For the simulations, the source areas shown in Figure 6.2 were characterized by rectangles and assigned control efficiencies according to Equation 6-3.

The proposed SIP control strategy allows for the flexible application of control measures that will reduce wind blown PM_{10} emissions from the lake bed to levels below a controlled emission rate that was determined to be 2.791% of the uncontrolled emissions rate in SIP Equation 6-1. (See SIP Chapter 7 for a discussion of the control strategy and control measure flexibility.) This controlled emission rate was determined by proportionally decreasing the uncontrolled modeled design day impact using linear roll-back. The design day is the third highest modeled PM_{10} day at the same receptor over a two year period. The following emission factor equation for controlled emissions was assumed for the attainment demonstration model:

Equation 6-3

$$PM_{10}\ (g/m^2/s) = (0.02791) * 1.2 \times 10^{-5} \exp[0.27*u(m/s)] \quad ;\textit{for Fall 1994}$$
$$PM_{10}\ (g/m^2/s) = (0.02791) * 4.0 \times 10^{-6} \exp[0.36*u\ (m/s)] \quad ;\textit{for Spring 1995}$$

Table 6.2 summarizes the annual and design day emissions from the input files used in the attainment demonstration. The design day, or the third highest prediction at the same receptor location in two years, was on March 12, 1994. Coincidentally, this design day was the same day for the Olancha and Keeler modeling regions.

Table 6.2: PM_{10} Emission Estimate Summary

Source Configuration	1994 PM_{10} Emissions (ton/yr)	1995 PM_{10} Emissions (ton/yr)	Design Day Emissions (ton/day)	Date of Design Day Emissions
Uncontrolled	110,000	136,000	4,732	3/12/94
Controlled	3,100	3,800	132	3/12/94

Emission rates based on Method 1 algorithm, proposed control measures, B-Tower wind speed data and area source configurations depicted in Figures 6.1 and 6.2.

In order to assess the proposed control strategy, a ring of receptors was placed at the 3600 ft elevation around Owens Lake and at the monitoring locations as shown in Figure 6.2. This elevation was the historical level of Owens Lake and is also representative of areas of potential public access. At their closest point, these receptors are within about 100 m of the eroding playas. The resolution of receptor spacing along the historic shoreline was increased in regions close to the source areas. The 68 receptors were divided into three groups corresponding to the modeling regions and meteorological data sets. The division of the receptors is shown in Figure 6.2.

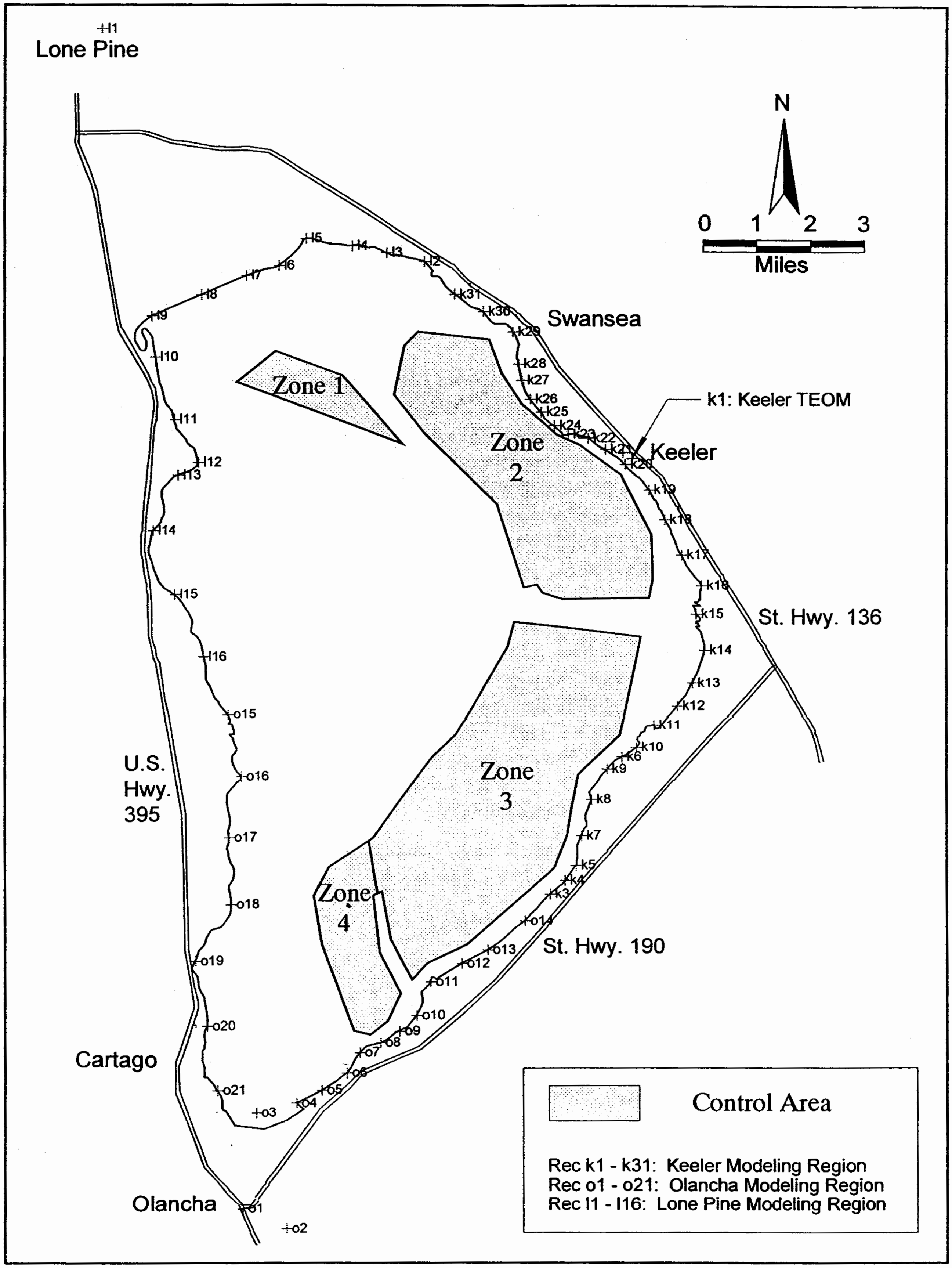

Figure 6.2: Air quality model: receptor locations and controlled source areas.

Daily predictions for receptors within each modeling region were added to a background value of 28 $\mu g/m^3$, then sorted to obtain the third highest prediction at each receptor location. Attainment of the NAAQS is demonstrated when the third highest prediction at the same location in two years is below 150 $\mu g/m^3$.

6-4.2 Modeling Results

The results of the attainment demonstration are summarized in Table 6.3, where the highest and design (highest of the third highest) concentrations are listed by modeling region. The third highest predictions at each receptor are shown in Figure 6.3. Appendix B contains a list of the top ten PM_{10} concentration predictions by modeling region, indicating the receptor locations and dates of these higher episodes.

The air quality model shows that the proposed control strategy would reduce ambient PM_{10} impacts at shoreline receptors by 97.21%. Design day concentrations in the Keeler area would be reduced from 3,872 $\mu g/m^3$ to 135 $\mu g/m^3$, in the Olancha modeling region design day concentrations would be reduced from 4,398 $\mu g/m^3$ to 150 $\mu g/m^3$. After implementation of the control strategy, the number of PM_{10} exceedances at shoreline receptors will be less than one per year, which complies with the PM_{10} NAAQS. Peak episode concentrations near Keeler can be expected to be near 200 $\mu g/m^3$, which is a substantial improvement over the current monitored concentrations, which can be around 4,000 $\mu g/m^3$.

To achieve the 97.21% emission reductions necessary to meet the standard, the controlled emission rate must be 1.25 metric tons of PM_{10} per square kilometer per day (approximately 1.4 tons per 250 acres per day). This is based on the emissions for the design day meteorology on March 12, 1994. The three control measures discussed in Chapter 5, shallow flooding, managed vegetation and gravel, all have controlled emissions below this controlled emission rate. This attainment demonstration is based on the projection that all control measures that are implemented in the future will meet this controlled emission rate as necessary to ensure attainment of the NAAQS.

Table 6.3: Highest and Third Highest 24-hour Predictions

	Highest Episode			Third Highest Episode [a]		
Modeling Region	PM_{10} ($\mu g/m^3$)	Date	Receptor	PM_{10} ($\mu g/m^3$)	Date	Receptor
Keeler	198.7	12/12/95	K-25	135.2	3/12/94	K-9
Olancha	191.2	6/6/95	O-14	150	3/12/94	O-14
Lone Pine	131.9	3/3/95	L-2	85.9	2/13/95	L-2

(a) 24-hour period that resulted in the third highest prediction at the same receptor location in two years.
(b) Receptor locations are shown in Figure 6.2.

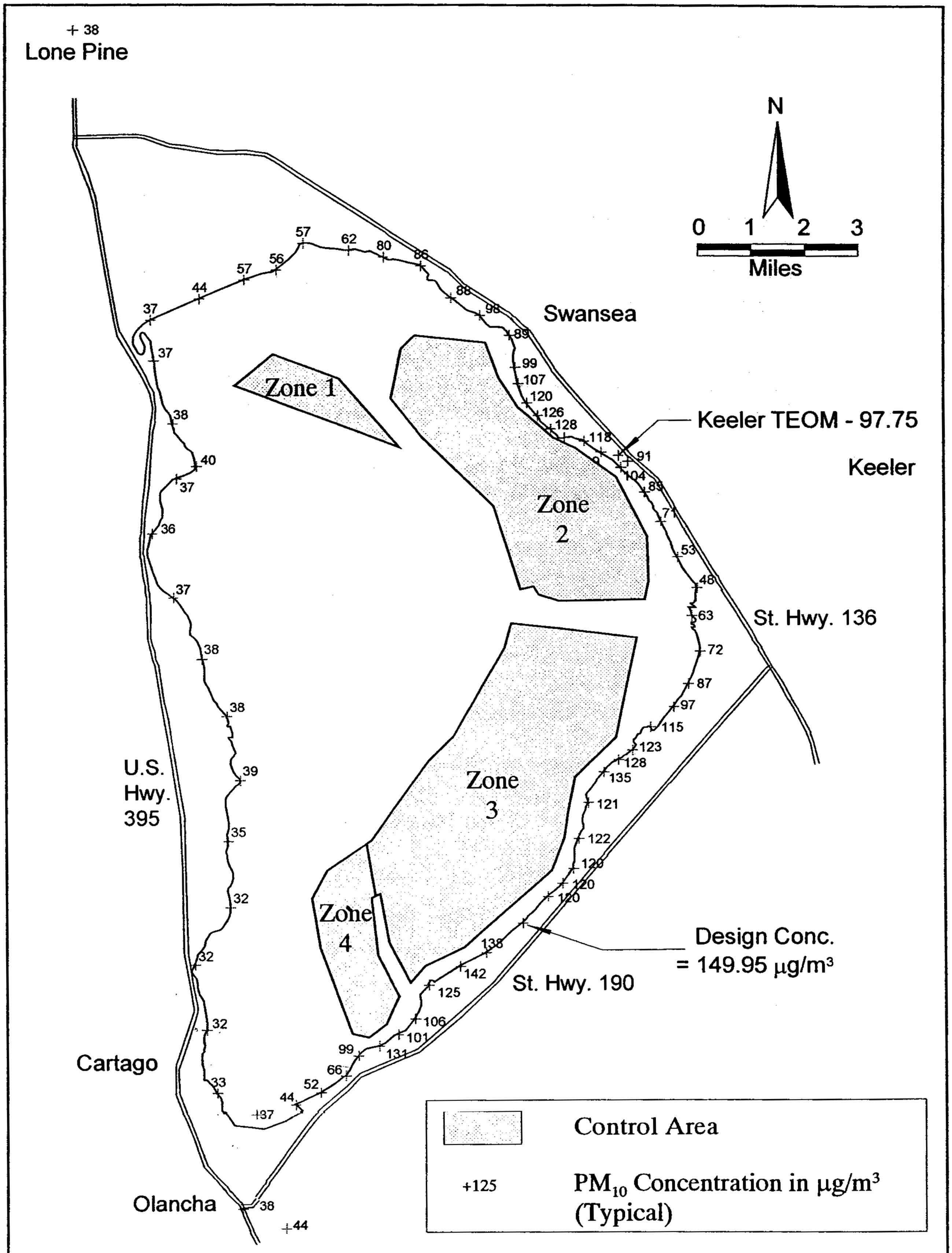

Figure 6.3: Air quality model: third highest 24-hour PM_{10} concentrations for 1994-95 with controls in place.

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CHAPTER 7

Control Strategy and Attainment Demonstration

FIGURES & TABLES

7-1 INTRODUCTION

The selected PM_{10} control strategy that is discussed in this section sets forth an overall plan to control dust from Owens Lake by combining the three control measures discussed in Chapter 5, shallow flooding, managed vegetation and gravel, with unspecified control measures to be chosen by the City of Los Angeles (City) for the Dirty Socks area of the lake bed (Zone 4 in Figure 7.1). Through the use of air quality modeling (Chapter 6), the Great Basin Unified Air Pollution Control District (District) has determined that this control strategy has a high likelihood of bringing the Owens Valley PM_{10} Planning Area (OVPA) into attainment with the PM_{10} National Ambient Air Quality Standards (PM_{10} NAAQS) by the statutory deadline of December 31, 2006 provided for in the federal Clean Air Act, or sooner.

The statutory deadline for attainment of the PM_{10} NAAQS in the OVPA is currently December 31, 2001 [42 U.S.C. § 7513(c)(2)]. In order to implement the proposed control strategy, it will be necessary for the Administrator of the U.S. Environmental Protection Agency to grant one five-year extension of the attainment date to December 31, 2006. This extension is authorized by Section 188(e) of the Clean Air Act Amendments of 1990 [42 U.S.C. § 7513(e)] and is hereby being formally requested by the District.

7-2 PROPOSED CONTROL STRATEGY

The proposed control strategy will take place in two increments. Increment 1 will take place between November 16, 1998 and December 31, 2003. Increment 1 requires the implementation of control measures on sixteen and one-half (16.5) square miles of the Owens Lake bed, unless the District finds that attainment is achieved by placing controls on a smaller area. During Increment 1 the emphasis will be on controlling the most emissive areas of the lake bed (in terms of frequency and severity of emissions). Increment 1 will focus on improving control measure efficiencies and on identifying those remaining areas of the lake bed that will continue to contribute to PM_{10} NAAQS violations, if any. Increment 2 will take place between January 1, 2004 and December 31, 2006. Increment 2 will require any additional control measures necessary to provide for attainment of the PM_{10} NAAQS by December 31, 2006.

7-2.1 Increment 1 Requirements

Increment 1 control measures will be implemented in three phases. Phase 1 will be to complete implementation of control measures on ten (10) square miles of lake bed by December 31, 2001. Phase 2 will be to complete implementation of control measures on an additional three and one-half (3.5) square miles of lake bed (for a total of 13.5 sq. mi. controlled) by December 31, 2002, unless the District determines that the NAAQS can be attained by December 31, 2006 without implementing additional controls. Phase 3 will be to complete implementation of control measures on an additional three (3) square miles of lake bed (for a total of 16.5 sq. mi. controlled) by December 31, 2003, unless the District

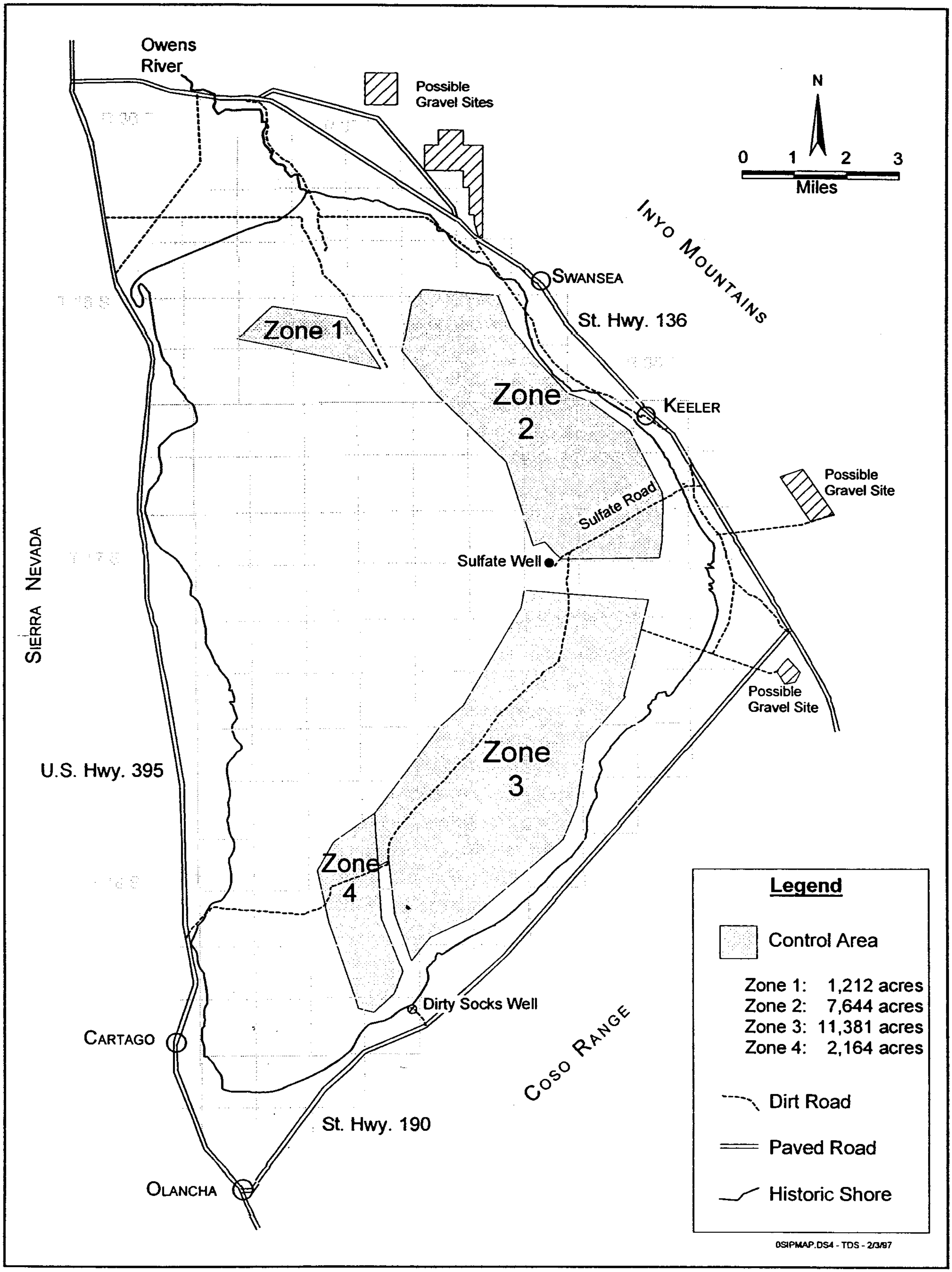

Figure 7.1: Control area.

determines that the NAAQS can be attained by December 31, 2006 without implementing additional controls.

The Increment 1 control strategy will use one or more of the three control measures specified in Chapter 5 (shallow flooding, managed vegetation and gravel) and unspecified control measures, to control PM_{10} emissions from the Owens Lake bed (Figure 7.1). The 35-square mile control area encompasses those areas of the lake bed that have been identified by the District as having the potential to cause or contribute to violations of the PM_{10} NAAQS. The control area is divided into four sub-areas or "zones." Zone 1 or the "Delta Zone" is a 1,212-acre area on the north end of the lake bed west of the Owens River delta. Zone 2 or the "Keeler Zone" is a 7,644-acre area east of the Owens River delta in the northeast corner of the lake bed. Zone 3 or the "Coso Zone" is an 11,381-acre area along the southeast portion of the lake bed. Zone 4 or the "Dirty Socks Zone" is a 2,163-acre area north of the Dirty Socks Well on the southern portion of the lake bed. The District and the City may jointly agree to modify the control area identified in Figure 7.1.

The proposed control strategy allows the City to use any combination of the three allowable control measures, shallow flooding, managed vegetation or gravel, in Zones 1, 2 and 3. The City is encouraged to develop refinements to these three control measures and to develop additional effective control measures. The District and the City may jointly agree to modify the proposed control measures or to add one or more control measures to the list of allowable control measures (see Section 5-5 for a discussion of alternative control measures).

In the Dirty Socks Zone (Zone 4) the City has the authority to implement one or more control measures of its choosing. The control measures installed in this area do not need to be approved by the District.

7-2.2 Increment 2 Requirements

Increment 2 of the control strategy will take place between January 1, 2004 and December 31, 2006. Increment 2 requires the implementation of any additional control measures necessary to provide for attainment of the PM_{10} NAAQS.

This SIP and its incorporated Board Order (SIP and Order) require the City to continue to implement control measures on an additional two (2) square miles of lake bed in 2004, 2005 and 2006 (Phases 4, 5 and 6). If the NAAQS has not been met by 2006, as a contingency measure, this SIP and Order require the City to implement control measures on an additional two (2) square miles of the lake bed every year until the PM_{10} NAAQS is attained.

The District commits to revise this SIP and Order in 2003 (2003 SIP) to incorporate new knowledge and provide for attainment of the PM_{10} NAAQS by December 31, 2006. If the District determines that additional or fewer controls are required to meet the NAAQS by December 31, 2006, the 2003 SIP will provide for implementation of the appropriate control measures for Increment 2 of the control strategy. Increment 2, as modified by the

2003 SIP, may require more or less controls than the two (2) square miles per year required by this SIP and Order. Table 7.1 summarizes the implementation phasing of the control measures.

Table 7.1 – Implementation phasing summary.

Increment/Phase	Area Controlled (acres)	Cumulative Area (acres)	Control Date
Increment 1			
Phase 1	6,400	6,400	Dec. 31, 2001
Phase 2[1]	2,240	8,640	Dec. 31, 2002
Phase 3[1]	1,920	10,560	Dec. 31, 2003
Increment 2			
Phase 4[1]	1,280	11,840	Dec. 31, 2004
Phase 5[1]	1,280	13,120	Dec. 31, 2005
Phase 6[1]	1,280	14,400	Dec. 31, 2006
Adntl. Acreage Phases 4-6[2]	11,840[3]	22,400[3]	Dec. 31, 2006

Notes:
[1] - If necessary to attain the PM_{10} NAAQS by December 31, 2006.
[2] - As may be required by the mandatory 2003 SIP revision.
[3] - Undisturbed areas in the four control zones that emit less than 12 pounds of PM_{10} per acre per day under design-day winds will not require mitigation, but are included in the control area for attainment demonstration purposes.

7-3 IMPLEMENTATION MILESTONES

As discussed above, the control measures are to be implemented in two increments. The mandatory project implementation milestones are set forth in Table 7.2, below. Increment 1 will be complete by December 31, 2003, at which time Increment 2 will begin, if necessary. The 2003 SIP may revise the implementation milestones for Increment 2.

Table 7.2 Mandatory project implementation milestones.

Milestone	Date
Increment 1	
Phase 1 (10 sq. mi.)	December 31, 2001
Phase 2 (additional 3.5 sq. mi.)	December 31, 2002
Phase 3 (additional 3 sq. mi.)	December 31, 2003
Increment 2	
Phase 4 (additional 2 sq. mi.)	December 31, 2004
Phase 5 (additional 2 sq. mi.)	December 31, 2005
Phase 6 (additional 2 sq. mi.)	December 31, 2006

7-4 2003 SIP REVISION

The proposed control strategy provides for an evaluation of the progress made toward attaining the PM_{10} NAAQS in the 2003 SIP. If additional controls are necessary after 2003, the 2003 SIP and associated control order will be the mechanism by which additional controls are required. If attainment has already been achieved by 2003, then the 2003 SIP will reflect this fact.

In the event of a 2003 SIP legal challenge by the City, this SIP and Order require the City to continue to annually complete implementation and begin operation of control measures on an additional two (2) square miles of the Owens Lake bed by December 31 of each calendar year after 2003. The implementation of these additional control measures will continue until the District determines on or before December 31 of the previous year, that the OVPA will attain the PM_{10} NAAQS by the statutory deadline without implementation of further controls. The City will continuously operate and maintain the control measures as necessary to attain and maintain the PM_{10} NAAQS.

Upon State of California approval of the 2003 SIP pursuant to Health & Safety Code §41650, the City shall make up any control measure shortfall caused by the City SIP challenge, if any, or shall be provided credit for control measure installation beyond the State approved SIP, if any. Any required control measure shortfall will be made up within one (1) year of the approval of the 2003 SIP by the State.

7-5 PROVISION FOR CONTINGENCY CONTROL MEASURE

Although the District concludes that attainment of the federal PM_{10} NAAQS will be accomplished through the implementation of the SIP control strategy, the federal Clean Air Act Amendments of 1990 require a description of contingency measures (CAAA Section 172(c)(9)). The contingency measures are control measures that will be implemented in case the SIP control strategy fails to bring the area into attainment.

The District commits to make a determination in 2006 as to whether the OVPA will attain the PM_{10} NAAQS by the end of 2006. If the District determines that the OVPA will attain the PM_{10} NAAQS by December 31, 2006, no additional controls will be required. If the District determines that the OVPA will not attain the PM_{10} NAAQS by December 31, 2006, the following contingency control measure shall be implemented to bring the OVPA into attainment with the PM_{10} NAAQS:

- Implementation of additional controls. If in 2006 the District determines that the OVPA has not attained the PM_{10} NAAQS, the City will continue to implement control measures on an additional two (2) square miles of the Owens Lake bed every year until the District determines that the NAAQS have been attained. In these circumstances this contingency measure is automatic; it is incorporated into this SIP and Order and requires no further action by the District or any other agency.

In addition to the implementation of controls on additional areas of the lake bed, it may be possible for the City to attain the PM_{10} NAAQS by increasing the control efficiency of control measures already deployed or by replacing control measures already deployed. However, such actions taken on existing measures will not relieve the City of any requirement to implement measures on additional areas of the lake bed and such actions will be taken at the City's discretion. Such control measure efficiency improvements or replacements could be accomplished by:

- Increasing the application intensity of implemented controls. For example, this may include increasing vegetation cover, and/or increasing surface water coverage.

- Replacing control measures that are not appropriately sited. For example, gravel may replace shallow flooding or managed vegetation in areas initially proposed for those controls, but that are later found to be inappropriate due to soil type, salt infiltration or other site specific problems.

7-6 PM_{10} EMISSION REDUCTION TREND

An estimate of the PM_{10} emission reduction trend over the eight-year implementation period can be estimated using the information discussed in Section 7-2 and an approximation for the amount of PM_{10} emissions per acre of playa controlled. Table 7.3 summarizes the size of the areas that will be controlled each year under the control strategy and the design-day PM_{10} emissions as controls are deployed. The model prepared by the District estimated a design-day PM_{10} emission total of 4,731 tons per day with no controls in place and emissions of 132 tons per day after controls are implemented (Table 6.2). For the estimated 22,400-acre control area, this corresponds to a design-day PM_{10} emission rate of 420 pounds per acre for the uncontrolled lake bed and 12 pounds after controls are in place; this is a 97.2 percent decrease in emissions. Figure 7.2 shows the estimated design-day PM_{10} emission trend line for the SIP control strategy. A similar trend line would also be estimated for the reduction of annual emissions.

Table 7.3 – Estimated Design Day Emission Trend

Phase	Control Date	Area Controlled (acres)	Cumulative Area Controlled (acres)	Design Day Emissions (tons/day)
Uncontrolled		0	0	4,731
Phase 1	Dec. 31, 2001	6,400	6,400	3,417
Phase 2	Dec. 31, 2002	2,240	8,640	2,957
Phase 3	Dec. 31, 2003	1,920	10,560	2,563
Attainment	Dec. 31, 2006	11,840*	22,400*	132

* Estimated maximum area to be controlled in Increment 2. It may be possible to meet the design-day emission limit of 132 tons by controlling less than 22,400 acres.

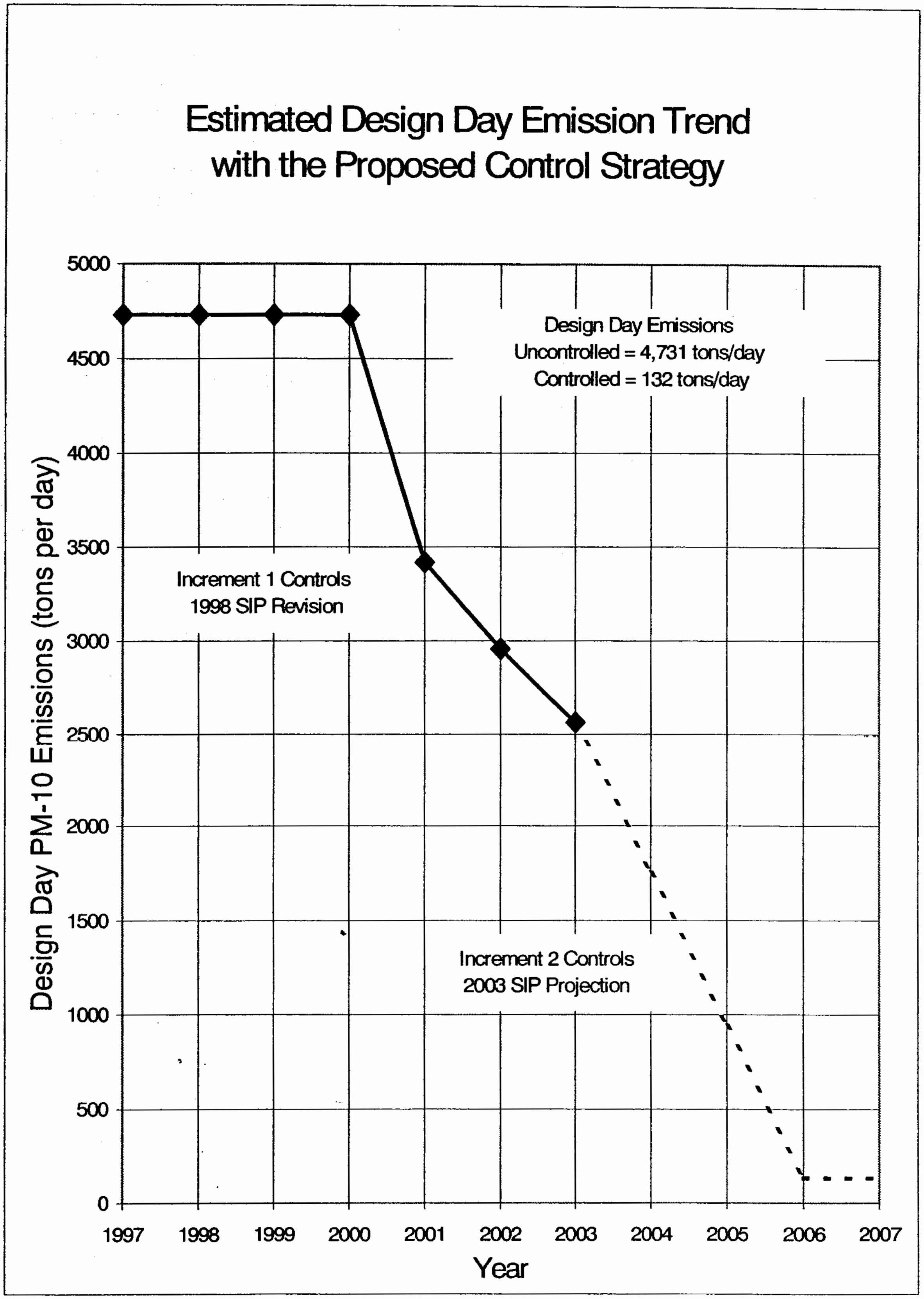

Figure 7.2 – Estimated design-day PM_{10} emission trend with controls in place.

7-7 MODELED ATTAINMENT DEMONSTRATION

As discussed in Chapter 6, an air quality modeling analysis was performed to show that the proposed control strategy would reduce the PM_{10} emissions to a level that will bring the areas around Owens Lake into compliance with the PM_{10} NAAQS. Air quality modeling utilized the USEPA approved guideline model, Industrial Source Complex – Short-term version 3. After the proposed control strategy is implemented, ambient PM_{10} levels are expected to be below the 24-hour PM_{10} NAAQS of 150 $\mu g/m^3$. The highest impact area is expected to occur in the area near the southeast shoreline (see Figure 6.3).

7-8 REASONABLE FURTHER PROGRESS

Under CAAA Section 189(c), the demonstration of attainment SIP is required to include quantitative milestones that are to be achieved every three years until the area is redesignated attainment. These milestones must demonstrate reasonable further progress toward attainment of the NAAQS by the attainment date. Table 7.2 includes the milestones that will be tracked to achieve the emission reduction trend as shown in Figure 7.2 to demonstrate reasonable further progress toward attaining the NAAQS. As required by Section 189(c)(2) of the CAAA, the District shall submit to the USEPA, no later than 90 days after the date of each milestone, a demonstration that each milestone has been met.

7-9 IMPLEMENTATION MONITORING AND ENFORCEMENT

Adoption of the control strategy set forth in this SIP will require the District to maintain programs to monitor and enforce the proper and timely execution of mandatory implementation and air quality attainment provisions of this SIP. With regard to air quality, the District will continue to monitor PM_{10} levels in the OVPA in order to determine:

- whether reasonable further progress is being made, as predicted by the estimated emission trend (Figure 7.2),
- whether the control strategy achieves progress toward attainment of the 24-hour PM_{10} NAAQS by December 31, 2006 and
- whether the PM_{10} NAAQS has been attained in the OVPA.

The determination of when the OVPA has attained the PM_{10} NAAQS is the authority and responsibility of the District. However, the City does not waive any legal right or remedy available to it with respect to any such determination.

With regard to control measure deployment, the District will monitor and enforce the City of Los Angeles' implementation of the control strategy, to ensure that the control measures are properly and timely installed, and that their installation and operation conform to the design and performance requirements of this SIP. Failure to meet any of the mandatory project implementation milestones set forth in Section 7-3 is subject to enforcement as authorized by Health and Safety Code § 42316. All necessary environmental analysis, leases, easements and permit approvals required to implement the control measures are the sole responsibility of the City. For enforcement purposes, each phase is a separate milestone.

With regard to the impact of the control measures on the environment, the District adopted a Mitigation Monitoring and Reporting Program at the time it certified the Final Environmental Impact Report for the 1997 SIP (GBUAPCD, 1997c). As required by the Mitigation and Monitoring Program, the District will enforce the mitigation measures, as well as elements of the project description, that are intended to avoid or lessen adverse environmental impacts of implementing the control strategy. Some of those mitigation measures and project elements require long-term monitoring of certain environmental effects of implementing the control strategy, and taking appropriate responsive action when the monitoring discloses an adverse environmental effect.

7-10 COST AND EMPLOYMENT

The cost of implementing PM_{10} control measures on the Owens Lake bed will depend on the total acreage and choice of controls necessary to meet the PM_{10} NAAQS. Appendix K sets forth the District's estimates of the cost per acre of one possible scenario using the three control measures discussed in Chapter 5. This estimate is based on an assumed mix and amount of controls. This scenario assumes that the entire 22,400 acres shown as emissive by the air quality model requires controls. It assumes that approximately 40 percent of the area is controlled with shallow flooding, approximately 40 percent of the area is controlled with managed vegetation and approximately 20 percent is controlled with gravel. The range of preliminary costs for the construction of control measures is $91 to $250 million (Appendix K shows a construction estimate $113 million). The range of comparative preliminary costs for annual operation and maintenance is $26 to $30 million (Appendix K shows an O & M estimate $26.6 million). The range of these costs are based on the analyses performed by the District (Appendices G and K), and adjusted costs from the Parsons Engineering Science report, which is included with the District's evaluation of their costs in the comments to the 1997 SIP (Appendix H). These estimates make the conservative assumption that the City replaces the water supplied from the Los Angeles Aqueduct with purchases from the Metropolitan Water District at a cost of $450 per acre-foot.

Using the construction and annual cost estimates, the range of the 25-year annualized cost is $38 to $50 million, for a cost per ton of PM_{10} controlled of $130 to $175 (Appendix K shows a per ton cost of $138). The South Coast 1987 Air Quality Management Plan set the PM_{10} BACM cost-feasibility limit at $5,300 per ton. Actual control costs required by the South Coast Plan range from $170 per ton for agricultural sources to $630 per ton for unpaved roads. It is estimated that the Proposed Project will create between 84 and 91 jobs during construction and 14 long-term jobs for operation and maintenance of the control measures (GBUAPCD, 1997a, GBUAPCD, 1997b and Parsons, 1997).

7-11 COMMITMENT TO REDUCE IMPLEMENTATION COST

During the course of implementing the control strategy, experience and ongoing studies will provide knowledge that will help to reduce the cost of implementing the control measures. Experience will be gained while constructing and operating the control measures on the playa that will help to reduce costs associated with the control measures. The proposed control strategy provides both the time and the control measure flexibility to ensure that control efficiencies will improve as controls are implemented.

The District will commit through this SIP to work cooperatively with the City to reduce control measure construction and operation costs and to minimize the resources necessary to assure attainment of the PM_{10} NAAQS. The District will also work with the City to develop additional effective control measures. However, these measures must provide a level of control that provides for attainment of the PM_{10} NAAQS.

7-12 EXISTING RULES AND REGULATIONS TO CONTROL PM_{10}

The focus of the discussion in the SIP control strategy is on controls for Owens Lake, which is regulated under California Health & Safety Code §42316. This is discussed in more detail in Chapter 8. Other sources that contribute PM_{10}, such as industrial sources, forest management burning (see section 4-2.4 regarding prescribed burning), and fugitive dust are covered under existing District Rules. These rules are listed in Table 7.4 for sources other than Owens Lake. Methods to control fugitive dust and to comply with these rules are included in permits to operate for industrial sources. An example of a permit to operate for an industrial facility is included in Appendix C.

It should be noted that contractors that are involved in the implementation of the SIP control strategy, such as road building, gravel mining and hauling are subject to these District rules and regulations regarding fugitive dust control. Any gravel mining and hauling activities will be required to apply for an Authority to Construct and obtain a Permit to Operate from the District. This permit will include Conditions of Approval such as those included in the example permit in Appendix C.

7-13 AUTHORITY AND RESOURCES

Under California Health & Safety Code §42316, the District is authorized to require the City of Los Angeles to undertake reasonable control measures to mitigate the air quality impacts of its activities in the production, diversion, storage or conveyance of water. The control measures may only be required on the basis of substantial evidence that the water production, diversion, storage or conveyance of water by the City causes or contributes to violations of state or federal ambient air quality standards. In addition, the control measures shall not affect the right of the City to produce, divert, store or convey water.

The District has found that the control measures required under this plan are reasonable and that, on the basis of substantial evidence, the City's water production, diversion, storage or conveyance causes or contributes to violations of state or federal ambient air quality

Table 7.4 Existing Rules and Regulations to Control Sources of PM_{10}.

District Rule	Description
209-A	Requires new sources with PM_{10} emissions greater than 250 pounds per day of total suspended particulates, or facility modifications of greater than 15 tons per year of PM_{10} to apply Best Available Control Technology to control PM emissions.
400	Limits visible emissions from any source, except those exempted under Rule 405, to less than Ringelmann 1 or 20% opacity.
401	Requires that reasonable precautions be taken to prevent visible particulate emissions from crossing the property boundary.
402	Prohibits sources of air pollution from causing a nuisance to the public or endangering public health and safety.
408	Limits agricultural burning operations to designated burn days and requires a burn permit.
409	Limits range improvement burning to designated burn days and requires that a burn plan be approved by the Air Pollution Control Officer.
410	Limits forest management burning to designated burn days and requires that a burn plan be approved by the Air Pollution Control.
411	Limits wildland management burning to designated burn days and requires that a burn plan be approved by the Air Pollution Control Officer.

standards in the Owens Valley Planning Area. Also, the District has concluded that the required control measures do not affect the right of the City to produce, divert, store or convey water. On this basis, the District has authority, directly under state law, to issue orders directing the City of Los Angeles to implement the control strategy described in this plan. Those orders are enforceable by the District under state law. Health & Safety Code §42402 provides that the District may impose civil penalties of up to $10,000 per day against a person who violates any order issued pursuant to Health & Safety Code §42316. In addition, under Health & Safety Code §41513, the District is empowered to bring a judicial action in the name of the People of the State of California to enjoin any violation of its orders.

The District has the financial resources to enforce compliance with the plan. California Health & Safety Code §42316 authorizes the District annually to assess and collect reasonable fees against the City of Los Angeles. The amount of the fees is set by the District, based on an estimate of the actual costs of the District of its activities associated with the development of air pollution control measures and related air quality analysis, pertaining to the air quality impacts of the City's production, diversion, storage or conveyance of water. Enforcement of the requirements of this plan is a cost that the District may properly include in the estimate it develops as a basis to impose its annual fees under Health & Safety Code §42316. Such enforcement costs include salaries and expenses of appropriate personnel, and attorneys' fees incurred in enforcing provisions of the plan, and defending the District in challenges to the plan and its adoption. As with the control measures, the District's orders to pay fees are enforceable under state law. The District may impose civil penalties of up to $10,000 per day and seek injunctive relief if any of its fee assessments are not timely and fully paid. Moreover, although state law permits the City to appeal an order imposing fees to the State Air Resources Board, the appeal does not stay the City's obligation to pay the fees on time.

7-14 REFERENCES

GBUAPCD, 1997a. Great Basin Unified Air Pollution Control District, Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan Comparative Cost Estimate, GBUAPCD, Bishop, California, March 1997.

GBUAPCD, 1997b. Great Basin Unified Air Pollution Control District, Proposed Natural Events Policy for PM_{10} Exceedances at Owens Lake, GBUAPCD, Bishop, California, June 1997.

GBUAPCD, 1997c. Great Basin Unified Air Pollution Control District, Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan Final Environmental Impact Report, GBUAPCD, Bishop, California, July 2, 1997.

Parsons, 1997. Engineering Cost Estimate for the Proposed EIR Alternative at Owens Lake, CA, Prepared by Parsons Engineering Science for the Los Angeles Department of Water and Power, Pasadena, California, May 6, 1997.

CHAPTER 8

Enabling Legislation to Implement Control Strategy

FIGURE

BOARD ORDER TABLE AND EXHIBIT

8-1 CONTROL STRATEGY IMPLEMENTATION

Under California Health & Safety Code §42316 (see Figure 8.1 and Section 2-2.2.2), the Great Basin Unified Air Pollution Control District (District) is adopting an order to the City of Los Angeles (City) to implement the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan (SIP) control measures on the schedule included in Chapter 7. The schedule will require that implementation of the control measures take place over an eight-year period with completion by December 31, 2006. The Board order to implement the control strategy is incorporated into this SIP and adopted concurrently with the approval of this SIP.

The order requires the City to implement shallow flooding, managed vegetation, gravel or other unspecified control measures within the areas shown in and described by Exhibit 1, below. Implementation under the Board's order also ensures compliance with the California Environmental Quality Act. This includes specified environmental mitigation measures, environmental monitoring and reporting requirements. Additional environmental documents to the SIP Final Environmental Impact Report (EIR) and EIR Addendum Number 1 may be needed for complete implementation of the proposed control strategy.

Unless the District determines by December 31, 2002 that the Owens Valley Planning Area will attain the PM_{10} National Ambient Air Quality Standards (PM_{10} NAAQS) by December 31, 2006 without implementation of additional control measures, the District will revise the SIP in 2003 to provide for attainment of the PM_{10} NAAQS by the end of 2006. The 2003 SIP revision will include a new Board Order to require the City of Los Angeles to implement any additional control measures necessary to meet the PM_{10} NAAQS. The attainment demonstration presented in this document is based on the projection that the additional control measures will be implemented on the balance of the control area shown in Exhibit 1 and that the implemented controls will meet the emission allowance criteria (current modeling techniques show this allowance to be 1.25 metric tons of PM_{10} per square kilometer per day). The control measures required by the 2003 SIP may include expanding the control measures required under the Board Order in Section 8-2, or other control methods that are determined by the District as sufficient to attain the PM_{10} NAAQS. The 2003 SIP revision may also require applying controls in areas outside of the PM_{10} control area shown in Exhibit 1, if it is determined that additional PM_{10} source areas must be controlled to attain the standard.

Text of California Health & Safety Code §42316

H&S 42316 Great Basin APCD Authority Mitigation Requirements

(a) The Great Basin Air Pollution Control District may require the City of Los Angeles to undertake reasonable measures, including studies, to mitigate the air quality impacts of its activities in the production, diversion, storage, or conveyance of water and may require the city to pay, on an annual basis, reasonable fees, based on an estimate of the actual costs to the district of its activities associated with the development of the mitigation measures and related air quality analysis with respect to those activities of the city. The mitigation measures shall not affect the right of the city to produce, divert, store, or convey water and, except for studies and monitoring activities, the mitigation measures may only be required or amended on the basis of substantial evidence establishing that water production, diversion, storage, or conveyance by the city causes or contributes to violations of state or federal ambient air quality standards.

(b) The city may appeal any measures or fees imposed by the district to the state board within 30 days of the adoption of the measures or fees. The state board, on at least 30 days' notice, shall conduct an independent hearing on the validity of the measures or reasonableness of the fees which are the subject of the appeal. The decision of the state board shall be in writing and shall be served on both the district and the city. Pending a decision by the state board, the city shall not be required to comply with any measures which have been appealed. Either the district or the city may bring a judicial action to challenge a decision by the state board under this section. The action shall be brought pursuant to Section 1094.5 of the Code of Civil Procedures and shall be filed within 30 days of service of the decision of the state board.

(c) A violation of any measure imposed by the district pursuant to this section is a violation of an order of the district within the meaning of Sections 41513 and 42402.

(d) The district shall have no authority with respect to the water production, diversion, storage, and conveyance activities of the city except as provided in this section. Nothing in this section exempts a geothermal electric generating plant from permit or other district requirements.

(Added by Stats. 1983, Ch. 608, Sec. 1. Effective September 1, 1983.)

Figure 8.1: Text of CH&SC §42316 that allows the District to assess fees for studies and order mitigation measures to implement the SIP control strategy.

RESOLUTION NO. 98-05

RESOLUTION OF THE GOVERNING BOARD OF THE GREAT BASIN UNIFIED AIR POLLUTION CONTROL DISTRICT ADOPTING THE 1998 REVISION TO THE OWENS VALLEY PM_{10} PLANNING AREA DEMONSTRATION OF ATTAINMENT STATE IMPLEMENTATION PLAN AND INCORPORATED BOARD ORDER, AND ADOPTING A MITIGATION MONITORING AND REPORTING PLAN, AND MAKING FINDINGS OF FACT.

WHEREAS, in Resolution 98-04, which is incorporated by reference herein, the Governing Board of the Great Basin Unified Air Pollution Control District ("Governing District") certified that Addendum No. 1 (the "Addendum") to the Final Environmental Impact Report ("FEIR") prepared for the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order (collectively, "Attainment Demonstration SIP") has been completed in compliance with California Environmental Quality Act ("CEQA"); that the Governing Board has reviewed and considered the information and analysis contained in the Addendum with the information and analysis contained in the FEIR; and that the Addendum reflects the independent judgment of the Great Basin Unified Air Pollution Control District (the "District");

WHEREAS, prior to the Governing Board's action certifying the Addendum, the District and its consultants analyzed the environmental impacts of the proposed 1998 Revision to the Attainment Demonstration SIP (the "1998 SIP Revision"); and

WHEREAS, the proposed 1998 SIP Revision was circulated for public and governmental agency comment; and

WHEREAS, the FEIR and the Addendum identified certain significant effects on the environment that, absent the adoption of mitigation measures, would be caused by the City of Los Angeles' compliance with the Attainment Demonstration SIP;

WHEREAS, the District is required, pursuant to the California Environmental Quality Act ("CEQA") (Pub. Resources Code, § 21000 *et seq.*), to adopt all feasible mitigation measures or feasible project alternatives that can substantially lessen or avoid any significant impacts on the environment associated with a project to be approved, such as the Attainment Demonstration SIP;

WHEREAS, the Findings of Fact adopted as <u>Exhibit A</u> to this Resolution demonstrate that all of the significant impacts on the environment associated with the 1998 SIP Revision can be avoided through the adoption of feasible mitigation measures;

WHEREAS, the Governing Board has determined, for reasons set forth in Exhibit A hereto and described in the FEIR and the Addendum, that the 1998 SIP Revision is superior to all feasible project alternatives, that feasible project alternatives would not reduce any potentially significant and unavoidable impact of the Attainment Demonstration SIP to less-than-significant levels; and that the No Project Alternative, which would avoid these impacts, would fail to achieve most of the objectives and benefits of the Attainment Demonstration SIP;

WHEREAS, the Governing Board is required by Public Resources Code Section 21081.6, subdivision (a), to adopt a mitigation monitoring and reporting program to ensure that the mitigation measures adopted by the District are actually carried out;

WHEREAS, the final Mitigation Monitoring and Reporting Program for the 1998 SIP Revision has been prepared, and is adopted as Exhibit B to this resolution;

NOW, THEREFORE, BE IT RESOLVED by the Governing Board of the Great Basin Unified Air Pollution Control District as follows:

1. Through this Resolution, the Governing Board hereby reaffirms each of its findings and resolutions made in Resolution 98-04 which is incorporated herein by reference and approves and adopts the 1998 Revision to the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order, which approval and adoption are effective immediately;

2. The Governing Board hereby adopts and issues Great Basin Unified Air Pollution Control District Order No. 981116-01 set forth in Chapter 8 of the 1998 Revision to the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order, which adoption and issuance are effective immediately;

3. The Clerk of the Governing Board is hereby authorized to combine and compile the 1998 SIP Revision with the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order adopted July 2, 1997 in order to produce and certify on behalf of the District the "Revised Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order", which compilation upon the Clerk's certification, shall constitute the authoritative version of the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order adopted July 2, 1997, as revised by the 1998 SIP Revision;

5. Through this Resolution, which incorporates by reference and adopts the Mitigation Monitoring and Reporting Program included as Exhibit B to this Resolution, the Governing Board has satisfied its obligations pursuant to Public Resources Code section 21081.6, subdivision (a);

6. By adopting this Resolution, including the exhibits attached hereto, the Governing Board has satisfied its obligations pursuant to Public Resources Code section 21081 and California Code of Regulations, title 14, section 15091, in that the Governing Board has made one or more of the following findings with respect to the significant or potentially significant effects of the Attainment Demonstration SIP: (a) Changes or alterations have been required in, or incorporated into the Attainment Demonstration SIP which mitigate or avoid many of the significant environmental effects thereof as identified in the FEIR; (b) Some changes or alterations are within the responsibility and jurisdiction of another public agency and such changes have been, or can and should be, adopted by that other agency; (c) Specific economic, legal, social, technological, or other considerations make infeasible the mitigation measures or alternatives identified in the environmental impact report. Based upon these findings and the information contained in the record, the Governing Board concludes that the adoption of the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order will not cause to occur any significant adverse effect on the physical environment.

APPROVED AND ADOPTED by the Governing Board of the Great Basin Unified Air Pollution Control District this 16th day of November, 1998, by the following vote:

AYES: Chairman Chris Gansberg, Jr., Supervisors: Linda Arcularius, Andrea Lawrence, Herman Zellmer, Michael Dorame and Joann Ronci

NOES: Ø

ABSTAIN: Ø

ABSENT: Ø

Chris Gansberg Jr.

Chris Gansberg
Chairman, Governing Board

ATTEST:

Donna Leavitt

Donna Leavitt,
Clerk of the Governing Board

Attachments: Exhibit A - Findings of Fact
Exhibit B - Mitigation Monitoring and Reporting Program

8-2 THE BOARD ORDER

The following order of the Great Basin Unified Air Pollution Control District is incorporated into this State Implementation Plan and constitutes an integral part thereof.

BOARD ORDER # 981116-01
Implementation of PM_{10} Control Measures on the Owens Lake Bed

With regard to the control of PM_{10} emissions from the bed of Owens Lake, the Governing Board of the Great Basin Unified Air Pollution Control District (District) orders the City of Los Angeles (City) as follows:

1. Phase 1 - The City shall complete implementation of PM_{10} control measures, as described in Paragraph 9 hereof, on ten (10) square miles of the Owens Lake bed by December 31, 2001. Upon implementation, the City shall continuously operate and maintain the control measures to comply with the performance standards set forth for such measures in the control measure descriptions contained in this Order.

2. Phase 2 - The City shall complete implementation of PM_{10} control measures, as described in Paragraph 9 hereof, on an additional three and one-half (3.5) square miles of the Owens Lake bed by December 31, 2002, unless the District determines on or before December 31, 2001, that the Owens Valley Planning Area (OVPA) will attain the PM_{10} NAAQS by December 31, 2006 without implementation of further control measures. Upon implementation, the City shall continuously operate and maintain the control measures to comply with the performance standards set forth for such measures in the control measure descriptions contained in this Order.

3. Phase 3 - The City shall complete implementation of PM_{10} control measures, as described in Paragraph 9 hereof, on an additional three (3) square miles of the Owens Lake bed by December 31, 2003, unless the District determines on or before December 31, 2002, that the OVPA will attain the PM_{10} NAAQS by December 31, 2006 without implementation of further control measures. Upon implementation, the City shall continuously operate and maintain the control measures to comply with the performance standards set forth for such measures in the control measure descriptions contained in this Order.

4. Phase 4 - The City shall complete implementation of PM_{10} control measures, as described in Paragraph 9 hereof, on an additional two (2) square miles of the Owens Lake bed by December 31, 2004, unless the District determines on or before December 31, 2003, that the OVPA will attain the PM_{10} NAAQS by December 31, 2006 without implementation of further control measures. Upon implementation, the City shall continuously operate and maintain the control measures to comply with the performance standards set forth for such measures in the control measure descriptions contained in this Order.

5. **Phase 5** - The City shall complete implementation of PM_{10} control measures, as described in Paragraph 9 hereof, on an additional two (2) square miles of the Owens Lake bed by December 31, 2005, unless the District determines on or before December 31, 2004, that the OVPA will attain the PM_{10} NAAQS by December 31, 2006 without implementation of further control measures. Upon implementation, the City shall continuously operate and maintain the control measures to comply with the performance standards set forth for such measures in the control measure descriptions contained in this Order.

6. **Phase 6** - The City shall complete implementation of PM_{10} control measures, as described in Paragraph 9 hereof, on an additional two (2) square miles of the Owens Lake bed by December 31, 2006, unless the District determines on or before December 31, 2005, that the OVPA will attain the PM_{10} NAAQS by December 31, 2006 without implementation of further control measures. Upon implementation, the City shall continuously operate and maintain the control measures to comply with the performance standards set forth for such measures in the control measure descriptions contained in this Order.

7. **Contingency measure** - In 2006, the District will make a determination as to whether the OVPA will attain the PM_{10} NAAQS by December 31, 2006. Unless the District determines that the PM_{10} NAAQS will be attained by December 31, 2006, the following contingency measure is required:

   The City shall complete implementation of PM_{10} control measures, as described in Paragraph 9 hereof, on an additional two (2) square miles of the Owens Lake bed by December 31 of each year, unless the District determines by December 31 of the previous year, that the OVPA will attain the PM_{10} NAAQS without implementation of further control measures. Upon implementation, the City shall continuously operate and maintain the control measures to comply with the performance standards set forth for such measures in the control measure descriptions contained in this Order.

8. **Location of control measures** - The control measures implemented shall be located within the area identified in Exhibit 1. The District and the City may jointly agree to modify the areas identified in Exhibit 1.

9. **Control measures** - The City shall implement the PM_{10} control measures as described herein in the section titled "Control Measures." The District and the City may jointly agree to modify, or add, one or more control measures to those identified below. On the three and one-half (3.5) square miles of the "Dirty Socks" area identified as Zone 4 in Exhibit 1, the City has the authority to try one (1) or more control measures of its choosing not identified below. To complete implementation of a specified control measure by a particular date as required by this order means that the control measure shall be constructed, installed, operated and maintained so as to comply with the performance standards for the specified control measure not later than five o'clock p.m.

of the required date. Where this order provides for actions to be authorized by joint agreement of the parties, neither party shall be obligated to agree.

10. <u>Control measure replacement</u> - Replacing, modifying, improving or reworking control measures on areas previously counted as controlled under Paragraphs 1 through 7 hereof does not satisfy any requirement of Paragraphs 2 through 7 hereof for implementation of control measures on additional areas.

11. <u>2003 SIP revision</u> - The District will revise the OVPA Demonstration of Attainment State Implementation Plan (SIP) by December 31, 2003 to incorporate the knowledge gained by previous implementation of control measures (the "2003 SIP"). The 2003 SIP will provide for attainment in the OVPA of the PM_{10} NAAQS by December 31, 2006 and may, among other things, modify the requirements set forth in Paragraphs 4 through 9 hereof.

12. <u>Placement of additional controls</u> - In the event of a 2003 SIP legal challenge by the City, the City shall continue to implement control measures on an additional two (2) square miles of the Owens Lake bed annually, as provided in Paragraphs 4, 5, 6 and 7 hereof. Upon State of California approval of the 2003 SIP pursuant to Health & Safety Code Section 41650, the City shall make-up any control shortfall between the requirements of the 2003 SIP and the requirements of this paragraph for the period of the City's SIP challenge, if any, or shall be provided credit for control measure installation beyond the requirements of the State approved 2003 SIP, if any. The City shall effect any required make up of a control measure shortfall by completing implementation of control measures sufficient to satisfy the shortfall by the one (1) year anniversary of the date of the approval of the 2003 SIP by the State.

Control Measures

Shallow Flooding

The shallow flooding control measure will apply water to the surface of the areas of the lake bed where shallow flooding is used as a control measure. The City shall apply water in amounts and by means sufficient to achieve the following performance standard commencing on September 15 of each year, and ending on June 15 of the next year: at least 75% percent of each square mile of the designated areas shall continuously consist of standing water or surface saturated soil. Aerial photography or other methods satisfactory to the District shall be used to confirm coverage.

Between June 16 and July 31 of each calendar year, the City will supply, within the boundaries of the areas designated for control by shallow flooding, water in amounts and locations adequate to maintain sources of food and water suitable for sustaining nesting and fledgling shorebirds, including western snowy plovers, nesting within the boundaries of those control areas or within ½ mile of their boundaries. If the control measure as implemented creates vegetation of the type and density used as wildlife habitat, the City shall supply water in amounts sufficient to maintain that vegetation in a state suitable for wildlife habitat during the period between June 16 and July 31 of each calendar year. Between August 1 and September 14 of each calendar year, the District does not require any water to be supplied to areas controlled with shallow flooding.

The City shall construct a berm keyed into the lake bed sediments along the lower boundary of each of the areas designated for control by shallow flooding to minimize the transmission of excess water from the control areas toward the Owens Lake brine pool. The design and implementation of this berm will incorporate snowy plover crossings located at no more than 500 feet apart along the length of the berm, adequate in design to freely allow traverse of the berm by both snowy plover adults and chicks. Surface waters that reach the lower boundary of those control areas will be collected and recirculated for reapplication to the control areas. The control measure areas will have lateral boundary edge berms as necessary to contain waters in the control areas and to isolate the control measure areas from each other and from areas not controlled.

The City shall remove any exotic pest plants, including salt cedar (*Tamarix ramosissima*), that invade any of the areas designated for control by shallow flooding. As necessary to protect human health, the City shall avoid or abate mosquito breeding and swarming in the control areas by effective means that minimize adverse effects upon adjacent wildlife.

Managed Vegetation

In areas where Managed Vegetation is used as a control measure, the City shall achieve the following performance standard: coverage of at least 50% on each acre in substantially evenly distributed live or dead vegetation, as measured by the point-frame method. The vegetation shall consist only of locally-adapted native species or species approved by both the District and the California State Lands Commission.

The following portions of the areas designated for control with managed vegetation are exempted from the requirement of 50% vegetative coverage:

1) portions consistently inundated with water, such as reservoirs and canals,

2) roadways necessary to access, operate and maintain the control measure which are otherwise controlled to render them substantially non-emissive,

3) portions used as floodwater diversion channels or desiltation/retention basins, and

4) portions set aside as Transmontane Alkaline Meadow (TAM) habitat restoration zone as may be required to mitigate environmental impacts associated with the loss of existing TAM.

The City shall remove any exotic pest plants, including salt cedar (*Tamarix ramosissima*), that invade any of the areas designated for control by managed vegetation. To the extent necessary to protect human health, the City shall avoid or abate mosquito breeding and swarming in those control areas by means which minimize adverse effects upon adjacent wildlife.

To protect the managed vegetation control measure from natural flooding, the City shall incorporate drains and channels in the control measure area adequate to divert the flood waters away from the vegetated areas and to outlet the flood waters into the Owens Lake brine pool (or reservoir(s), if any). The drains and channels shall be designed to incorporate features (such as desiltation/ retention basins) adequate to capture the alluvial material carried by the flood waters and to avoid greater than normal deposition of this material into the Owens Lake brine pool.

The City shall construct a berm keyed into the lake bed sediments along the lower boundary of the areas designated for control by managed vegetation to minimize the transmission of excess water from the control area toward the Owens Lake brine pool. The design and implementation of this berm will incorporate snowy plover crossings located at no more than 500 feet apart along the length of the berm, adequate in design to freely allow traverse of the berm by both snowy plover adults and chicks. Surface waters that reach the lower boundary of the control area will be collected and recirculated for reapplication to the control area or other discharge. The control measure areas will have lateral boundary edge berms as necessary to contain waters in the control areas and to isolate the control measure areas from each other and from areas not controlled.

Gravel

In areas where gravel is used as a control measure, the City shall meet the following performance standard: one hundred percent of the control area shall be covered with a layer of gravel at least four inches thick. All gravel material placed must be screened to a size greater than ⅜-inch in diameter. Where necessary to support the gravel blanket, it shall be placed over a permanent permeable geotextile fabric. The gravel shall have resistance to leaching and erosion. It shall be no more toxic than the gravel analyzed by the District in the SIP's Final Environmental Report from the Keeler fan site. It shall also be comparable in coloration to the existing lake bed soils.

To protect the control measure from natural flooding, the City shall incorporate drains and channels in the control measure areas adequate to divert the flood waters away from the graveled areas and to outlet the flood waters into the Owens Lake brine pool. The drains and channels shall be designed to incorporate features (such as desiltation or retention basins) adequate to capture the alluvial material carried by the flood waters and to avoid greater than normal deposition of this material into the Owens Lake brine pool. The gravel placement design and implementation shall adequately protect the graveled areas from the deposition of wind- and water-borne soil. The City will apply best available control measures (BACM) and New Source Performance Standard (NSPS) emission limits to its gravel mining and transportation activities occurring in the District's geographic boundaries as required by the District in the City's District-issued Permit to Construct and Permit to Operate.

SCHEDULE

The implementation of the control measures shall be conducted so as to attain each project milestone set forth in Paragraphs 1 through 7, above, and summarized in Table 1, below, on or before the date ascribed to such milestone.

Table 1 Mandatory project implementation milestones.

Milestone	Date
1. **Phase 1** – Complete implementation on 10 mi^2	December 31, 2001
2. **Phase 2** – Complete implementation on an additional 3.5 mi^2	December 31, 2002
3. **Phase 3** – Complete implementation on an additional 3 mi^2	December 31, 2003
4. **Phase 4** – Complete implementation on an additional 2 mi^2	December 31, 2004
5. **Phase 5** – Complete implementation on an additional 2 mi^2	December 31, 2005
6. **Phase 6** – Complete implementation on an additional 2 mi^2	December 31, 2006

ADDITIONAL REQUIREMENTS

Furthermore, the Board orders the City of Los Angeles to satisfy the following requirements related to the implementation of the shallow flooding, managed vegetation, and gravel control measures:

1. The City's construction and implementation activities will comply with Mitigation Measures set forth in the Final Environmental Impact Report and Environmental Impact Report Addendum Number 1 relating to protection of air quality, vegetation resources, wildlife resources and cultural resources. The City will mitigate transportation impacts caused by their construction and implementation activities.

2. The City shall comply with any applicable requirements of the Mitigation Monitoring and Reporting Program adopted by the District concurrently with its certification of the Final Environmental Impact Report and Final Environmental Impact Report Addendum for this project.

3. The City shall apply best available control measures (BACM) to control air emissions from its construction/implementation activities occurring in the District's geographic boundaries as required by the District in the City's District-issued Authority to Construct and Permit to Operate.

Attachment: Exhibit 1 – Map and Coordinates of Control Area (2 pages)

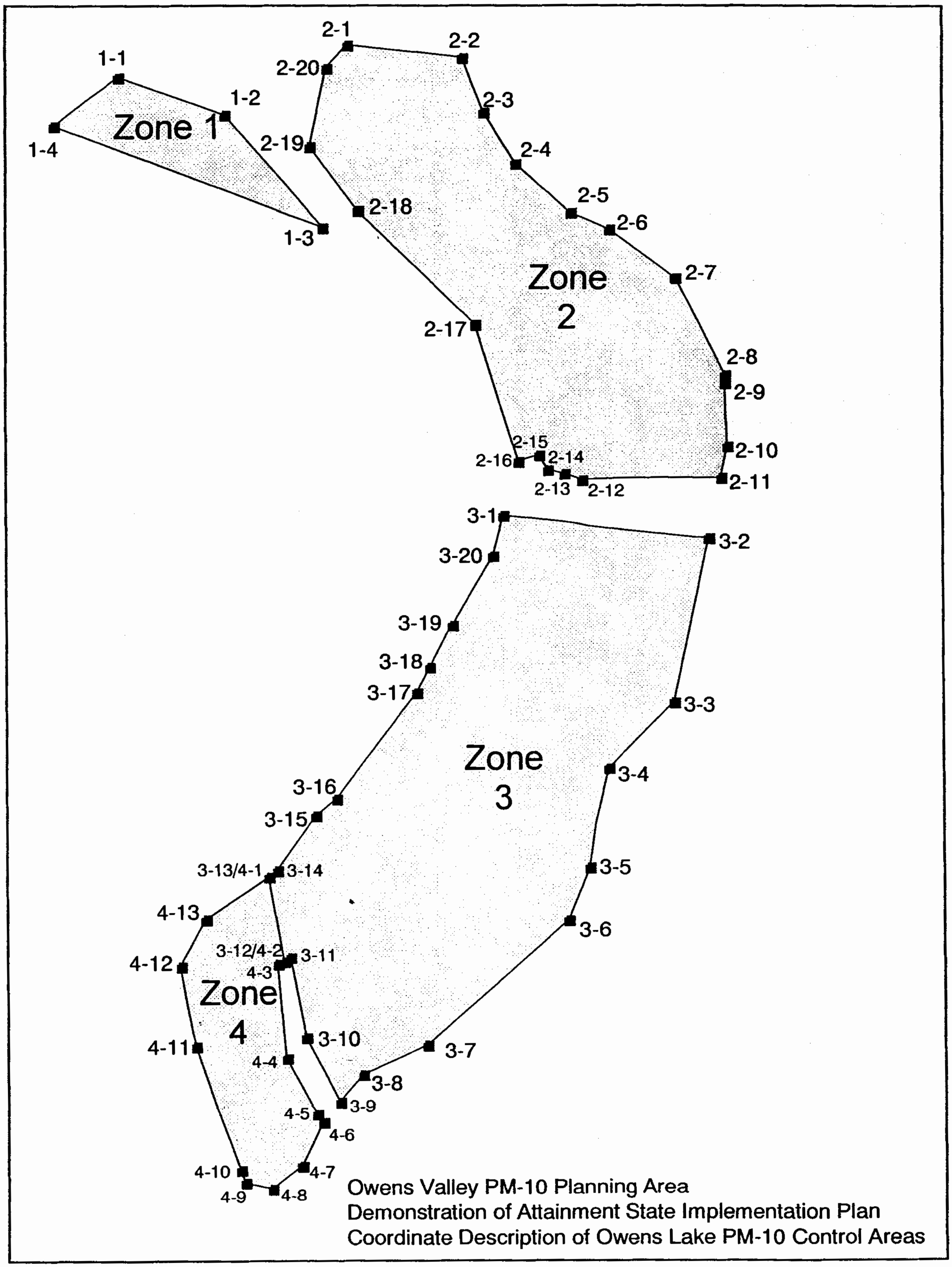

Exhibit 1: Map of control area.

Owens Valley PM-10 Planning Area
Demonstration of Attainment State Implementation Plan
Coordinate Description of Owens Lake PM-10 Control Measure Areas

Point #	Longitude	Latitude
1-1	-117.99035	36.51845
1-2	-117.96797	36.51159
1-3	-117.94773	36.49253
1-4	-118.00360	36.51007
2-1	-117.94223	36.52319
2-2	-117.91819	36.52090
2-3	-117.91402	36.51154
2-4	-117.90746	36.50302
2-5	-117.89590	36.49453
2-6	-117.88818	36.49166
2-7	-117.87443	36.48330
2-8	-117.86451	36.46672
2-9	-117.86447	36.46527
2-10	-117.86420	36.45444
2-11	-117.86560	36.44925
2-12	-117.89455	36.44916
2-13	-117.89795	36.45004
2-14	-117.90140	36.45093
2-15	-117.90319	36.45333
2-16	-117.90764	36.45255
2-17	-117.91618	36.47577
2-18	-117.94021	36.49519
2-19	-117.95038	36.50601
2-20	-117.94675	36.51949

Point #	Longitude	Latitude
3-1	-117.91088	36.44312
3-2	-117.86846	36.43863
3-3	-117.87594	36.41089
3-4	-117.89002	36.40005
3-5	-117.89406	36.38327
3-6	-117.89845	36.37439
3-7	-117.92836	36.35348
3-8	-117.94175	36.34858
3-9	-117.94667	36.34402
3-10	-117.95377	36.35522
3-11	-117.95654	36.36858
3-12	-117.95811	36.36804
3-13	-117.96090	36.38246
3-14	-117.95921	36.38336
3-15	-117.95087	36.39252
3-16	-117.94804	36.39399
3-17	-117.92834	36.41453
3-18	-117.92693	36.41748
3-19	-117.92178	36.42456
3-20	-117.91321	36.43637
4-1	-117.96090	36.38246
4-2	-117.95811	36.36804
4-3	-117.95955	36.36754
4-4	-117.95763	36.35165
4-5	-117.95156	36.34197
4-6	-117.95056	36.34038
4-7	-117.95509	36.33281
4-8	-117.96116	36.32909
4-9	-117.96671	36.33017
4-10	-117.96768	36.33241
4-11	-117.97701	36.35391
4-12	-117.97958	36.36767
4-13	-117.97437	36.37530

Note: All coordinates are in decimal degrees, WGS 84 spheroid coordinate system

Exhibit 1: Coordinates of control area.

CHAPTER 9

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CHAPTER 10

Glossary and List of Acronyms

10-1 GLOSSARY

airshed	A geographical area that, because of topography, meteorology, and climate, shares the same air.
Board	The Governing Board of the Great Basin Unified Air Pollution Control District
City	The City of Los Angeles, including its Department of Water and Power
control measures	Those methods of PM_{10} abatement that could be placed into portions of the Owens Lake playa and, when in place, are effective in reducing the PM_{10} emissions from the surface over which they are implemented.
District	The Great Basin Unified Air Pollution Control District (a.k.a. GBUAPCD and District).
efflorescence	Efflorescence occurs when subsurface moisture is drawn upward through capillary action, carrying dissolved salts with it. As moisture evaporates, the salts are left at the surface in fine powdery deposits that can be lifted by turbulent winds. Powdery efflorescent salt surfaces have a very high PM_{10} content.
non-attainment area	An area that has not met state and USEPA air quality requirements.
Owens Lake playa	The surface area of the Owens Lake bed which is not covered by the Owens Lake brine pool; the actual size of the playa may change from year to year, and includes those portions of the lake bed which may be temporarily covered with water which is not high salinity.
Proposed Project	The sum of those activities that are proposed to be adopted by the Great Basin Unified Air Pollution Control District in the PM_{10} State Implementation Plan for the Owens Valley Planning Area and implemented to reduce fugitive PM_{10} emissions from the Owens Lake playa to meet the National Ambient Air Quality Standards for particulate matter smaller than 10 microns (PM_{10}); this would include all actions, whether undertaken on or off the playa.
SIP EIR	The Final Environmental Impact Report and any EIR addendums or supplements that were written to accompany and support the State Implementation Plan as required by the California Environmental Quality Act.

10-2 LIST OF ACRONYMS

ADT	Average daily traffic
AMSL	Above mean sea level
A&WMA	Air & Waste Management Association
BACM	Best Available Control Measures
BACT	Best Available Control Technology
BLM	U.S. Department of Interior, Bureau of Land Management
CAAA	Federal Clean Air Act Amendments of 1990
CalTrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CASAC	Clean Air Scientific Advisory Committee
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CH&SC	Calif. Health & Safety Code
DRI	Desert Research Institute
EIR	Environmental Impact Report
FEIR	Final Environmental Impact Report
FTEE	Full-time equivalent employee
GBUAPCD	Great Basin Unified Air Pollution Control District (a.k.a. District)
GIS	Geographic Information System
GPS	Global Positioning System
ISCST3	Industrial Source Complex Short Term, a.k.a ISC3
LADWP	Los Angeles Department of Water and Power
MFG	McCulley, Frick and Gilman
NAAQS	National ambient air quality standards
NOAA	National Oceanographic and Atmospheric Administration
NEAP	Natural Event Action Plans
NEPA	National Environmental Policy Act
NSPS	New Source Performance Standard
OLSAC	Owens Lake Soda Ash Company
OVPA	Owens Valley PM_{10} Planning Area

PM_{10}	Particulate Matter less than 10 microns nominal aerodynamic diameter
PSD	Prevention of Significant Deterioration
R.	Range
SIP	State Implementation Plan
SLC	California State Lands Commission
SSI	Size Selective Inlet
T.	Township
T/d	U.S. short tons per day
TEOM	Tapered Element Oscillating Microbalance, continuously measures ambient PM_{10}
TSP	Total suspended particulates
UCD	University of California at Davis
USEPA	U.S. Environmental Protection Agency
USDA	U.S. Department of Agriculture

10-3 MEASUREMENT UNITS

ac	acre, 640 acres = 1 square mile
ac-ft	acre-feet, 1 ac-ft = 325,851 gallons = 43,560 cubic feet (1 ac-ft will cover a 1 acre area 1 foot deep with water.)
°C	degrees Celsius
°F	degrees Fahrenheit
ft	feet, 1 foot = 0.3048 meters
g	grams, 1,000 grams = 1 kilogram
kg	kilogram, 1 kilogram = 2.2046 pounds
m	meters, 1 meter = 3.28 feet
m/s	meters per second, 1 meter per second = 2.237 miles per hour
mph	miles per hour, 1 mile per hour = 0.447 meters per second
ppm	parts per million
s	second
ton	US short ton, 1 ton = 2,000 pounds weight = 907.2 kilograms
yr	year
'	feet
"	inches
µg	microgram, 1 microgram = 10^{-6} grams
µm	micron, 1 micron = 10^{-6} meters

CHAPTER 11

Declaration of the Clerk of the Board and Resolutions Certifying the EIR and Approving the SIP

DECLARATION
OF
DONNA LEAVITT

I, Donna Leavitt, declare as follows:

1. I am the Clerk of the Governing Board of the Great Basin Unified Air Pollution Control District. The District is a unified air pollution control district consisting of Inyo, Mono, and Alpine counties in the State of California.

2. At least thirty days before the November 16, 1998 public hearing of the Great Basin Unified Air Pollution Control District Governing Board on adoption of the proposed 1998 revision to the previously-adopted Owens Valley PM-10 Planning Area Demonstration of State Implementation Plan, I served the notice of the public hearing in the form attached hereto as **Exhibit A**, and a copy of the Draft 1998 Revision to the Owens Valley PM-10 Planning Area Demonstration of Attainment State Implementation Plan, on the Administrator of the United States Environmental Protection Agency, through the appropriate regional office, by sending on September 25, 1998 true copies thereof in an envelope addressed to Ms. Felicia Marcus, Regional Administrator for EPA Region 9, at 75 Hawthorne Street, San Francisco, California 94105, via Federal Express Priority Overnight Delivery.

3. At least thirty days before the November 16, 1998 public hearing of the Great Basin Unified Air Pollution Control District Governing Board on adoption of the proposed 1998 revision to the previously-adopted Owens Valley PM-10 Planning Area Demonstration of State Implementation Plan, I served the notice of the public hearing in the form attached hereto as **Exhibit A**, and a copy of the Draft 1998 Revision to the Owens Valley PM-10 Planning Area Demonstration of Attainment State Implementation Plan, on each local air pollution control agency significantly impacted, by sending on September 25, 1998 true copies thereof in an envelope addressed to Mr. Thomas Paxson, the Air Pollution Control Officer of the Kern County Air Pollution Control District, at 2700 "M" Street, Suite 290, Bakersfield, California 93301, via Federal Express Priority Overnight Delivery.

4. At least thirty days before the November 16, 1998 public hearing of the Great Basin Unified Air Pollution Control District Governing Board on adoption of the proposed 1998 revision to the previously-adopted Owens Valley PM-10 Planning Area Demonstration of State Implementation Plan, I served the notice of the public hearing in the form attached hereto as **Exhibit A**, and a copy of the Draft 1998 Revision to the Owens Valley PM-10 Planning Area Demonstration of Attainment State Implementation Plan, on the California State Air Resources Board, by sending on September 25, 1998 true copies thereof in an envelope addressed to Mr. Michael Kenny, Executive Officer, California Air Resources Board, at 2020 "L" Street, Sacramento, California 95814, via Federal Express Priority Overnight Delivery.

5. At least thirty days before the November 16, 1998 public hearing of the Great Basin Unified Air Pollution Control District Governing Board on adoption of the proposed 1998 revision to the previously-adopted Owens Valley PM-10 Planning Area Demonstration of State Implementation Plan, I served the notice of the public hearing in the form attached hereto as **Exhibit A**, and a copy of the Draft 1998 Revision to the Owens Valley PM-10 Planning Area Demonstration of Attainment State Implementation Plan, on the City of Los Angeles and the Department of Water and Power of the City of Los Angeles, by sending on September 25, 1998 true copies thereof in an envelope addressed to Mr. S. David Freeman, General Manager, Los Angeles Department of Water and Power, at 111 N. Hope Street, Suite 1550, Los Angeles, California 90012, via Federal Express Priority Overnight Delivery and in an envelope addressed to Mr. Gerald Gewe, Executive Assistant of Water Services, Los Angeles Department of Water and Power, at 111 N. Hope Street, Los Angeles, California 90012, via Federal Express Priority Overnight Delivery.

6. At least thirty days before the November 16, 1998 public hearing of the Great Basin Unified Air Pollution Control District Governing Board on adoption of the proposed 1998 revision to the previously-adopted Owens Valley PM-10 Planning Area Demonstration of State Implementation Plan, I caused to be published the text of the notice of the public hearing of the Governing Board of the Great Basin Unified Air Pollution Control District in the form attached hereto as **Exhibit B,** in the Inyo Register, a newspaper of general circulation in the County of Inyo, California; in the Review Herald, a newspaper of general circulation in Mono County, California; and in the Tahoe Daily Tribune a newspaper of general circulation in El Dorado County, California (a county adjacent to Alpine County, California, which has no newspaper of general circulation). Copies of the original proofs of such publication are attached hereto as **Exhibit C**.

7. At least thirty days before the November 16, 1998 public hearing of the Great Basin Unified Air Pollution Control District Governing Board on adoption of the proposed 1998 revision to the previously-adopted Owens Valley PM-10 Planning Area Demonstration of State Implementation Plan, I caused to be published in the Inyo Register, a newspaper of general circulation in the County of Inyo, California, the county wherein the entire Owens Valley PM-10 Planning Area is situated, a large display advertisement setting forth the date, time, and place of the public hearing, in the form of **Exhibit D** attached.

8. At least thirty days before the November 16, 1998 public hearing of the Great Basin Unified Air Pollution Control District Governing Board on adoption of the proposed 1998 revision to the previously-adopted Owens Valley PM-10 Planning Area Demonstration of State Implementation Plan, and continuously through the date of the public hearing, a copy of the Draft 1998 Revision to the Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan was made available for public inspection at the District's main office at 157 Short Street, Bishop, California, which office is located in Inyo County, California, the region in which the entire Owens Valley PM10 Planning Area, and the affected source, are located.

9. On September 25, 1998, I sent a copy of the notice of public hearing of the Governing Board of the Great Basin Unified Air Pollution Control District in the form attached hereto as **Exhibit E**, to each and every addressee shown in the list attached hereto as **Exhibit F** via the United States Postal Service, postage prepaid.

10. As authorized by District Governing Board Resolution No. 98-05, I hereby certify on behalf of the District that the within document is the authoritative compilation of the Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order adopted July 2, 1998, as revised by the 1998 Revision to the Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order adopted November 16, 1998. This compilation may be correctly referred to as the "Revised Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order."

I declare that the foregoing is true and correct under penalty of perjury. Done at Bishop, Inyo county California, this 20th day of November, 1998.

Donna Leavitt

Donna Leavitt

EXHIBIT A

NOTICE OF PUBLIC HEARING

Ellen Hardebeck
Control Officer

GREAT BASIN UNIFIED AIR POLLUTION CONTROL DISTRICT

157 Short Street - Bishop, CA 93514
(760) 872-8211 * Fax (760) 872-6109

September 25, 1998

NOTICE OF A PUBLIC HEARING ON THE PROPOSED REVISION TO THE OWENS VALLEY PM-10 PLANNING AREA DEMONSTRATION OF ATTAINMENT STATE IMPLEMENTATION PLAN

PLEASE TAKE NOTICE that on Monday, November 16, 1998, the Governing Board of the Great Basin Unified Air Pollution Control District (District) will conduct a public hearing and consider for adoption a proposed revision to the previously-adopted Owens Valley PM-10 Planning Area Demonstration of Attainment State Implementation Plan. The public hearing, and consideration for adoption, will occur at the District Governing Board's Regular Meeting on November 16, 1998 at 10:00 a.m. in the City of Bishop City Council Chambers, 301 West Line Street, Bishop, California. In addition, the District's Governing Board will consider approval of an addendum to the Final Environmental Impact Report (EIR) previously certified for the Owens Valley PM-10 SIP. The addendum will amend the Final EIR to reflect the changes to the Owens Valley SIP made by the proposed SIP revision. Members of the public will have an opportunity to submit written comments or make oral statements at the public hearing on both the addendum to the Final EIR and the proposed SIP revision.

On July 2, 1997, the Governing Board of the Great Basin Unified Air Pollution Control District (District) adopted the Owens Valley PM-10 Planning Area Demonstration Of Attainment State Implementation Plan (SIP). The SIP describes how the District plans to attain the federal standards for particulate matter pollution in the region surrounding Owens Lake in southern Inyo County, California. On July 27, 1998, the District Governing Board approved a Memorandum of Agreement (MOA) with the City of Los Angeles to resolve disputes between the City and the District concerning the SIP. The MOA provides that the District will consider adopting a revision to the Owens Valley PM-10 SIP before November 30, 1998 to amend its requirements to conform to the commitments and timetables set forth in the MOA.

These revisions include a five-year extension of time for the City to implement controls on the Owens Lake bed to bring the area into attainment with the National Ambient Air Quality Standards (NAAQS) for particulate matter by December 31, 2006. The revisions allow the City of Los Angeles to apply shallow flooding, managed vegetation, or gravel or another control measure agreed to by the District on the following schedule: 10 square miles of the lakebed by December 31, 2001; 3.5 additional square miles by December 31, 2002, 3 additional square miles by December 31, 2003, and 2 additional square miles every year until the District determines the NAAQS have been attained.

The District staff encourages those who have comments on the proposed SIP revision to submit them to the District in writing before the close of business on Monday, October 26, 1998. The District staff will prepare written responses to all comments received in writing at the District office at 157 Short Street, Bishop, CA 93514 by 5 p.m. on that day. Those comments, together with the District staff's responses, will be forwarded to the District Governing Board for their review in advance of the November 16, 1998 public hearing. Written comments received after that date but before the public hearing will be given to the Governing Board but may not receive a District staff response.

The proposed SIP revision modifies, and refers to, the text of the Owens Valley PM-10 SIP adopted on July 2, 1997. Attached is a copy of the proposed SIP revision to the Owens Valley PM-10 SIP. Copies of the Owens Valley PM-10 SIP adopted on July 2, 1997 are available for inspection at the District Office at 157 Short Street, Bishop, California 93514. Interested parties may call the District Office at (760) 872-8211 to have a copy mailed. If you have any questions, call Ted Schade at (760) 872-8211.

EXHIBIT B

NOTICE OF PUBLIC HEARING
FOR PUBLICATION IN NEWSPAPERS OF GENERAL CIRCULATION

PUBLIC NOTICE

PUBLIC HEARING ON THE PROPOSED REVISION TO THE OWENS VALLEY PM-10 PLANNING AREA DEMONSTRATION OF ATTAINMENT STATE IMPLEMENTATION PLAN

The Great Basin Unified Air Pollution Control District (District) will conduct a public hearing and consider for adoption a proposed revision to the previously-adopted Owens Valley PM-10 Planning Area Demonstration of Attainment State Implementation Plan. The public hearing, and consideration for adoption, will occur at the District Governing Board's Regular Meeting on November 16, 1998 at 10:00 A.M. in the City of Bishop City Council Chambers, 301 West Line Street, Bishop, California. In addition, the District's Governing Board will consider approval of an addendum to the Final Environmental Impact Report (EIR) previously certified for the Owens Valley PM-10 SIP. The addendum will amend the Final EIR to reflect the changes to the Owens Valley SIP made by the proposed SIP revision. Members of the public will have an opportunity to submit written comments or make oral statements at the public hearing on both the addendum to the Final EIR and the proposed SIP revision.

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These revisions include a five-year extension of time for the City to implement controls on the Owens Lake bed to bring the area into attainment with the National Ambient Air Quality Standards (NAAQs) for particulate matter by December 31, 2006. The revisions allow the City of Los Angeles to apply shallow flooding, managed vegetation, or gravel or another control measure agreed to by the District on the following schedule: 10 square miles of the lake bed by December 31, 2001; 3.5 additional square miles by December 31, 2002, 3 additional square miles by December 31, 2003, and 2 additional square miles every year until the District determines the NAAQS have been attained.

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EXHIBIT C

PROOFS OF PUBLICATION

PROOF OF PUBLICATION
(2015.5 C.C.P.)

This space is for County clerk's Filing Stamp

STATE OF CALIFORNIA,
COUNTY OF INYO

I am a citizen of the United States and a resident of the County aforesaid. I am over the age of eighteen years, and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of the

The Inyo Register

a newspaper of general circulation, published in

County of Inyo, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Inyo, State of California, under date of Oct. 5, 1953, Case number 5414; that the notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

Oct. 1, 13, 29

all in the year 19 98

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at Bishop, California,

this 16th day of Nov 19 98

Carol [signature]

Signature

Proof of Publication of

Public Hearing

Paste Clipping of Notice SECURELY in the Space

PUBLIC NOTICE
PUBLIC HEARING ON THE PROPOSED REVISION TO THE OWENS VALLEY PM-10 PLANNING AREA DEMONSTRATION OF ATTAINMENT STATE IMPLEMENTATION PLAN

The Great Basin Unified Air Pollution Control District (District) will conduct a public hearing and consider for adoption a proposed revision to the previously-adopted Owens Valley PM-10 Planning Area Demonstration of Attainment State Implementation Plan. The public hearing, and consideration for adoption, will occur at the District Governing Board's Regular Meeting on November 16, 1998 at 10:00 A.M. in the City of Bishop City Council Chambers, 301 West Line Street, Bishop, California. In addition, the District's Governing Board will consider approval of an addendum to the Final Environmental Impact Report (EIR) previously certified for the Owens Valley PM-10 SIP. The addendum will amend the Final EIR to reflect the changes to the Owens Valley SIP made by the proposed SIP revision. Members of the public will have an opportunity to submit written comments and make oral statements at the public hearing on both the addendum to the Final EIR and the proposed SIP revision.

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The District staff encourages those who have comments on the proposed SIP revision to submit them to the District in writing before the close of business on Monday, October 26, 1998. The District staff will prepare written responses to all comments received in writing at the District office at 157 Short Street, Bishop, CA 93514 by 5:00 p.m. on that day. Those comments together with the District staff's responses, will be forwarded to the District Governing Board for their review in advance of the November 16, 1998 public hearing. Written comments received after that date but before the public hearing will be given to the Governing Board but may not receive a District staff response.

The proposed SIP revision modifies, and refers to, the text of the Owens Valley PM-10 SIP adopted on July 2, 1997. Copies of the proposed SIP revision to the Owens Valley PM-10 SIP, and of the Owens Valley PM-10 SIP adopted on July 2, 1997, are available for inspection at the District Office at 157 Short Street, Bishop, CA 93514. Interested parties may call the District Office at (760)872-8211 to have copies mailed. If you have questions, call Ted Schade at (760)872-8211.

(IR: Oct. 1, 13, 29, 1998-6287c)

This space is for the County Clerk's Filing Stamp

Proof of Publication

(2015.5 C.C.P.)

STATE OF CALIFORNIA,
COUNTY OF INYO

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of the

Review – Herald

, a newspaper of general circulation, published in

Mammoth Lakes,

County of Mono. The Lakes District Review was adjudicated Dec. 18, 1975, as a newspaper of general circulation for the town of Mammoth Lakes, CA. The Mono Herald was adjudicated Oct. 23, 1953 as a newspaper of general circulation for Mono County, CA. The notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dated, to wit:

Oct. 1, 15, 29

all in the year 1998

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at Bishop, California,

this 29th day of Oct. 1998

[signature]

Signature

Proof of Publication of Public Hearing Notice

Paste Clipping of Notice SECURELY in this Space

PUBLIC NOTICE
PUBLIC HEARING ON THE PROPOSED REVISION TO THE OWENS VALLEY PM-10 PLANNING AREA

DEMONSTRATION OF ATTAINMENT STATE IMPLEMENTATION PLAN

The Great Basin Unified Air Pollution Control District (District) will conduct a public hearing and consider for adoption a proposed revision to the previously-adopted Owens Valley PM-10 Planning Area Demonstration of Attainment State Implementation Plan. The public hearing, and consideration for adoption, will occur at the District Governing Board's Regular Meeting on November 16, 1998 at 10:00 A.M. in the City of Bishop City Council Chambers, 301 West Line Street, Bishop, California. In addition, the District's Governing Board will consider approval of an addendum to the Final Environmental Impact Report (EIR) previously certified for the Owens Valley PM-10 SIP. The addendum will amend the Final EIR to reflect the changes to the Owens Valley SIP made by the proposed SIP revision. Members of the public will have an opportunity to submit written comments and make oral statements at the public hearing on both the addendum to the Final EIR and the proposed SIP revision.

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These revisions include a five-year extension of time for the City to implement controls on the Owens Lake bed to bring the area into attainment with the National Ambient Air Quality Standards (NAAQs) for particulate matter by December 31, 2006. The revisions allow the City of Los Angeles to apply shallow flooding, managed vegetation, or gravel or another control measure agreed to by the District on the following schedule: 10 square miles of the lake bed by December 31, 2001; 3.5 additional square miles by December 31, 2002, 3 additional square miles by December 31, 2003, and 2 additional square miles every year until the District determines the NAAQS have been attained.

The District staff encourages those who have comments on the proposed SIP revision to submit them to the District in writing before the close of business on Monday, October 26, 1998. The District staff will prepare written responses to all comments received in writing at the District office at 157 Short Street, Bishop, CA 93514 by 5:00 p.m. on that day. Those comments together with the District staff's responses, will be forwarded to the District Governing Board for their review in advance of the November 16, 1998 public hearing. Written comments received after that date but before the public hearing will be given to the Governing Board but may not receive a District staff response.

The proposed SIP revision modifies, and refers to, the text of the Owens Valley PM-10 SIP adopted on July 2, 1997. Copies of the proposed SIP revision to the Owens Valley PM-10 SIP, and of the Owens Valley PM-10 SIP adopted on July 2, 1997, are available for inspection at the District Office at 157 Short Street, Bishop, CA 93514. Interested parties may call the District Office at (760)872-8211 to have copies mailed. If you have questions, call Ted Schade at (760)872-8211.

(RH: Oct. 1, 15, 29, 1998-6993C)

AFFIDAVIT OF PUBLICATION

GREAT BASIN UNIFIED
AIR POLLUTION CONTROL
DISTRICT
ATTN: DONNA LEAVITT
157 SHORT STREET, STE 6
BISHOP, CA 93514

STATE OF CALIFORNIA
County of El Dorado

I am a citizen of the United States and a resident of the County foresaid; I am over eighteen years, and not a part to or interested in the above entitled matter, I am the principal clerk of the printer of the Tahoe Daily Tribune, a newspaper of general circulation, printed and published Monday through Friday in the City of South Lake Tahoe, County of El Dorado, and which newspaper has been adjudicated a newspaper of general circulation by the Superior Court of the County of El Dorado, State of California under the date March 6, 1970, Case Number 18569, that the notice of which the annexed is a printed copy (set in type not smaller than six (6) point), has been published in each regular and entire issue of said newspaper and not in any supplemental therefore on the following dates, to wit:

Oct. 2, 13, 29, 1998

I certify under penalty, that the foregoing is true and correct.

Dated at South Lake Tahoe, California this:

29th Day of October 1998

Signed: [signature]
Sherri Moore- Legal Clerk

PUBLIC NOTICE

PUBLIC HEARING ON THE PROPOSED REVISION TO THE OWENS VALLEY PM-10 PLANNING AREA DEMONSTRATION OF ATTAINMENT STATE IMPLEMENTATION PLAN

The Great Basin Unified Air Pollution Control District (District) will conduct a public hearing and consider for adoption a proposed revision to the previously-adopted Owens Valley PM-10 Planning Area Demonstration of Attainment State Implementation Plan. The public hearing, and consideration for adoption, will occur at the District Governing Board's Regular Meeting on November 16, 1998 at 10:00 A. M. in the City of Bishop City Council Chambers, 301 West Line Street, Bishop, California. In addition, the District's Governing Board will consider approval of an addendum to the Final Environmental Impact Report (EIR) previously certified for the Owens Valley PM-10 SIP. The addendum will amend the Final EIR to reflect the changes to the Owens Valley SIP made by the proposed SIP revision. Members of the public will have an opportunity to submit written comments or make oral statements at the public hearings on both the addendum to the Final EIR and the proposed SIP revision.

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TDT Oct. 2, 13, 29, 1998

EXHIBIT D

DISPLAY ADVERTISEMENT

PROOF OF PUBLICATION
(2015.5 C.C.P.)

STATE OF CALIFORNIA,
COUNTY OF INYO

I am a citizen of the United States and a resident of the County aforesaid. I am over the age of eighteen years, and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of the

The Inyo Register

a newspaper of general circulation, published in

County of Inyo, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Inyo, State of California, under date of Oct. 5, 1953, Case number 5414; that the notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

Oct. 1, 13, 27

all in the year 1998.

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at Bishop, California,

this 29th day of Oct 1998

Signature

This space is for County clerk's Filing Stamp

Proof of Publication of

Public Hearing Notice

Paste Clipping of Notice SECURELY in the Space

Great Basin APCD Board

PUBLIC HEARING

Revision to the Owens Lake Dust Control Plan (Demonstration of Attainment State Implementation Plan) and Addendum to the Environmental Impact Report

Monday, November 16, 1998
10:00 a.m.

City Council Chambers

Bishop City Hall • 301 West Line Street • Bishop, CA 93514

The Revision to the Plan is available for review at the District Offices at 157 Short Street, Bishop, CA. Call 872-8211 to have a copy mailed to you.

EXHIBIT E

NOTICE OF PUBLIC HEARING SENT TO ADDRESSEES ON MAILING LIST

Ellen Hardebeck
Control Officer

GREAT BASIN UNIFIED AIR POLLUTION CONTROL DISTRICT

157 Short Street - Bishop, CA 93514
(760) 872-8211 * Fax (760) 872-6109

September 25, 1998

NOTICE OF A PUBLIC HEARING ON THE PROPOSED REVISION TO THE OWENS VALLEY PM-10 PLANNING AREA DEMONSTRATION OF ATTAINMENT STATE IMPLEMENTATION PLAN

PLEASE TAKE NOTICE that on Monday, November 16, 1998, the Governing Board of the Great Basin Unified Air Pollution Control District (District) will conduct a public hearing and consider for adoption a proposed revision to the previously-adopted Owens Valley PM-10 Planning Area Demonstration of Attainment State Implementation Plan. The public hearing, and consideration for adoption, will occur at the District Governing Board's Regular Meeting on November 16, 1998 at 10:00 a.m. in the City of Bishop City Council Chambers, 301 West Line Street, Bishop, California. In addition, the District's Governing Board will consider approval of an addendum to the Final Environmental Impact Report (EIR) previously certified for the Owens Valley PM-10 SIP. The addendum will amend the Final EIR to reflect the changes to the Owens Valley SIP made by the proposed SIP revision. Members of the public will have an opportunity to submit written comments or make oral statements at the public hearing on both the addendum to the Final EIR and the proposed SIP revision.

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EXHIBIT F

MAILING LIST FOR NOTICE OF PUBLIC HEARING

Agency 1	First Name	Last Name	Address 1	City	State	Zipcode
AER	Prasad	Pai	2682 Bishop Dr., Suite 120	San Ramon	CA	94583
Aerovironment, Inc.	Drew	Lindberg	222 E. Huntington Drive, Ste 200	Monrovia	CA	91016
Agrarian Research & Management	Frank	Stradling Jr.	1980 North 435 East	Provo	UT	84604
Air Resources Board	Robert	Barham	Research Division / P.O. Box 2815	Sacramento	CA	95812
Air Resources Board	Karlyn	Black	Executive Office / P.O. Box 2815	Sacramento	CA	95814
Air Resources Board	Paul	Buttner	Executive Office / P.O. Box 2815	Sacramento	CA	95814
Air Resources Board	Dean	Saito	Executive Office/P. O. Box 2815	Sacramento	CA	95814
Air Resources Board	Lynn	Terry	Executive Office/P. O. Box 2815	Sacramento	CA	95814
Air Sciences, Inc.	Roger	Steen	12596 W. Bayaud Avenue	Lakewood	CO	80228
Atmospheric Science	Tom	Gill	P.O. Box 42101	Lubbock	TX	79409-2101
Bakersfield Californian			P. O. Box 2996	Bakersfield	CA	93303-2996
Benton Tribal Office	Rose Marie	Saulque	Star Route 4, Box 56-A	Benton	CA	93512
Big Pine Band of Owens Valley	Cheryl	Andreas	P. O. Box 700	Big Pine	CA	93513
Big Pine High School	Hope	Nolen	P.O. Box 908	Big Pine	CA	93513
Big Pine Tribal Office	Donna	Duckey	P. O. Box 700	Big Pine	CA	93513
Bishop Community of Bishop Colony	Tilford P.	Denver	P. O. Box 548	Bishop	CA	93515
Bishop Paiute Shoshone Tribe	Alan	Spoonhunter	819 N. Barlow Lane	Bishop	CA	93514
Bishop Tribal Council	Allen	Summers	P. O. Box 548	Bishop	CA	93514
Bookman-Edmonston Engineering	L. Niel	Allen	3100 Zinfandel Dr., Ste. 170	Sacramento	CA	95851-0408
Bookman-Edmonston Engineering	Herb	Greydannus	P. O. Box 15516	Sacramento	CA	95852
Bridgeport Tribal Office	Herb	Glazier	P. O. Box 37	Bridgeport	CA	93517
Brobeck, Phleger & Harrison	Linda J.	Bozung	550 South Hope Street	Los Angeles	CA	90071-2604
Brobeck, Phleger & Harrison	Steven J.	Renshaw	550 South Hope Street	Los Angeles	CA	90071-2604
Bureau of Reclaimation	Dennis	Wolfe	P. O. Box 849	Temecula	CA	92593
Calif. Dept. of Toxic Substances Control			400 "P" St., Fourth Floor	Sacramento	CA	95812-0805
Calif. Environmental Protection Agency	R. L.	Holtzer	P. O. Box 942732	Sacramento	CA	94234-7320
Calif. Environmental Protection Agency	James	Strock	555 Capital Mall, Suite 525	Sacramento	CA	95814
Calif. Native American Heritage Comm.			915 Capitol Mall, Room 364	Sacramento	CA	95814
Calif. Office of Historic Preservation	Hans	Kreutzberg	P.O. Box 942896	Sacramento	CA	94296-0001
Califonria Native Plant Society	Daniel	Pritchett	P. O. Box 1411	Bishop	CA	93515
California Air Resources Board	Barbara	Fry	P. O. Box 2815	Sacramento	CA	95814
California Department of Health	Kim	Dinh	601 N. 7th Street	Sacramento	CA	94234-7320
California Dept. of Boating & Waterways	Nicole	Arbuckle	1629 S Street	Sacramento	CA	95814
California Dept. of Conservation	Jason	Marshall	801 K Street, MS 24-02	Sacramento	CA	95814
California Dept. of Fish & Game			330 Golden Shore - Suite 50	Long Beach	CA	90802

Agency 1	First Name	Last Name	Address 1	City	State	Zipcode
California Dept. of Fish & Game	Vern	Bleich	407 W. Line Street	Bishop	CA	93514
California Dept. of Fish & Game	Susan	Cochran	1220 South Street	Sacramento	CA	95814
California Dept. of Fish & Game	Celeste	Cushman	1416 9Th Street	Sacramento	CA	95814
California Dept. of Fish & Game	Bruce	Kinney	407 W. Line Street	Bishop	CA	93514
California Dept. of Fish & Game	Tom	Lipp	P.O. Box 99	Independence	CA	93526
California Dept. of Fish & Game	Alan	Pickard	407 W. Line Street	Bishop	CA	93514
California Dept. of Fish & Game	Denyse	Racine	407 West Line Street, Room 8	Bishop	CA	93514
California Dept. of Fish & Game	Gene	Toffoli	1416 9Th Street	Sacramento	CA	95814
California Dept. of Fish & Game	Ron	Van Benthuysen	Air Services Dept, 1416 9Th Street	Sacramento	CA	95814
California Dept. of Fish & Game	Darrell	Wong	407 W. Line St.	Bishop	CA	93514
California Dept. of Fish and Game	G.	Noltes	1234 East Shaw Avenue	Fresno	CA	93710
California Dept. of Fish and Game	Curt	Taucher	330 Golden Shore, Ste. 50	Long Beach	CA	90802
California Dept. of Forestry	Gary	Brittner	1416 Ninth Street, Room 1540-47	Sacramento	CA	95814
California Dept. of General Services	Robert	Sleppy	400 R Street, Suite 5100	Sacramento	CA	95814
California Dept. of Parks & Recreation	Ken	Pierce	P.O. Box 942896	Sacramento	CA	94296-0001
California Dept. of Transportation	Tom	Dayak	500 South Main Street	Bishop	CA	93514
California Dept. of Transportation	Lisa	Flores	500 South Main Street	Bishop	CA	93514
California Dept. of Transportation & Plann	Ron	Helgeson	P.O. Box 942874	Sacramento	CA	94274-0001
California Dept. of Water Resources	Nadell	Gayou	1020 Ninth Street, Third Floor	Sacramento	CA	95814
California Energy Commission	Lorri	Gervais	1516 Ninth Street, MS 48	Sacramento	CA	95814
California Energy Company	John	Copp	900 N. Heritage Drive, Bldg D	Ridgecrest	CA	93556
California Energy Company	Mike	Scott	900 N. Heritage, Bldg. D	Ridgecrest	CA	93555
California Highway Patrol	Tom	Micone	2555 First Avenue	Sacramento	CA	95818
California Indian Legal Services	Dorothy	Alther	819 N. Barlow Lane	Bishop	CA	93514
California Integrated Waste Mgmt. Board	Mark	DeBie	8800 Cal Center Drive	Sacramento	CA	95826
California Native Plant Society	Mary	De Decker	HCR 67, Box 35	Independence	CA	93526
California Native Plant Society	Karen	Ferrell	Rt. 2, Box 352	Bishop	CA	93514
California Reclamation Board	Wendy	Halverson	1020 Ninth Street, Room 240	Sacramento	CA	95814
California RWQCB/Lahontan Region	Ken	Carter	15428 Civic Dr., Ste. 100	Victorville	CA	92392
California RWQCB/Lahontan Region	Tom	Rheiner	15428 Civic Drive, Ste. 100	Victorville	CA	92392
California State Clearinghouse			1400 Tenth Street, #121	Sacramento	CA	95814
California State Coastal Conservancy	Reed	Holderman	1330 Broadway, Suite 1100	Oakland	CA	94612
California State Geologist			801 K Street	Sacramento	CA	95814-3531
California State Lands Commission	Betty	Eubanks	100 Howe Avenue, Suite 100 South	Sacramento	CA	95825-8202
California State Lands Commission	Mary	Griggs	100 Howe Avenue, Suite 100 South	Sacramento	CA	95825-8202

Agency 1	First Name	Last Name	Address 1	City	State	Zipcode
California State Lands Commission	Robert	Hight	100 Howe Ave., Ste. 100 South	Sacramento	CA	95814
California State Lands Commission	William	Morrison	100 Howe Ave., Ste. 100 South	Sacramento	CA	95825
California State Lands Commission	Arthur	Nitsche	200 Oceangate, 12Th Flr	Long Beach	CA	90802
California State Lands Commission	Michael	Valentine	100 Howe Ave., Ste. 100 South	Sacramento	CA	95814
California State Lands Commission	Al	Willard	200 Oceangate, 12Th Flr	Long Beach	CA	90802
California State Water RCB	Mike	Falkenstein	901 P Street, 3rd Floor	Sacramento	CA	95814
California State Water RCB	Wayne	Hubbard	P.O. Box 944212	Sacramento	CA	94244-2120
California State Water RCB	Phil	Zentner	P.O. Box 944213	Sacramento	CA	94244-2130
Cerro Gordo Mines	Mike	Patterson	Rt. 1, Box 5 Swansea	Lone Pine	CA	93545
Cerro Gordo Mines	Jody	Stewart	P. O. Box 221	Keeler	CA	93530
City of Bishop	Rick	Pucci	377 West Line Street	Bishop	CA	93514
City of Los Angeles	Dave	Babb	300 Mandich Street	Bishop	CA	93514
City of Los Angeles	Alvin	Bautista	P.O. Box 111, Room 1466	Los Angeles	CA	90051-0100
City of Los Angeles	Charles	Chang	333 S. Deaudry Avenue	Los Angeles	CA	90017
City of Los Angeles	Barbara	Garrett	255 City Hall	Los Angeles	CA	90012
City of Los Angeles	Randall	Hough	P. O. Box 111, Room 1534	Los Angeles	CA	90051-0100
City of Los Angeles	Paula	Hubbard	300 Mandich Street	Bishop	CA	93514
City of Los Angeles	Lillian	Kawasaki	201 N. Figueroa St - Ste. 200	Los Angeles	CA	90012
City of Los Angeles	Clarence	Martin	300 Mandich Street	Bishop	CA	93514
City of Los Angeles	Glenn	Singley	300 Mandich Street	Bishop	CA	93514
City of Los Angeles	Bryan	Tillemans	300 Mandich Street	Bishop	CA	93514
City of Ridgecrest	Kenneth	Kelley	100 W. California Ave.	Ridgecrest	CA	93555
Colorado River Board	Gerald R.	Zimmerman	770 Fairmont Avenue, Suite 100	Glendale	CA	91203-1035
Community Development Department	Sherri	Neuman	100 W. California Avenue	Ridgecrest	CA	93555
County of Inyo	Peter	Chamberlin	P. O. Box L	Independence	CA	93526
Crocker Nuclear Lab	Lowell	Ashbaugh	University of California	Davis	CA	95616-8569
Crocker Nuclear Lab/Air Quality Group	Thomas	Cahill	University Of California	Davis	CA	95616
Crocker Nuclear Lab/Air Quality Group	Scott	Copeland	University Of California	Davis	CA	95616
Crocker Nuclear Lab/O.L. Task Group	Robert	Flocchini	University Of California	Davis	CA	95616
CSU, Bakersfield	Jim	Ostdick	9001 Stockdale Hwy.	Bakersfield	CA	93311
Daily Independent	Chris	Bouneff	P. O. Box 7	Ridgecrest	CA	93556
Dames & Moore, Inc.	Jeffrey	Zukin	5425 Hollister Ave, Ste. 160	Santa Barbara	CA	93111
Deep Springs College	Joe	Szewczak	HC 72, Box 45001	Dyer	NV	89010
Department Of Defense	Tom	Campbell	823-Eood; 1 Administrative Circle	China Lake	CA	93555
Department of the Navy	Carolyn	Shepherd	Naval Air Weapons Station	China Lake	CA	93555-6001

Agency 1	First Name	Last Name	Address 1	City	State	Zipcode
Department of Transportation	Dennis	Manning	500 South Main Street	Bishop	CA	93514
Derio / Norcross	David	Norcross	379 Mt. Tom Road	Bishop	CA	93514
Desert Protective Council	Howard & Harrie	Allen	3750 El Canto Drive	Spring Valley	CA	91977
Desert Research Institute	Andy	Baas	P. O. Box 60220	Reno	NV	89506-0220
Desert Research Institute	Judith	Chow	P.O. Box 60220	Reno	NV	89506
Desert Research Institute	Gil	Cochran	P.O. Box 60220	Reno	NV	89506-0220
Desert Research Institute	Jack	Gillies	P.O. Box 60220	Reno	NV	89506-0220
Desert Research Institute	Britt	Jacobson	P.O. Box 60220	Reno	NV	89506-0220
Desert Research Institute	Nick	Lancaster	P.O. Box 60220	Reno	NV	89506-0220
Desert Research Institute	Brad	Lyles	P.O. Box 60220	Reno	NV	89506-0220
Desert Research Institute	Tomoaki	Miura	P.O. Box 60220	Reno	NV	89506-0220
Desert Research Institute	Brad	Schultz	P.O. Box 60220	Reno	NV	89506-0220
Desert Research Institute	Scott	Tyler	P.O. Box 60220	Reno	NV	89506-0220
Desert Tortoise Preserve Committee			P.O. Box 453	Ridgecrest	CA	93555
Ducks Unlimited, Inc.	Robert	Charney, P.E.	3074 Gold Canal Drive	Rancho Cordova	CA	95670-6116
East Kern Resource Conservation District	Donna	Thomas	8158 Panorama Trail	Inyokern	CA	93527
Eastern California Museum	Bill	Michael	P.O. Box 206	Independence	CA	93526
Eastern Sierra Audubon			P. O. Box 624	Bishop	CA	93515
ENSR Consulting & Engineering	Sara J.	Head	1220 Avenida Acaso	Camarillo	CA	93012
Environmental Mgmt Associates	Dwight	Carey	1698 Greenbriar Lane, Suite 210	Brea	CA	92621-5919
Fort Independence Community of Paiute	Dan J.	Miller	P. O. Box 67	Independence	CA	93526
Fort Independence General Council	Richard	Wilder	P. O. Box 192	Independence	CA	93526
Fort Independence Reservation	Stephanie	Stephens	P.O. Box 67	Independence	CA	93526
Frank Hovore and Associates	Frank	Hovore	14734 Sundance Place	Santa Clarita	CA	91351-1542
Fresno Bee			1626 E. Street	Fresno	CA	93786
Genesis	Carlos	Mota Urbina	4500 North 32nd Street, Ste. 100	Phoenix	AZ	85018
Geologic Analysis Services	Jay	Eliason	P. O. Box 309	Deary	ID	83823
Goddard & Goddard Engineering	Wilson	Goddard	6870 Frontage Road	Lucerne	CA	95458
Governor's Office of Planning	Antero	Rivasplata	1400 Tenth Street	Sacramento	CA	95814
High Desert Multi-Use Coalition	Ron	Schiller	1163 S. Garth	Ridgecrest	CA	93555
IIT Research Institute	Ronald G.	Draftz	10 West 35th Street	Chicago	IL	60616
Indian Wells Valley Water	Mike	Hokanson	P. O. Box 1329	Ridgecrest	CA	93556
Indian Wells Valley Water	LeRoy O.	Tucker	P. O. Box 1329	Ridgecrest	CA	93555
Indian Wells Valley Water	Arden	Wallum	500 W. Ridgecrest Blvd.	Ridgecrest	CA	93556
Inyo County	Paul	Bruce	P.O. Drawer M	Independence	CA	93526

Agency 1	First Name	Last Name	Address 1	City	State	Zipcode
Inyo County	Rene	Mendez	P.O. Drawer N	Independence	CA	93526
Inyo County Board of Supervisors	Julie	Bear	336 First Street	Bishop	CA	93514
Inyo County Building Dept.	Mike	Conklin	168 Edwards St.	Independence	CA	93526
Inyo County Environmental Health Dept.	Robert	Kennedy	P.O. Box 427	Independence	CA	93526
Inyo County Library			168 North Edwards	Independence	CA	93526
Inyo County Library			210 Academy Avenue	Bishop	CA	93514
Inyo County Library			N. Main Street	Big Pine	CA	93513
Inyo County Library			Washington & Bush	Lone Pine	CA	93545
Inyo County Planning Commission	Gerald	Atkinson	135 Carmelia Lane	Big Pine	CA	93513
Inyo County Planning Commission	R. Daniel	Berry	110 Hay Street	Lone Pine	CA	93545
Inyo County Planning Commission	Jerry	Hollowell	113 Pine Road	Big Pine	CA	93513-2008
Inyo County Planning Commission	Elmer M.	Katzenstein	2724 Carol Lane	Bishop	CA	93514
Inyo County Planning Commission	John E.	Robinson	1610 Arapahoe Circle	Bishop	CA	93514
Inyo County Planning Department	Curtis	Kellogg	Drawer L	Independence	CA	93526
Inyo County Planning Department	Chuck	Thistlewaite	Drawer L	Independence	CA	93526
Inyo County Public Works Dept.	James	Gooch	168 N. Edwards St.	Independence	CA	93526
Inyo County Water Department	Greg	James	163 May Street	Bishop	CA	93514
Inyo County Water Department	Leah	Kirk	163 May Street	Bishop	CA	93514
Inyo Crude	Ken	Sample	1290 No. Main Street	Bishop	CA	93514
Inyo Register			450 East Line Street	Bishop	CA	93514
Inyokern Airport District	Nancy	Bass	P.O. Box 634	Inyokern	CA	93527
Inyokern Chamber of Commerce	Karen	Friddament	P.O. Box 232	Inyokern	CA	93527
Inyokern Community Services District	Eugenia	Hanvey	P.O. Box 1418	Inyokern	CA	93527
IWV Well Owners Association	Peggy	Breeden	P.O. Box 1432	Inyokern	CA	93527
Jet Avia	Ron	Wright	Box 306	Hurry	WA	84737
Jones & Stokes Associates, Inc.			2600 V Street	Sacramento	CA	95818-1914
Jones & Stokes Associates, Inc.	Robert	Francisco	2600 V Street	Sacramento	CA	95818-1914
Jones & Stokes Associates, Inc.	Tim	Rimpo	2600 V Street	Sacramento	CA	95818-1914
Jones & Stokes Associates, Inc.	Wayne	Shijo	2600 V Street	Sacramento	CA	95818-1914
KDAY	Bennett	Kessler	1280 N. Main St	Bishop	CA	93514
Keeler Community Service District	Nyla	Swanson	P.O. Box 63	Keeler	CA	93530
Kern Audubon Society		Conservation Chair	P.O. Box 3581	Bakersfield	CA	93385
Kern Council of Governments	Marilyn	Beardslee	1401 19th Street, Ste. 300	Bakersfield	CA	93301
Kern County APCD	Thomas	Paxson	2700 "M" Street, Suite 290	Bakersfield	CA	93301
Kern Valley Indian Community	Ron	Wermuth	P. O. Box 168	Kernville	CA	

Agency 1	First Name	Last Name	Address 1	City	State	Zipcode
KIBS-KBOV	John	Daily	P. O. Box 757	Bishop	CA	93514
King Videocable Channel 5			P. O. Box 1866	Mammoth Lakes	CA	93546
KMMT Radio			P. O. Box 1284	Mammoth Lakes	CA	93546
Lake Minerals Corporation	Paul	Lamos	P.O. Box 37	Lone Pine	CA	93545
Law / Crandall, Inc.	William	O'Braitis	200 Citadel Drive	Los Angeles	CA	90040
Levine Fricke	Bob	Solotar	1900 Powell Street, 12th Floor	Emeryville	CA	94608
Lone Pine Chamber of Commerce	Mary	Sinclair	P.O. Box 749	Lone Pine	CA	93545
Lone Pine Fire Department	LeRoy & Irene	Kritz	650 Alabama Drive	Lone Pine	CA	93545
Lone Pine Tribe	Sandra	Jefferson Jonge	101 South Main St.	Lone Pine	CA	93545
Lone Pine Unified School District	William	Schmidt	223 East Locust Street	Lone Pine	CA	93545
Los Angeles Times	Marla	Cone	Environmental Writer	Los Angeles	CA	90053
Los Angeles Times	Kevin	Roderick	P. O. Box 60185	Los Angeles	CA	90060
Luhdorff & Scalmanini	Larry	Ernst	500 First Street	Woodland	CA	95695
Luhdorff & Scalmanini	Joe	Scalmanini	500 First Street	Woodland	CA	95695
Mammoth Times Weekly			P. O. Box 3929	Mammoth Lakes	CA	93546
Maturango Museum of the			100 E. Las Flores Avenue	Ridgecrest	CA	93555
McCulley, Frick & Gilman, Inc.	Ken	Richmond	19203-36th Ave W	Lynnwood	WA	98036-5707
Metro. Water Dist. of So. Calif.	Wyatt	Jon	350 S. Grand Street	Los Angeles	CA	90071
MHA Environmental Consulting, Inc.	Laurie	McClenahan	520 S. El Camino Real, Suite 800	San Mateo	CA	94402-1721
Midwest Research Institute	Chatten	Cowherd	425 Volker Blvd.	Kansas City,	MO	64110
Montgomery-Watson	Janet	Fahey	P.O. Box 7009	Pasadena	CA	91109-7009
Mt. Whitney-Aurora Gold	Gene	Mathern	4418 Griffin Avenue	Los Angeles	CA	90031
Mt. Whitney-Aurora Gold	Vernon	Rea	P. O. Box 1091	Lone Pine	CA	93545
Nat. Oceanic & Atmospheric Admin.	Dale	Gillette	Mail Drop 81	Research Triangle Pk	NC	27711
National Audubon Society	Art	Mancl	1770 East 26th Avenue	Eugene	OR	97403
National Audubon Society	Don	Moore	1807 Drummond	Ridgecrest	CA	93555
National Park Service - 774			P. O. Box 37127	Washington	D.C.	20013-7127
Natural History Museum of L.A. County	Kimball	Garrett	900 Exposition Boulevard	Los Angeles	CA	90007
Naval Air Weapons Station	Raymond	Kelso	Code 472 130 D	China Lake	CA	93555
Naval Air Weapons Station (C080)	Terry	Belisle	1 Administrative Circle	China Lake	CA	93555-6001
Naval Air Weapons Station (C8305)	Brenda	Mohn	1 Administrative Circle	China Lake	CA	93555-6001
Neponset Geophysical Corp.			P. O. Box 3000	Pahrump	NV	89041-3000
Nikolaus and Nikolaus	Dennis	Nikolaus	P. O. Box 1295	Bishop	CA	93515
NOAA	Chris	Elvidge	Nat. Geophysical Data Center	Boulder	CO	80303
North Am. Chemical	Ross	May	P. O. Box 367	Trona	CA	93592

Agency 1	First Name	Last Name	Address 1	City	State	Zipcode
Olancha Community Service	William	Atkins	P.O. Box 64	Olancha	CA	93549
Olancha Fire Department	Steve	Davis		Olancha	CA	93549
Owens Valley High School	Gary B.	Swift	202 South Clay Street	Independence	CA	93526
Owens Valley Indian Water Commission	Teri	Cawelte	101 South Barlow Lane	Bishop	CA	93514
Owens Valley Indian Water Commission	Nick	Sprague	101 South Barlow Lane	Bishop	CA	93514
Owens Valley Mosquito Abatement Dist.			207 W. South Street	Bishop	CA	93514
Owens Valley Paiute Shoshone Cultural C	Raymond	Andrews	P. O. Box 1281	Bishop	CA	93514
P and D Environmental Services	Ty	Garrison	401 West A Street, Ste. 2500	San Diego	CA	92101
Pacific Custom Materials	Nancy	Garnett	1341 W. Mockingbird Lane	Dallas	TX	75247
Pacific Southwest Biological Services	R. Mitchel	Beauchamp	P. O. Box 985	Natioanl City	CA	91951-0985
Parsons Engineering Science, Inc.	Ranajit	Sahu	100 West Walnut Street	Pasadena	CA	91124
People for the West	Linus	Brewer	P.O. Box 68	Lone Pine	CA	93545
Point Reyes Bird Observatory	Daniel	Evans	4990 Shoreline Highway	Stinson Beach	CA	94970
Point Reyes Bird Observatory	Gary	Page	4990 Shoreline Highway	Stinson Beach	CA	94970
Radian Corporation	C. N. "Raj"	Rangaraj	16845 Von Karman Ave., Ste. 100	Irvine	CA	92714
Rain For Rent	Dave	Hand	3413 State Road	Bakersfield	CA	93303
Rain-For-Rent	Mike	Grundvig	P.O. Box 588	San Joaquin	CA	93660
Rain-For-Rent	Jerry	Lake	P.O. Box 2248	Bakersfield	CA	93303
Review Herald	Jason	Montiel	P. O. Box 110	Mammoth Lakes	CA	93546
San Bernardino County Museum	Bob	McKernan	2024 Orange Tree Lane	Redlands	CA	92374
San Francisco Bay Dev. Commission	Steve	McAdam	30 Van Ness Avenue, Room 2011	San Francisco	CA	94102
Sapphos Environmental	Marie	Campbell	50 S. DeLacey, Suite 210	Pasadena	CA	91105
Sensit Labs, Inc.	Paul	Stockton	Rr 01, Box 38	Portland	ND	58274
Sierra Club			P.O. Box 8096	Reno	NV	89507-8096
Sierra Club	Constantina	Ecomou	10 Panoramic Way	Berkeley	CA	94704
Sierra Club		Range Of Light Grou	P.O. Box 1973	Mammoth Lakes	CA	93546
Sierra Club CA-NV Mining Committee	Stan	Haye	P.O. Drawer W	Indepenedence	CA	93526
Sierra Club Legal Defense Fund	Jessica	Wooley	180 Montgomery St, #1400	San Francisco	CA	94104-4230
Sierra Club/Audubon Society	Michael	Prather	P.O. Box 406	Lone Pine	CA	93545
Sierra Nevada Aquatic Research Lab.	Dave	Herbst	Route 1, Box 198	Mammoth Lakes	CA	93546
Southern California Edison Company	Rob	Farber	374 Lagoon Street	Bishop	CA	93514
Special Products International	Joe	Barton	P. O. Box 937	Half Moon Bay	CA	94019
State of California	Mary	Scoonover	1300 I Street #1101	Sacramento	CA	94244-2550
State of California	Jan	Stevens	1300 I Street #1101	Sacramento	CA	94244-2550
State of California	Katy	Walton	500 S. Main Street	Bishop	CA	93514

Agency 1	First Name	Last Name	Address 1	City	State	Zipcode
Sweetwater Environmental Biologists	Jeff	Lincer	11969 Paseo Fuerte	El Cajon	CA	92020-8366
T & B Planning Consultants	Karen	Ruggles	3242 Halladay Ct., Ste. 100	Santa Ana	CA	92705
Tahoe Regional Planning	Rick	Angelocci	P.O. Box 1038	Zephyr Cove	NV	89448
Tahoe Regional Planning Agency	Jim	Allison	P. O. Box 1038	Zephyr Cove	NV	89448-1038
Team Engineering	Walt	Pachucki	P.O. Box 1265	Bishop	CA	93515
Tensar	Chris	Young	1925 Adobe Road	Paso Robles	CA	93446
Terry's Backhoe Service	Don	Terry	3801 Faith Home Rd.	Ceres	CA	95207
The News Review	Liz	Babcock	P. O. Box 640	Ridgecrest	CA	93556
The News Review	Patti	Cosner	P. O. Box 640	Ridgecrest	CA	93556
The Press-Enterprise	Gary	Polakovic	3512 Fourteenth Street	Riverside	CA	92501-3878
The Wildlife Society	David	Boyer	1463 Glen Avon Drive	San Marcos	CA	92069
Timbisha Shoshone Tribe	Richard	Boland	P. O. Box 206	Death Valley	CA	92328-0206
Timbisha Shoshone Tribe	Pauline	Esteves	P. O. Box 206	Death Valley	CA	92328-0206
Toiyabe Indian Health Project	David	Lent	52 Tu Su Lane	Bishop	CA	93514-8058
U.S. Army Corps of Engineers			2151 Allesandro Drive, Ste 255	Ventura	CA	93001
U.S. Army Corps of Engineers			P.O. Box 2711	Los Angeles	CA	90053
U.S. Department of Agriculture	Mark	Davis	136 Edwards	Bishop	CA	93514
U.S. Department of Agriculture	Donald W.	Fryrear	P. O. Box 909	Big Spring	TX	79721-0909
U.S. Department of Agriculture	Maxine	Levin	USDA / 2121-C, Ste 102	Davis	CA	95616
U.S. Department of Agriculture	Dennis	Martin	873 North Main Street	Bishop	CA	93514
U.S. Department of Agriculture	Luci	McKee	873 No. Main Street	Bishop	CA	93514
U.S. Department of Agriculture	Ed	Tallyn	136 Edwards Street	Bishop	CA	93514
U.S. Department of Interior			MIB 4544	Washington	D.C.	20240
U.S. Department of Interior			California Desert District	Riverside	CA	92507
U.S. Department of Interior			P.O. Box 2507, Bldg. 67	Denver	CO	80225-0007
U.S. Department of Interior			1849 C Street, NW	Washington	D.C.	20240
U.S. Department of Interior	Lee	Delaney	300 So. Richmond Road	Ridgecrest	CA	93555-9523
U.S. Department of Interior	Doug	Dodge	785 No. Main Street, Ste E	Bishop	CA	93514-2471
U.S. Department of Interior	Larry	Primosch	785 No. Main Street, Ste E	Bishop	CA	93514-2471
U.S. Department of Interior	Genivieve	Rasmussen	785 North Main Street, Ste E	Bishop	CA	93514-2471
U.S. Department of Interior	Judith E.	Rocchio	600 Harrison Street, #600	San Francisco	CA	94107-1372
U.S. Department of Interior	Terry	Russi	785 North Main Street	Bishop	CA	93514
U.S. Department of the Interior	Glenn W.	Harris	300 S. Richmond Road	Ridgecrest	CA	93555
U.S. Department of the Interior	H. Ronald	Pulliam	National Biological Service	Washington	DC	20240
U.S. Dept. of Interior				Death Valley	CA	92328

Agency 1	First Name	Last Name	Address 1	City	State	Zipcode
U.S. Dept. of Interior				Death Valley	CA	92328
U.S. Dept. of Interior	Ross R.	Hopkins	P. O. Box 426	Independence	CA	93526
U.S. Dept. of the Interior	Steve	Smith	300 South Richmond Road	Ridgecrest	CA	93555
U.S. Fish & Wildlife Service	Ray	Bransfield	2493 Portola Road, Suite B	Ventura	CA	93003
U.S. Fish & Wildlife Service	Cat	Brown	2493 Portola Road, Suite B	Ventura	CA	93003
U.S. Fish & Wildlife Service	Tiffany	Welsh	2493 Portola Road, Suite B	Ventura	CA	93003
U.S. Geological Survey	Howard	Wilshire	345 Middlefield Road	Menlo Park	CA	94025
U.S. Senator	Barbara	Boxer	1700 Montgomery St., Ste. 240	San Francisco	CA	94111
U.S. Senator	Dianne	Feinstein	525 Market Street, Ste. 3670	San Francisco	CA	94105
U.S.E.P.A.	Larry	Biland	75 Hawthorne Street	San Francisco	CA	94105
UC Riverside	David	Grantz	Kearney Agricultural Center	Parlier	CA	93648
UCLA School Of Public Health	John	Froines	10833 Leconte Avenue	Los Angeles	CA	90024-1772
Univ. of Nevada, Las Vegas	David E.	James	4505 Maryland Parkway	Las Vegas	NV	89154-3936
University of Calif., Davis	Greg	Cho		Davis	CA	95616-8569
University of Calif., Davis	Randy	Dahlgren	Hoagland Hall	Davis	CA	95616-8569
University of Calif., Davis	Bruce	Eldridge	Univ. of Calif., at Davis	Davis	CA	95616
University of Calif., Davis	Carol	Morton	News Service	Davis	CA	95616
University of Calif., Davis	Jim	Richards	Hoagland Hall	Davis	CA	95616-8569
University of Calif., Davis	Bruce	White		Davis	CA	95616-8569
Ute Ute Gwaitu Paiute	Rose Marie	Bahe	Star Route 4, Box 56-A	Benton	CA	93512
Versar, Inc.	Blaine	Comer	769 Utah Valley Drive	American Fork	UT	84003
Warzyn, Inc. PAS 1-3D	John	Pinsonnault	P. O. Box 7009	Pasadena	CA	91109-7009
Washoe Tribe of NV & Calif.	Janelle	Conway	919 US HWY 395 South	Gardnerville	NV	89410
Wave Propogation Lab, R/E/WP	Reginald	Hill	325 Broadway	Boulder	CO	80303
Western Asphalt, Inc.	Leo	Elliott	3800 Gilmore Ave.	Bakersfield	CA	93308
Weststar 12	Paula	Brown	P. O. Box 1268	Bishop	CA	93514
White Mountain Research Station	David	Trydahl	3000 E. Line St.	Bishop	CA	93514
Winnedumah Country Inn	Marvey	Chapman	P. O. Box 189	Independence	CA	93526
Woodward-Clyde	Bill	Hutchison	410 N. 44th Street	Phoenix	AZ	85008
WTJ Software Service	Wally	Jansen	809 Lawrence Rd.	San Mateo	CA	94401
	Tim	Alpers	P. O. Box 263	Lee Vining	CA	93541
	Ruth & Dolph	Amster	1418 Synor Avenue	Ridgecrest	CA	93555
	Keith	Andrews	P. O. Box 1079	Lone Pine	CA	93545
	Linda	Arcularius	Rt 2, Box 24A	Bishop	CA	93514
	Larry	Armstrong	291 Lakeview	Lone Pine	CA	93545

Agency 1	First Name	Last Name	Address 1	City	State	Zipcode
	Ralph T.	Asdel	Star Rt Box K17	Big Pine	CA	93513
	Mark	Bagley	175 So. First St.	Bishop	CA	93514
	Todd	Bean	P.O. Box 1025	Lone Pine	CA	93545
	Steven	Blum	901"P" Street	Sacramento	CA	95814
	Colleen	Bracken	225 W. Robertson Rd., Apt. C	Ridgecrest	CA	93555
	Keith	Bright	Drawer V	Independence	CA	93526
	Hoy	Buell	Greenhart Farms, Inc.	Arroyo Grande	CA	93421-6510
	Paul	Burns	P.O. Box 333	Inyokern	CA	93527
	Eunice	Caffee	P.O. Box 4	Inyokern	CA	93527
	Dave	Calkins	1 Carolyn Court	Orinda	CA	94563
	Tom	Camine	548 East Dana Avenue	Ridgecrest	CA	93555
	Fred	Camphausen	2765 Sierra Vista Way	Bishop	CA	93514
	Camille	Cervantes	P. O. Box 524	Lone Pine	CA	93545
	Del	Chambers	P. O. Box 9	Lone Pine	CA	93545
	Becky	Christensen	P. O. Box 65	Olancha	CA	93549
	Don	Christenson	P. O. Box 38	Lone Pine	CA	93545
	Cam	Craik	35 Monroe Ranch Road	Markleville	CA	96120
	Jean	Crispin	P.O. Box 1026	Lone Pine	CA	93545
	Robert	Curry	P.O. Box 770	Soquel	CA	95073
	Mary	De La Torre	28103 Windy Way	Castaic	CA	91384
	Michael	Dorame	Rt. 2, Box 159	Lone Pine	CA	93545
	Julie & John	Dukes	P. O. Box 3033	San Anselmo	CA	94979-3033
	Pat	Dunn	1441 Westwood Blvd., Ste. D	Los Angeles	CA	90024
	Tom	Farnetti	P. O. Box 1237	Mammoth Lakes	CA	93546
	Loretta	Foreman	P.O. Box 556	Lone Pine	CA	93545
	Marty	Forstenzer	P. O. Box 387	Bishop	CA	93515
	Francis	Fretcher	P.O. Box 156	Olancha	CA	93549
	Jerry	Gabriel	1800 Valley View Drive	Bishop	CA	93514
	Chris	Gansberg, Jr.	2277 Foothill Road	Markleeville	CA	96120
	Betty	Gilchrist	Rte 2, Box 89	Lone Pine	CA	93545
	Derham	Giuliani	P.O. Box 265	Big Pine	CA	93514
	Mary	Grimsley	1012 N. Sierra View	Ridgecrest	CA	93555
	David	Groeneveld	P.O. Box 3296	Telluride	CO	81435
	Bob	Hamblin	P.O. Box 66	Lone Pine	CA	93545
	Dan and Nina	Hardewick	303 Lake Street	Cartago	CA	93549

Agency 1	First Name	Last Name	Address 1	City	State	Zipcode
	Kathleen	Heater	Rt. 2, Box 207	Lone Pine	CA	93545
	Thomas & JoAnn	Heindel	P.O. Box 400	Big Pine	CA	93513
	John	Hewmann	2109 W. Ridgecrest Blvd.	Ridgecrest	CA	93555
	Zona	Holt	233 W. Lake Road	Cartago	CA	93520
	Linda	Hubbs	P.O. Box 447	Lone Pine	CA	93545
	Helen	Huntley	301 E. Wilson Avenue	Ridgecrest	CA	93555
	Bruce	Ivey	P.O. Box 304	Independence	CA	93526
	Rod	Jenson	2048 Las Flores	Ridgecrest	CA	93555
	Mr. & Mrs. G. L.	Johnson	1561 N. Everett	Ridgecrest	CA	93555
	Dorothy May	Joseph	P.O. Box 562	Lone Pine	CA	93545
	Stephen	Kalish	8574 Rim Rock Place	Bishop	CA	93514
	Bennett	Kessler	P.O. Box 275	Independence	CA	93526
	Richard	Knox	P. O. Box 447	Bishop	CA	93515
	Devon	Kohen	21918 Bahamas Drive	Mission Viejo	CA	92692
	Bryson	Kratz	400 E. Yaney	Bishop	CA	93514
	Earl	Kruch	3303 Sage Flat Road	Olancha	CA	93549
	Debra	Lawhon	1111 Via Chaparral	Santa Barbara	CA	93105
	Andrea	Lawrence	P.O. Box 43	Mammoth Lakes	CA	93546
	Eric	Layman	900 N. Heritage Dr., #D	Ridgecrest	CA	93555-5517
	Philip	Leitner	2 Parkway Court	Orinda	CA	94563
	Mykle	Loftus	304 Vanessa	Ridgecrest	CA	93555
	Richard	Lopez	P. O. Box 212	Keeler	CA	93530
	Mary	Lundstrom	731 Howell Avenue	Ridgecrest	CA	93555
	Jim	Macey	Box 131	Keeler	CA	93530
	Rick	Maddux	P.O. Box 712	Lone Pine	CA	93545
	William	Manning	P.O. Box 513	Big Pine	CA	93513
	Mitch	Markota	1217 Tamarisk	Ridgecrest	CA	93555
	Rick	McCoy	P.O. Box 128	June Lake	CA	93529
	Denise	McEntee	213 S. Forest Knoll	Ridgecrest	CA	93555
	John	McQuiston	400 N. China Lake Blvd.	Ridgecrest	CA	93555
	Elaine	Mead	7611 Brown Road	Inyokern	CA	93527
	Robert E.	Michener	3117 Tumbleweed Rd.	Bishop	CA	93514
	Andrew	Morin	P.O. Box 24	Lone Pine	CA	93545
	Tony	Morin	200 W. Moyer Spacefront 23	Ridgecrest	CA	93555-2637
	Sandra L.	Nagel	932 W. Vicki Avenue	Ridgecrest	CA	93555

Agency 1	First Name	Last Name	Address 1	City	State	Zipcode
	Bill	Nevins	365 E. Kendall Avenue	Ridgecrest	CA	93555
	Tezz	Niemeyer	P. O. Box 115	Olancha	CA	93549
	Kathy	Noland	P.O. Box 835	Lone Pine	CA	93545
	Pat	O'Dell	P.O. Box 523	Bishop	CA	93515
	Donald W.	Odell	P.O. Box 128	Lone Pine	CA	93545
	Derek	Olson	199 Edwards Street	Bishop	CA	93514
	Dr. Bruce	Parker	1081 N. China Lake Blvd.	Ridgecrest	CA	93555
	Robert	Paschall	2758 Glenbrook Way	Bishop	CA	93514
	Chris	Patton	2800 Corabel Lane	Sacramento	CA	95821-5285
	Paul	Payne	P.O. Box 11	Lone Pine	CA	93545
	Rob	Pearce	311 Vista Road	Bishop	CA	93514
	Richard L.	Perrine	22611 Kittridge St.	West Hills	CA	91307
	Rick	Perrine, Jr.	1025 Farragut Street	Ridgecrest	CA	94555
	Bill & Lorraine	Peterson	P.O. Box 807	Lone Pine	CA	93545
	Steve	Peterson	155 Iroquois Drive	Boulder	CO	80303
	Thomas	Phifer	451 Pine Street	Big Pine	CA	93513
	Karen	Piper	2806 Lynnwood Street	Columbia	MO	65203
	Ray	Powell	115 South Lakeview	Lone Pine	CA	93545
	Larry	Pruce	P.O. Box 67	Olancha	CA	93549
	Clyde Lee	Robinson	P. O. Box 1207	Weldon	CA	93283
	Julie	Robinson	P. O. Box 3033	San Anselmo	CA	94979
	Michele	Rosato	400 N. China Lake Blvd.	Ridgecrest	CA	93555
	Patty	Rosenberg	P.O. Box 127	Olancha	CA	93549
	Richard	Ryme	P.O. Box 319	Lone Pine	CA	93545
	Melinda	Salmonds	720 Cartago	Olancha	CA	93549
	Marian & A. J.	Seiter	P. O. Box 615	Lone Pine	CA	93545
	Bea	Smith	918 Beverley Court	Ridgecrest	CA	93555
	Troy	Soenen	139 Balsam Street	Ridgecrest	CA	93555
	Pierre	St Amand	1748 Los Flores	Ridgecrest	CA	93555
	Barbara	Steel	16602 Monte Oro Drive	Whittier	CA	90603
	John	Stephan	900 Spring Street	Oakview	CA	93022
	Larry	Trowsdale	951 E. Skylark Avenue	Ridgecrest	CA	93555
	Dean	Vanderwall	P.O. Box 189	Lone Pine	CA	93545
	C. Ann	Wade	2112 Carson River Road	Markleeville	CA	96120
	Sam	Wasson	P.O. Box 223	Keeler	CA	93530

Agency 1	First Name	Last Name	Address 1	City	State	Zipcode
	Allen	Weston	110 Enchanted Lake	Olancha	CA	93549
	Norman	Whittaker	P.O. Box 211	Keeler	CA	93530
	Judy	Wickman	SR 2 Box 170	Lone Pine	CA	93545
	Gavin	Wilkinson	P. O. Box 1102	Lone Pine	CA	93545
	Dave	Willey	P.O. Box 948	Lone Pine	CA	93545
	Earl	Wilson	P.O. Box 830	Lone Pine	CA	93545
	James	Wilson	2636 Irene Way	Bishop	CA	93514
	Lois	Wilson	P. O. Box 617	Lone Pine	CA	93545
	Jay	Young	1925 Sydnor Avenue	Ridgecrest	CA	93555
	John K.	Ziegler	330 Irving Road	York	PA	17403-3908

Resolutions Certifying Addendum Number 1 to the Final Environmental Impact Report (Resolution 98-04) and Adopting the 1998 Revision to the SIP (Resolution 98-05)

RESOLUTION NO. 98-04

RESOLUTION OF THE GOVERNING BOARD OF THE GREAT BASIN UNIFIED AIR POLLUTION CONTROL DISTRICT CERTIFYING ADDENDUM NO. 1 TO THE FINAL ENVIRONMENTAL IMPACT REPORT FOR THE OWENS VALLEY PM_{10} PLANNING AREA DEMONSTRATION OF ATTAINMENT STATE IMPLEMENTATION PLAN AND INCORPORATED BOARD ORDER

For reasons detailed below, the Governing Board of the Great Basin Unified Air Pollution Control District (the "Governing Board") certifies that the Addendum No. 1 (the "Addendum") to the Final Environmental Impact Report ("FEIR") prepared for the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order has been completed in compliance with the California Environmental Quality Act ("CEQA") (Pub. Res. Code, §21000, *et seq.*); that the Governing Board has reviewed and considered the information and analysis contained in Addendum together with that contained in the FEIR; and that the FEIR, as modified by the Addendum, reflects the independent judgment of the Great Basin Unified Air Pollution Control District (the "District").

WHEREAS, pursuant to the federal Clean Air Act Amendments of 1990, the State of California is required to submit to the Administrator of the United States Environmental Protection Agency a State Implementation Plan for the Owens Valley Planning Area that demonstrates timely attainment of the National Ambient Air Quality Standards ("NAAQS") for PM_{10}, defined as particulate matter having an aerodynamic diameter of a nominal 10 microns or less; and

WHEREAS, the Great Basin Unified Air Pollution Control District is the body vested by law with the authority and responsibility to develop and adopt the Attainment Demonstration State Implementation Plan for the Owens Valley PM_{10} Planning Area, and to submit the Attainment Demonstration SIP to the State Air Resources Board for its approval and submittal to the U.S. Environmental Protection Agency Administrator on behalf the State of California; and

WHEREAS, on July 2, 1997, the District's Governing Board adopted the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order (collectively, "Attainment Demonstration SIP") to comply with the requirements of state and federal air quality law; and

WHEREAS, in conjunction with its adoption of the Attainment Demonstration SIP, the District's Governing Board adopted a resolution certifying that the FEIR had been completed in compliance with the California Environmental Quality Act; that the Governing Board had reviewed and considered the information and analysis contained in the FEIR; and that the FEIR reflected the independent judgment of the District; and

WHEREAS, the District determined that a Revision to the Attainment Demonstration SIP and the subsequent rescission of District Order No. 070297-04, requiring the City to implement the control measures prescribed in the Attainment Demonstration SIP, were advised in the circumstances; and

WHEREAS, the adoption of the proposed 1998 Revision to the Attainment Demonstration SIP and the subsequent rescission of District Order No. 070297-04 ("1998 SIP Revision") was a "project" as defined by CEQA; and

WHEREAS, the District determined that it was the appropriate public agency to act as Lead Agency under CEQA for the adoption of the proposed 1998 SIP Revision; and

WHEREAS, for the reasons set out in the Addendum, the preparation of a subsequent or supplemental environmental impact report was determined to be not appropriate for the proposed adoption of the 1998 SIP Revision under applicable CEQA statutory law and regulations; and

WHEREAS, the District prepared the Addendum, supported by third-party consultants with the District remaining responsible for managing the preparation of the Addendum and subjecting the contractor's drafts to its own independent review and analysis; and

WHEREAS, the Governing Board has reviewed the Addendum in its entirety, and considered its contents with the FEIR, and has determined that the Addendum for the 1998 SIP Revision meet all the requirements for certification under CEQA and reflects the independent judgment of the District;

NOW, THEREFORE, BE IT RESOLVED by the Governing Board of the Great Basin Unified Air Pollution Control District as follows:

1. It is hereby certified that the Addendum has been completed in compliance with CEQA;

2. It is hereby certified that this Addendum has been presented to the Governing Board of the Great Basin Unified Air Pollution Control District, which has reviewed and considered the information and analysis contained therein together with the information and analysis contained in the FEIR;

3. It is hereby certified that this Addendum reflects the independent judgment of the Great Basin Unified Air Pollution Control District;

4. This certification does not represent project approval or disapproval and does not constitute final action by the Great Basin Unified Air Pollution Control District.

APPROVED AND ADOPTED by the Governing Board of the Great Basin Unified Air Pollution Control District this 16th day of November, 1998, by the following vote:

AYES: Chairman Chris Gansberg, Jr., Supervisors: Linda Arcularius, Andrea Lawrence, Herman Zellmer, Michael Dorame and Joann Ronci

NOES: Ø

ABSTAIN: Ø

ABSENT: Ø

Chris Gansberg Jr

Chris Gansberg
Chairman, Governing Board

ATTEST:

Donna Leavitt

Donna Leavitt
Clerk of the Board

RESOLUTION NO. 98-05

RESOLUTION OF THE GOVERNING BOARD OF THE GREAT BASIN UNIFIED AIR POLLUTION CONTROL DISTRICT ADOPTING THE 1998 REVISION TO THE OWENS VALLEY PM_{10} PLANNING AREA DEMONSTRATION OF ATTAINMENT STATE IMPLEMENTATION PLAN AND INCORPORATED BOARD ORDER, AND ADOPTING A MITIGATION MONITORING AND REPORTING PLAN, AND MAKING FINDINGS OF FACT.

WHEREAS, in Resolution 98-04, which is incorporated by reference herein, the Governing Board of the Great Basin Unified Air Pollution Control District ("Governing District") certified that Addendum No. 1 (the "Addendum") to the Final Environmental Impact Report ("FEIR") prepared for the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order (collectively, "Attainment Demonstration SIP") has been completed in compliance with California Environmental Quality Act ("CEQA"); that the Governing Board has reviewed and considered the information and analysis contained in the Addendum with the information and analysis contained in the FEIR; and that the Addendum reflects the independent judgment of the Great Basin Unified Air Pollution Control District (the "District");

WHEREAS, prior to the Governing Board's action certifying the Addendum, the District and its consultants analyzed the environmental impacts of the proposed 1998 Revision to the Attainment Demonstration SIP (the "1998 SIP Revision"); and

WHEREAS, the proposed 1998 SIP Revision was circulated for public and governmental agency comment; and

WHEREAS, the FEIR and the Addendum identified certain significant effects on the environment that, absent the adoption of mitigation measures, would be caused by the City of Los Angeles' compliance with the Attainment Demonstration SIP;

WHEREAS, the District is required, pursuant to the California Environmental Quality Act ("CEQA") (Pub. Resources Code, § 21000 *et seq.*), to adopt all feasible mitigation measures or feasible project alternatives that can substantially lessen or avoid any significant impacts on the environment associated with a project to be approved, such as the Attainment Demonstration SIP;

WHEREAS, the Findings of Fact adopted as Exhibit A to this Resolution demonstrate that all of the significant impacts on the environment associated with the 1998 SIP Revision can be avoided through the adoption of feasible mitigation measures;

WHEREAS, the Governing Board has determined, for reasons set forth in Exhibit A hereto and described in the FEIR and the Addendum, that the 1998 SIP Revision is superior to all feasible project alternatives, that feasible project alternatives would not reduce any potentially significant and unavoidable impact of the Attainment Demonstration SIP to less-than-significant levels; and that the No Project Alternative, which would avoid these impacts, would fail to achieve most of the objectives and benefits of the Attainment Demonstration SIP;

WHEREAS, the Governing Board is required by Public Resources Code Section 21081.6, subdivision (a), to adopt a mitigation monitoring and reporting program to ensure that the mitigation measures adopted by the District are actually carried out;

WHEREAS, the final Mitigation Monitoring and Reporting Program for the 1998 SIP Revision has been prepared, and is adopted as Exhibit B to this resolution;

NOW, THEREFORE, BE IT RESOLVED by the Governing Board of the Great Basin Unified Air Pollution Control District as follows:

1. Through this Resolution, the Governing Board hereby reaffirms each of its findings and resolutions made in Resolution 98-04 which is incorporated herein by reference and approves and adopts the 1998 Revision to the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order, which approval and adoption are effective immediately;

2. The Governing Board hereby adopts and issues Great Basin Unified Air Pollution Control District Order No. 981116-01 set forth in Chapter 8 of the 1998 Revision to the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order, which adoption and issuance are effective immediately;

3. The Clerk of the Governing Board is hereby authorized to combine and compile the 1998 SIP Revision with the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order adopted July 2, 1997 in order to produce and certify on behalf of the District the "Revised Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order", which compilation upon the Clerk's certification, shall constitute the authoritative version of the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order adopted July 2, 1997, as revised by the 1998 SIP Revision;

5. Through this Resolution, which incorporates by reference and adopts the Mitigation Monitoring and Reporting Program included as Exhibit B to this Resolution, the Governing Board has satisfied its obligations pursuant to Public Resources Code section 21081.6, subdivision (a);

6. By adopting this Resolution, including the exhibits attached hereto, the Governing Board has satisfied its obligations pursuant to Public Resources Code section 21081 and California Code of Regulations, title 14, section 15091, in that the Governing Board has made one or more of the following findings with respect to the significant or potentially significant effects of the Attainment Demonstration SIP: (a) Changes or alterations have been required in, or incorporated into the Attainment Demonstration SIP which mitigate or avoid many of the significant environmental effects thereof as identified in the FEIR; (b) Some changes or alterations are within the responsibility and jurisdiction of another public agency and such changes have been, or can and should be, adopted by that other agency; (c) Specific economic, legal, social, technological, or other considerations make infeasible the mitigation measures or alternatives identified in the environmental impact report. Based upon these findings and the information contained in the record, the Governing Board concludes that the adoption of the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order will not cause to occur any significant adverse effect on the physical environment.

APPROVED AND ADOPTED by the Governing Board of the Great Basin Unified Air Pollution Control District this 16th day of November, 1998, by the following vote:

AYES: Chairman Chris Gansberg, Jr., Supervisors: Linda Arcularius, Andrea Lawrence, Herman Zellmer, Michael Dorame and Joann Ronci

NOES: Ø

ABSTAIN: Ø

ABSENT: Ø

Chris Gansberg Jr

Chris Gansberg
Chairman, Governing Board

ATTEST:

Donna Leavitt

Donna Leavitt,
Clerk of the Governing Board

Attachments: Exhibit A - Findings of Fact
Exhibit B - Mitigation Monitoring and Reporting Program

RESOLUTION 98-05, EXHIBIT A

1998 REVISIONS TO OWENS VALLEY PM_{10} PLANNING AREA DEMONSTRATION OF ATTAINMENT STATE IMPLEMENTATION PLAN

FINDINGS OF FACT UNDER THE PROVISIONS OF CALIFORNIA HEALTH AND SAFETY CODE SECTION 42316(a),

FINDINGS OF FACT ON SIGNIFICANT ENVIRONMENTAL IMPACTS OF THE PROPOSED PROJECT,

FINDINGS OF FACT ON PROJECT ALTERNATIVES,

AND OTHER FINDINGS OF FACT

Related Documentation:
November 16, 1998 SIP Revision
July 2, 1997 Demonstration of Attainment State Implementation Plan
November 16, 1998 Addendum No. 1 to Final EIR
March 25, 1997 Draft Environmental Impact Report
June 18, 1997 Final Environmental Impact Report
(State Clearinghouse Number 96122077)

Project Files May Be Reviewed at:

Great Basin Unified Air Pollution Control District
157 Short Street, Bishop, California 93514
(760) 872-8211

November 16, 1998

Resolution 98-05, Exhibit A - Findings of Fact Relating to the 1998 Revisions To Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan

Document Contents

INTRODUCTION AND PURPOSE

The proposed 1998 Revisions to the *Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order* ("1998 SIP Revision") is a "project" as defined by the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000 *et. seq.*). The Great Basin Unified Air Pollution Control District ("GBUAPCD" or "District") is the lead agency for the project. The District's Governing Board adopted and certified the Final Environmental Impact Report ("FEIR") for the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order ("SIP") concurrently with adoption of that SIP on July 2, 1997. For consideration of the 1998 SIP Revision, the District prepared an addendum to the FEIR, entitled "Addendum No. 1 to the Final Environmental Impact Report (FEIR) for the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order" ("Addendum"). The Draft 1998 SIP Revision was circulated to public agencies and the public for a 30-day review and comment period. Pursuant to the requirements of CEQA, the FEIR, as modified by the Addendum, describes the Proposed Project and affected environment; it identifies, analyzes and evaluates the potential significant environmental impacts that may result from the Proposed Project; it identifies measures to mitigate adverse environmental impacts; and it identifies and compares the merits of project alternatives.

CEQA Guidelines require a public agency's decision makers to consider the information in the FEIR and the Addendum along with other information that may be presented to the GBUAPCD when deciding whether to approve the Proposed Project. The Final EIR and Addendum set forth the information to be considered in the GBUAPCD Governing Board's evaluation of benefits and potential impacts to the environment resulting from the implementation of the SIP as revised by the 1998 SIP Revision.

The EIR for the proposed SIP identified potential adverse environmental impacts in the following areas: meteorology and air quality, vegetation resources, wildlife resources, cultural resources and transportation. It was concluded in the Final EIR and the Addendum that no significant adverse impacts will remain after implementation of feasible mitigation measures.

This document presents findings to be made by the GBUAPCD Governing Board prior to approval of the project pursuant to the requirements of CEQA and the CEQA Guidelines. CEQA requires the GBUAPCD to make certain written findings explaining how it has dealt with each alternative and each significant environmental impact identified in the Final EIR and the Addendum. The GBUAPCD may find that:

- changes or alterations have been required in or incorporated into the project to avoid or substantially lessen the significant environmental effects identified in the FEIR and Addendum;

- such changes or alterations are within the purview and jurisdiction of another agency and have been or should be adopted by that agency; or

- specific economic, social or other considerations make infeasible the mitigation measures or project alternatives identified in the FEIR and Addendum and Mitigation Monitoring and Reporting Program (MMRP).

Each of these findings are supported by substantial evidence in the administrative record. Evidence from the FEIR and Addendum, MMRP and elsewhere in the record of proceedings are relied upon to meet these criteria.

This document summarizes the significant environmental impacts of the Proposed Project and project alternatives and describes how these impacts are to be mitigated. An MMRP will be adopted concurrently with these findings (Exhibit B). The MMRP sets forth a program to ensure that required environmental impact mitigation measures are properly implemented.

FINDINGS OF FACT UNDER THE PROVISIONS OF CALIFORNIA HEALTH AND SAFETY CODE SECTION 42316(a)

On the basis of substantial evidence in the record, and for the reasons set forth in that certain *Staff Report To The Board: Compliance Of The Owens Valley PM_{10} Planning Area Demonstration Of Attainment State Implementation Plan Control Measures With Requirements Of Health & Safety Code Section 42316(a)* dated July, 1997, and that certain *Staff Report to the Board Re: Revisions to the July 2, 1997 Owens valley Planning Area State Implementation Plan* dated November 16, 1998, which are hereby incorporated herein by this reference, the Governing Board of the GBUAPCD makes the following findings:

- **Finding 1:** The GBUAPCD Governing Board finds that there are violations of the state and federal ambient air quality standards for PM_{10} in the Owens Valley PM_{10} Planning Area.

- **Finding 2:** The GBUAPCD Governing Board finds that the dry bed of Owens Lake causes and contributes to the violations of the state and federal ambient air quality standards for PM_{10} in the Owens Valley PM_{10} Planning Area.

- **Finding 3:** The GBUAPCD Governing Board finds that the water diversions of the City of Los Angeles have uncovered essentially all of the dust source areas on the dry lake bed, thus causing and contributing to violations of the state and federal ambient air quality standards for PM_{10} in the Owens Valley PM_{10} Planning Area.

- **Finding 4:** The GBUAPCD Governing Board finds that shallow flooding, managed vegetation, and gravel, as required and permitted by the 1998 SIP Revsision to the *Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order*, will mitigate the air quality impacts caused by the City of Los Angeles' water diversions.

- **Finding 5:** The GBUAPCD Governing Board finds that shallow flooding, managed vegetation, and gravel, as required and permittedby the *Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan*, are reasonable control measures for the dust-producing areas on Owens Lake.

- **Finding 6:** The GBUAPCD Governing Board finds that the control measures required by the 1998 SIP Revision to the *Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order* do not affect the right of the City to produce, divert, store or convey water.

- **Finding 7:** The GBUAPCD Governing Board finds the control measures required by the 1998 SIP Revision to the *Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order* can be completed by milestones and deadlines set forth in the Plan.

- **Finding 8:** The GBUAPCD Governing Board finds that the time period for implementation is a reasonable period to complete the implementation of the control measures.

- **Finding 9:** The GBUAPCD Governing Board makes each and every of the above findings on the basis of substantial evidence in the record. The GBUAPCD is the custodian of the materials which constitute the record of proceedings upon which the decision to approve the Proposed Project is based. These materials are located at the District's offices at 157 Short Street, Bishop, California 93514.

FINDINGS OF FACT ON SIGNIFICANT IMPACTS OF THE PROPOSED PROJECT

This section identifies the findings on significant impacts of the Proposed Project, as identified in the Final EIR ("EIR") and the Addendum by issue area.

Geology and Soils

The EIR discusses the Proposed Project's impacts on geology and soils in Section 5-1 of the EIR.

Impact: As explained in Section 5-1 of the EIR, the environmental impacts to geology and soils were found to be less-than-significant.

- **Mitigation Measures:** No mitigation measures are required for impacts to geology and soils.

- **Finding 10: No mitigation measures are required.** The GBUAPCD Governing Board finds that the Proposed Project will not create any unavoidable significant adverse geologic hazards, adverse geology or adverse soil impacts. The GBUAPCD Governing Board finds that mitigation measures are not required because the Proposed Project causes no significant environmental impacts to geology and soils.

Hydrology and Water Resources

The EIR discusses the Proposed Project's impacts on hydrology and water resources in Section 5-2 of the EIR.

Impact: As explained in Section 5-2 of the EIR, the environmental impacts to hydrology and water resources were found to be less-than-significant.

- **Mitigation Measures:** No mitigation measures are required for impacts to hydrology and water resources.

- **Finding 11: No mitigation measures are required.** The GBUAPCD Governing Board finds that the Proposed Project will not create any unavoidable significant adverse hydrologic impacts or significant adverse impacts to water resources. The GBUAPCD Governing Board finds that mitigation measures are not required because the Proposed Project causes no significant environmental impacts to hydrology and water resources.

Meteorology and Air Quality

The EIR discusses the Proposed Project's impacts on meteorology and air quality in Section 5-3 of the EIR.

Impact 5-3.1: As explained in Section 5-3 of the EIR, the Construction of the roadways, berms and pipelines would generate fugitive PM_{10} emissions and pollutants from vehicle exhaust, which could affect air quality. This is a potentially significant environmental impact.

- **Mitigation Measure 5-3.1:** Fugitive dust emissions will be controlled through the application of Best Available Control Measures (BACM) for fugitive dust emissions from unpaved roads and construction will comply with GBUAPCD Rules 400 and 401. This may include, but would not be limited to, use of chemical soil stabilizers, surface coverings, water trucks and water sprays.

- **Finding 12: Mitigation Measure is feasible and required.** The GBUAPCD Governing Board finds that Mitigation Measure 5-3.1 is feasible and reduces the impact on air quality to a less-than-significant level by reducing construction-related fugitive dust emissions.

- **Finding 13:** With the exception of Impact 5-3.1, the GBUAPCD Governing Board finds that the Proposed Project will not create any additional unavoidable significant adverse impacts to meteorology and air quality. With the exception of Mitigation Measure 5-3.1, the GBUAPCD Governing Board finds that additional air quality mitigation measures are not required because the Proposed Project causes no additional significant environmental impacts to meteorology and air quality.

VEGETATION RESOURCES

The EIR discusses the Proposed Project's impacts on vegetation resources in Section 5-4 of the EIR.

Impact 5-4.1: As explained in Section 5-4 of the EIR, the Proposed Project will convert 121 acres of Transmontane Alkaline Meadow (TAM) to unvegetated dry playa and standing water on the playa. This is a potentially significant environmental impact.

- **Mitigation Measure 5-4.1:** A total of 121 acres of TAM shall be established and maintained to replace vegetation lost as a result of fugitive dust control measure implementation and operation. The TAM will be vegetated to achieve species diversity and percent cover comparable to the TAM lost as a result of direct or indirect impacts. A minimum of 89 acres along the eastern edge of the managed vegetation control measure area will be set aside and established as TAM. The balance of replacement TAM may be established in the shallow flood control area. If at least 32 acres of TAM is not established and maintained in the shallow flood area, a total of at least 121 acres of TAM shall be established and maintained in the managed vegetation area.

- **Finding 14: Mitigation Measure is feasible and required.** The GBUAPCD Governing Board finds that Mitigation Measure 5-4.1 is feasible and reduces the impact on vegetation resources to a less-than-significant level by replacing the Transmontane Alkaline Meadow lost as a result of the Proposed Project.

Impact 5-4.2: As explained in Section 5-4 of the EIR, the Proposed Project will expand distribution of exotic pest plants within the Owens Valley PM_{10} study area. This is a potentially significant environmental impact.

- **Mitigation Measure 5-4.2:** Areas subject to shallow flooding and managed vegetation control measures will be surveyed annually after measure implementation to identify locations where exotic pest plants have encroached into the project area. Where exotic pest plants are identified as a result of annual monitoring, an exotic pest plant control program will be developed and implemented to eradicate exotic pest plants and noxious weeds. The control program will be accomplished through an appropriate combination of biological, mechanical and chemical control methods. The program will focus on the early removal of plants and, to the extent possible, will be coordinated with other control programs undertaken in Inyo County to ensure the most effective utilization of resources.

- **Finding 15: Mitigation Measure is feasible and required.** The GBUAPCD Governing Board finds that Mitigation Measure 5-4.2 is feasible and reduces the impact on vegetation resources to a less-than-significant level by preventing the expanded distribution of exotic pest plants within the Owens Valley PM_{10} study area.

Impact 5-4.3: As explained in Section 5-4 of the EIR, the Proposed Project will result in the loss of habitat potentially occupied by sensitive species of plants. This is a potentially significant environmental impact.

- **Mitigation Measure 5-4.3:** Prior to final siting of project infrastructure in shadscale scrub and TAM, a focused pre-construction survey will be conducted during optimal flowering period for Owens Valley checkerbloom, Inyo County mariposa lily, Booth's evening primrose, Kern County evening primrose, Ripley's cymopterus, Mono buckwheat, sand linanthus and Nevada oryctes. Final infrastructure alignments will be reconfigured as necessary to avoid populations of sensitive plant species if they are detected as a result of directed surveys.

- **Finding 16: Mitigation Measure is feasible and required.** The GBUAPCD Governing Board finds that Mitigation Measure 5-4.3 is feasible and reduces the impact on vegetation resources to a less-than-significant level by preventing the loss of habitat potentially occupied by sensitive species of plants.

- **Finding 17:** With the exception of Impacts 5-4.1, 5-4.2 and 5-4.3, the GBUAPCD Governing Board finds that the Proposed Project will not create any additional unavoidable significant adverse impacts to vegetation resources. With the exception of Mitigation Measures 5-4.1, 5-4.2 and 5-4.3, the GBUAPCD Governing Board finds that additional vegetation resource mitigation measures are not required because the Proposed Project causes no additional significant environmental impacts to vegetation resources.

WILDLIFE RESOURCES

The EIR discusses the Proposed Project's impacts on wildlife resources in Section 5-5 of the EIR.

Impact 5-5.2: As explained in Section 5-5 of the EIR, the Proposed Project will result in the loss of 121 acres of the dry Transmontane Alkaline Meadow sub-community which provides habitat for sensitive species of invertebrates, birds, and mammals. This is a potentially significant environmental impact.

- **Mitigation Measure 5-5.2:** A total of 121 acres of TAM shall be established and maintained to replace the alkali skipper and Owens Valley tiger beetle habitat lost as a result of fugitive dust control measure implementation and operation. The TAM will be vegetated to achieve species diversity and percent cover comparable to the TAM lost as a result of direct or indirect impacts. A minimum of 89 acres along the eastern edge of the managed vegetation control measure area will be set aside and established as TAM. The balance of replacement TAM may be established in the shallow flood control area. If at least 32 acres of TAM is not established and maintained in the shallow flood area, a total of at least 121 acres of TAM shall be established and maintained in the managed vegetation area. Surface water hydrology will replicate the existing conditions in areas lost as a result of project implementation. The revegetation area will be monitored until successful colonization of these species is demonstrated. Note: The 121 areas of TAM to be established as mitigation for this impact is not in addition to the TAM required under Mitigation Measure 5-4.1; these measures may be combined such that the same 121 acres of created TAM mitigates both impacts.

- **Finding 18: Mitigation Measure is feasible and required.** The GBUAPCD Governing Board finds that Mitigation Measure 5-5.2 is feasible and reduces the impact on wildlife resources to a less-than-significant level by replacing the Transmontane Alkaline Meadow lost as a result of the Proposed Project.

Impact 5-5.3: As explained in Section 5-5 of the EIR, the construction of buried water transmission pipeline in Transmontane Alkaline Meadow habitat during the breeding season for northern harrier has the potential to result in loss of occupied nesting habitat. This is a potentially significant environmental impact.

- **Mitigation Measure 5-5.3:** Potential impacts on nesting northern harriers in TAM shall be avoided and reduced to below the level of significance by scheduling the construction of project infrastructure outside the breeding season of the northern harrier (mid-March to mid-September). If the breeding season cannot be avoided, surveys shall be conducted, prior to construction, within and adjacent to the two acres of TAM projected to be impacted. If northern harriers are observed within the area that would be impacted, construction will be sited so as to avoid nesting individuals of this species.

■ **Finding 19: Mitigation Measure is feasible and required.** The GBUAPCD Governing Board finds that Mitigation Measure 5-5.3 is feasible and reduces the impact on wildlife resources to a less-than-significant level by preventing the potential loss of northern harrier nesting habitat.

Impact 5-5.4: As explained in Section 5-5 of the EIR, the construction of infrastructure improvements in Shadscale Scrub habitat during the breeding season of LeConte's thrasher and loggerhead shrike has the potential to result in loss of occupied nesting habitat. This is a potentially significant environmental impact.

- **Mitigation Measure 5-5.4:** Potential impacts on LeConte's thrasher and loggerhead shrike would be avoided and reduced below the level of significance by scheduling construction of all improvements in Shadscale Scrub in the vicinity of suitable nesting habitat outside of the breeding season for these species (mid-January to late July). If the breeding season cannot be avoided, surveys in the areas in which construction would take place would be conducted and areas containing breeding individuals will be avoided.

■ **Finding 20: Mitigation Measure is feasible and required.** The GBUAPCD Governing Board finds that Mitigation Measure 5-5.4 is feasible and reduces the impact on wildlife resources to a less-than-significant level by preventing the loss of potential LeConte's thrasher and loggerhead shrike nesting habitat.

Impact 5-5.5: As explained in Section 5-5 of the EIR, the construction, operation and maintenance of the Proposed Project would result in a 49 percent reduction of potentially suitable unvegetated playa nesting habitat for western snowy plover. This is a potentially significant environmental impact.

- **Mitigation Measure 5-5.5:** A western snowy plover breeding habitat restoration program shall be established. The restoration program shall include the following actions:

  (a) A pre-construction directed survey for breeding snowy plovers at Owens Lake will be undertaken during the breeding season in the year proceeding implementation of PM_{10}

control measures. The directed survey will be undertaken in accordance with the protocol established for the District's 1996 survey. The pre-construction survey will include all known or expected nesting areas at Owens Lake. The purpose of the survey will be to census: number and location of adults, number and location of juveniles, numbers and location of chicks, and locations of nests or expected nests.

(b) The maintenance of a viable breeding population for western snowy plovers is dependent on accessibility to suitable foraging habitat. A pre-construction survey to delineate the distribution of suitable foraging habitat in and adjacent to areas where PM_{10} Control Measures will be implemented will be undertaken in the year immediately proceeding project implementation. Suitable foraging habitat will include all areas supporting ephydrids. Density of March 10, 1997 ephydrids can be used as a measure of the quality of habitat. The results of directed surveys will be used as the basis for performance criteria in evaluating the quality of foraging habitat created as a result of project implementation.

(c) Ground disturbing activities associated with the implementation of shallow flooding, managed vegetation, gravel and associated development and infrastructure will not be undertaken in known or expected nesting areas identified as a result of the pre-construction survey for breeding snowy plovers during the breeding season, between March 15 and August 31.

(d) Construction avoidance measures to protect nesting and foraging habitat for western snowy plovers will be exercised when ground-disturbing activities associated with construction of shallow flooding, managed vegetation, gravel and associated development must be undertaken between March 15 and August 31. A qualified wildlife biologist shall survey work areas that approach known or expected nesting areas identified during the pre-construction survey. A 500-foot-radius buffer areas will be established to protect all known or expected nesting sites and the associated foraging areas. The wildlife biologist will delineate these areas with survey flag (or other comparable measures) to ensure that they are avoided during construction.

(e) Post-construction surveys shall be undertaken in the first, second, third, fifth, tenth, fifteenth, twentieth, and twenty-fifth years following implementation of water-based control measures. The results of the post-construction surveys will be analyzed in relation to pre-construction surveys and results for control sites established as part of the overall monitoring program for the project. Where the monitoring program indicates that western snowy plover population numbers are declining as a result of implementation and maintenance of the PM_{10} Control Measures, habitat restoration shall be undertaken to compensate for reduced numbers of potential nesting sites that occur as a result of the control measures that displace nesting sites. Sufficient breeding habitat restoration shall be undertaken to maintain population levels at sites on the east side of Owens Lake consistent with the average population numbers established as a result of the 1996 and 1997 directed surveys.

- **Finding 21: Mitigation Measure is feasible and required.** The GBUAPCD Governing Board finds that Mitigation Measure 5-5.5 is feasible and reduces the impact on wildlife resources to a less-than-significant level by mitigating for the loss of potentially suitable nesting habitat for western snowy plover.

- **Finding 22:** With the exception of Impacts 5-5.2, 5-5.3, 5-5.4 and 5-5.5, the GBUAPCD Governing Board finds that the Proposed Project will not create any additional unavoidable significant adverse impacts to wildlife resources. With the exception of Mitigation Measures 5-5.2, 5-5.3, 5-5.4 and 5-5.5, the GBUAPCD Governing Board finds that additional wildlife resource mitigation measures are not required because the Proposed Project causes no additional significant environmental impacts to wildlife resources.

CULTURAL RESOURCES

The EIR discusses the Proposed Project's impacts on cultural resources in Section 5-6 of the EIR.

Impact 5-6.1: As explained in Section 5-6 of the EIR, prehistoric cultural resources could be damaged or destroyed as a result of ground disturbance and flooding associated with the implementation and operation of the Proposed Project. This is a potentially significant environmental impact.

- **Mitigation Measure 5-6.1a:** Prior to any ground disturbance in the area identified as GB JSA-1, additional research and test excavation will be undertaken to determine whether this prehistoric resource is significant. If it is determined that this resource meets the significance criteria established for the Proposed Project in the EIR, it will be subjected to a data recovery program consisting of archaeological excavation to retrieve the important data from the site.

- **Mitigation Measure 5-6.1b:** Prior to any ground disturbance in areas identified as sensitive for prehistoric resources, archaeological surveys will be conducted to locate and record prehistoric resources. If the surveys result in identification of resources that cannot be avoided, additional research or test excavations, where appropriate, will be undertaken to determine whether the resource(s) are significant. Significant resources that cannot be avoided will be subjected to data recovery program consisting of archaeological excavation to retrieve the important site data. For resources that may be located within U.S. Army Corps of Engineers (Corps) jurisdictional areas, and subject to an MOA, this inventory, evaluation and treatment process will be coordinated with the Corps to ensure that the work conducted will also comply with Section 106 of the National Historic Preservation Act.

- **Finding 23: Mitigation Measures are feasible and required.** The GBUAPCD Governing Board finds that Mitigation Measures 5-6.1a and 5-6.1b are feasible and reduce the impact on cultural resources to a less-than-significant level by preventing the damage or destruction of significant prehistoric cultural resources.

- **Finding 24:** With the exception of Impact 5-6.1, the GBUAPCD Governing Board finds that the Proposed Project will not create any additional unavoidable significant adverse impacts to cultural resources. With the exception of Mitigation Measures 5-6.1a and 5-6.1b, the GBUAPCD Governing Board finds that additional cultural resource mitigation measures are not required because the Proposed Project causes no additional significant environmental impacts to cultural resources.

VISUAL RESOURCES

The EIR discusses the Proposed Project's impacts on visual resources in Section 5-7 of the EIR.

Impact: As explained in Section 5-7 of the EIR, the environmental impacts to visual resources were found to be less-than-significant.

- **Mitigation Measures:** No mitigation measures are required for impacts to visual resources.

- **Finding 25: No mitigation measures are required.** The GBUAPCD Governing Board finds that the Proposed Project will not create any significant unavoidable adverse visual impacts. The GBUAPCD Governing Board finds that mitigation measures are not required because the Proposed Project causes no significant environmental impacts to visual resources.

NOISE

The EIR discusses the Proposed Project's noise impacts in Section 5-8 of the EIR.

Impact: As explained in Section 5-8 of the EIR, the environmental impacts caused by noise from the Proposed Project were found to be less-than-significant.

- **Mitigation Measures:** No mitigation measures are required for impacts caused by noise from the Proposed Project.

- **Finding 26: No mitigation measures are required.** The GBUAPCD Governing Board finds that the Proposed Project will not create any unavoidable significant adverse noise impacts. The GBUAPCD Governing Board finds that mitigation measures are not required because the Proposed Project causes no significant noise-related environmental impacts.

LAND USE

The EIR discusses the Proposed Project's land use impacts in Section 5-9 of the EIR.

Impact: As explained in Section 5-9 of the EIR, the environmental impacts to land use caused by the Proposed Project were found to be less-than-significant.

- **Mitigation Measures:** No mitigation measures are required for impacts caused by noise from the Proposed Project.

- **Finding 27: No mitigation measures are required.** The GBUAPCD Governing Board finds that the Proposed Project will not create any unavoidable significant adverse land use impacts. The GBUAPCD Governing Board finds that mitigation measures are not required because the Proposed Project causes no significant noise-related environmental impacts.

TRANSPORTATION

The EIR discusses the Proposed Project's transportation impacts in Section 5-10 of the EIR.

Impacts 5-10.5 and 5-10.6: As explained in Section 5-10 of the EIR, increased hazards on the roadway network would occur as a result of hauling gravel to the lake bed. This is a potentially significant environmental impact.

- **Mitigation Measures 5-10.5 and 5-10.6:** Warning lights and signs shall be installed by CalTrans at any side road entrances or overweight vehicle crossings constructed on SR 136 or SR 190 that would be used by delivery trucks hauling gravel from sites above the highways. Lights and signs should be installed along the highways on either side of the crossings to warn motorists that there may be large, slow-moving trucks ahead. If CalTrans requires installation of traffic signals at the crossings, the warning signs and lights could be used in conjunction with the signals. Installation and funding of these safety devices shall be the responsibility of the City of Los Angeles. This measure shall be made a condition of project approval and shall be implemented prior to the commencement of gravel hauling operations.

- **Finding 28: Mitigation Measures are feasible and required.** The GBUAPCD Governing Board finds that Mitigation Measures 5-10.5 and 5-10.6 are feasible and reduce the transportation-related impacts to a less-than-significant level by reducing roadway hazards occurring as a result of hauling gravel to the lake bed.

<u>**Impact 5-10.8**</u>: As explained in Section 5-10 of the EIR, implementation of the Proposed Project would damage public roadway surfaces through hauling gravel to the lake bed. This is a potentially significant environmental impact.

- **Mitigation Measure 5-10.8:** All public roadways damaged by gravel hauling shall be repaired as required to maintain safe operating conditions throughout the gravel hauling period, as well as at the end of this period. Upon completion of gravel hauling operations, roadways shall be repaired to pre-project conditions. This measure shall be made a condition of the approvals to extract and haul gravel and shall be performed throughout the gravel hauling period.

- **Finding 29: Mitigation Measure is feasible and required.** The GBUAPCD Governing Board finds that Mitigation Measure 5-10.8 is feasible and reduces the transportation-related impacts to a less-than-significant level by reducing roadway hazards caused by damaged road surfaces.

- **Finding 30:** With the exception of Impacts 5-10.5, 5-10.6 and 5-10.8, the GBUAPCD Governing Board finds that the Proposed Project will not create any additional unavoidable significant adverse transportation-related impacts. With the exception of Mitigation Measures 5-10.5, 5-10.6 and 5-10.8, the GBUAPCD Governing Board finds that additional transportation-related mitigation measures are not required because the Proposed Project causes no additional significant transportation-related environmental impacts.

ECONOMIC AND SOCIAL IMPACTS

The EIR discusses the Proposed Project's economic and social impacts in Section 5-11 of the EIR.

<u>**Impact**</u>: As explained in Section 5-11 of the EIR, the economic and social environmental impacts caused by the Proposed Project were found to be less-than-significant.

- **Mitigation Measures:** No mitigation measures are required for economic and social impacts caused by the Proposed Project.

- **Finding 31: No mitigation measures are required.** The GBUAPCD Governing Board finds that the Proposed Project will not create any unavoidable significant adverse economic or social impacts. The GBUAPCD Governing Board finds that mitigation measures are not required because the Proposed Project causes no significant economic or social environmental impacts.

PUBLIC HEALTH AND SAFETY/RISK OF UPSET

The EIR discusses the Proposed Project's public health and safety and risk of upset impacts in Section 5-12 of the EIR.

<u>Impact</u>: As explained in Section 5-12 of the EIR, the environmental impacts to public health and safety and risk of upset caused by the Proposed Project were found to be less-than-significant.

- **Mitigation Measures:** No mitigation measures are required for public health and safety or risk of upset impacts caused the Proposed Project.

- **Finding 32: No mitigation measures are required.** The GBUAPCD Governing Board finds that the Proposed Project will not create any unavoidable significant adverse public health and safety or risk of upset impacts. The GBUAPCD Governing Board finds that mitigation measures are not required because the Proposed Project causes no significant public health and safety or risk of upset environmental impacts.

SIGNIFICANT IMPACTS CONCLUSION

- **Finding 33:** The GBUAPCD Governing Board finds that mitigation measures have been developed in the Final EIR and Addendum to reduce, to a less-than-significant level, the adverse environmental impacts caused by implementing the Proposed Project.

- **Finding 34:** The GBUAPCD Governing Board finds that all mitigation measures identified in the Final EIR and Addendum shall hereby be adopted and incorporated into the Proposed Project and shall be implemented as set forth in the Mitigation Monitoring and Reporting Program to be adopted by the Governing Board.

- **Finding 35:** The GBUAPCD Governing Board makes each and every of the above findings on the basis of substantial evidence in the record. The GBUAPCD is the custodian of the materials which constitute the record of proceedings upon which the decision to approve the Proposed Project is based. These materials are located at the District's offices at 157 Short Street, Bishop, California 93514.

FINDINGS OF FACT ON THE PROJECT ALTERNATIVES

This section identifies the findings on the project alternatives, as identified in the Draft EIR and Final EIR. The description of project alternatives and the analysis of their environmental impacts is contained in Chapter 7 of the EIR.

- **Finding 36:** The GBUAPCD Governing Board finds that Section 7-1.3 of the EIR adequately discusses, evaluates and eliminates from further consideration alternative PM_{10} control measures such as, surface compaction, chemical salt modification, chemical stabilizers, sprinkler systems, lowering the shallow groundwater table, alternative surface coverings, riparian corridors, an attainment extension and an attainment waiver under the EPA's Natural Event Policy.

- **Finding 37:** The GBUAPCD Governing Board finds that section 7-1.2 of the EIR adequately discusses and evaluates the environmental impacts caused by alternative control measures such as, tilling, salt flats, unconfined deep flooding, sand fences and tree row wind breaks.

ALTERNATIVE A - LOW VOLUME WATER USE: GROUNDWATER

- **Finding 38:** The GBUAPCD Governing Board finds that section 7-3 of the EIR adequately describes Alternative A and discusses and evaluates its environmental impacts.

- **Finding 39:** The GBUAPCD Governing Board finds that Alternative A does not avoid any adverse environmental impact of the Proposed Project that is significant after mitigation.

- **Finding 40:** The GBUAPCD Governing Board finds that Alternative A has significant adverse environmental impacts not associated with the Proposed Project, including the adverse effects of land subsidence and local groundwater drawdown.

- **Finding 41:** The GBUAPCD Governing Board finds that Alternative A employs certain control measures, such as tilling, salt flats and sand fences, that do not have as high a level of scientifically-demonstrable effectiveness on Owens Lake as the control measures employed by the Proposed Project. Therefore, this alternative does not satisfy a basic objective of the project, namely, that of having a high technical likelihood of success without substantial delays.

ALTERNATIVE A1 - LOW VOLUME WATER USE: SURFACE WATER

- **Finding 42:** The GBUAPCD Governing Board finds that section 7-3 of the EIR adequately describes Alternative A1 and discusses and evaluates its environmental impacts.

- **Finding 43:** The GBUAPCD Governing Board finds that Alternative A1 does not avoid any adverse environmental impact of the Proposed Project that is significant after mitigation.

- **Finding 44:** The GBUAPCD Governing Board finds that Alternative A1 employs certain control measures, such as tilling, salt flats and sand fences, that do not have as high a level of scientifically-demonstrable effectiveness on Owens Lake as the control measures employed by the Proposed Project. Therefore, this alternative does not satisfy a basic objective of the project, namely, that of having a high technical likelihood of success without substantial delays.

ALTERNATIVE B - MODERATE VOLUME WATER USE: GROUNDWATER

- **Finding 45:** The GBUAPCD Governing Board finds that section 7-4 of the EIR adequately describes Alternative B and discusses and evaluates its environmental impacts.

- **Finding 46:** The GBUAPCD Governing Board finds that Alternative B does not avoid any adverse environmental impact of the Proposed Project that is significant after mitigation.

- **Finding 47:** The GBUAPCD Governing Board finds that Alternative B has significant adverse environmental impacts not associated with the Proposed Project, including the adverse effects of land subsidence and local groundwater drawdown.

- **Finding 48:** The GBUAPCD Governing Board finds that Alternative B employs certain control measures, such as tilling and salt flats, that do not have as high a level of scientifically-demonstrable effectiveness on Owens Lake as the control measures employed by the Proposed Project. Therefore, this alternative does not satisfy a basic objective of the project, namely, that of having a high technical likelihood of success without substantial delays.

ALTERNATIVE B1 - MODERATE VOLUME WATER USE: SURFACE WATER

- **Finding 49:** The GBUAPCD Governing Board finds that section 7-4 of the EIR adequately describes Alternative B1 and discusses and evaluates its environmental impacts.

- **Finding 50:** The GBUAPCD Governing Board finds that Alternative B1 does not avoid any adverse environmental impact of the Proposed Project that is significant after mitigation.

- **Finding 51:** The GBUAPCD Governing Board finds that Alternative B1 has significant adverse environmental impacts not associated with the Proposed Project, including adverse impacts on available water resources.

- **Finding 52:** The GBUAPCD Governing Board finds that Alternative B1 employs certain control measures, such as tilling and salt flats, that do not have as high a level of scientifically-demonstrable effectiveness on Owens Lake as the control measures employed by the Proposed Project. Therefore, this alternative does not satisfy a basic objective of the project, namely, that of having a high technical likelihood of success without substantial delays.

ALTERNATIVE C - NO WATER USE

- **Finding 53:** The GBUAPCD Governing Board finds that section 7-5 of the EIR adequately describes Alternative C and discusses and evaluates its environmental impacts.
- **Finding 54:** The GBUAPCD Governing Board finds that Alternative C does not avoid any adverse environmental impact of the Proposed Project that is significant after mitigation.
- **Finding 55:** The GBUAPCD Governing Board finds that Alternative C uses more gravel than the Proposed Project. Alternatives that use more gravel than the Proposed Project do not satisfy a basic objective of the project, namely, that of being consistent with the State of California's obligations to preserve and enhance the public trust values associated with Owens Lake.

ALTERNATIVE D - MANAGED LOW VOLUME WATER USE: GROUNDWATER

- **Finding 56:** The GBUAPCD Governing Board finds that section 7-6 of the EIR adequately describes Alternative D and discusses and evaluates its environmental impacts.
- **Finding 57:** The GBUAPCD Governing Board finds that Alternative D does not avoid any adverse environmental impact of the Proposed Project that is significant after mitigation.
- **Finding 58:** The GBUAPCD Governing Board finds that Alternative D has significant adverse environmental impacts not associated with the Proposed Project, including the adverse effects of land subsidence and local groundwater drawdown.
- **Finding 59:** The GBUAPCD Governing Board finds that Alternative D employs certain control measures, such as tree rows and salt flats, that do not have as high a level of scientifically-demonstrable effectiveness on Owens Lake as the control measures employed by the Proposed Project. Therefore, this alternative does not satisfy a basic objective of the project, namely, that of having a high technical likelihood of success without substantial delays.

ALTERNATIVE D1 - MANAGED LOW VOLUME WATER USE: SURFACE WATER

- **Finding 60:** The GBUAPCD Governing Board finds that section 7-6 of the EIR adequately describes Alternative D1 and discusses and evaluates its environmental impacts.

- **Finding 61:** The GBUAPCD Governing Board finds that Alternative D1 does not avoid any adverse environmental impact of the Proposed Project that is significant after mitigation.

- **Finding 62:** The GBUAPCD Governing Board finds that Alternative D1 employs certain control measures, such as tree rows and salt flats, that do not have as high a level of scientifically-demonstrable effectiveness on Owens Lake as the control measures employed by the Proposed Project. Therefore, this alternative does not satisfy a basic objective of the project, namely, that of having a high technical likelihood of success without substantial delays.

ALTERNATIVE E - HIGH VOLUME WATER USE: SURFACE WATER

- **Finding 63:** The GBUAPCD Governing Board finds that section 7-7 of the EIR adequately describes Alternative E and discusses and evaluates its environmental impacts.

- **Finding 64:** The GBUAPCD Governing Board finds that Alternative E does not avoid any adverse environmental impact of the Proposed Project that is significant after mitigation.

- **Finding 65:** The GBUAPCD Governing Board finds that Alternative E has significant adverse environmental impacts not associated with the Proposed Project, including the adverse impacts on available water resources.

ALTERNATIVE F - NO PROJECT

- **Finding 66:** The GBUAPCD Governing Board finds that section 7-8 of the EIR adequately describes Alternative F and discusses and evaluates its environmental impacts.

- **Finding 67:** The GBUAPCD Governing Board finds that Alternative F does not avoid any adverse environmental impact of the Proposed Project that is significant after mitigation.

- **Finding 68:** The GBUAPCD Governing Board finds that Alternative F does not satisfy the basic purpose of the project relating to the timely attainment of the federal PM_{10} standard.

ALTERNATIVES CONCLUSION

CEQA requires the Draft EIR and Final EIR to include the description and evaluation of a reasonable range of feasible alternatives to the Proposed Project. If the Lead Agency concludes that the Proposed Project will cause one or more significant environmental impacts, then it is required to consider the alternatives and decide whether there is a feasible alternative project which both achieves the basic objectives of the Proposed Project, and reduces or avoids a significant environmental impact caused by the Proposed Project. If there is such an alternative, CEQA mandates that the Lead Agency may not approve the Proposed Project.

- **Finding 69:** The GBUAPCD Governing Board finds that the Draft EIR and Final EIR have described and evaluated a reasonable range of feasible alternatives to the Proposed Project that utilized a range of potential control measures and a range of natural resource quantities.

- **Finding 70:** The Draft EIR and Final EIR conclude that the Proposed Project will not cause any significant environmental impact after mitigation, therefore, the GBUAPCD Governing Board finds that none of the alternatives evaluated in the Draft EIR and Final EIR avoids an environmental effect of the Proposed Project which is significant after mitigation.

- **Finding 71:** The GBUAPCD Governing Board finds that by adopting the mitigation measures associated with the Proposed Project and incorporating the mitigation measures into the approval of the Proposed Project, that all of the Proposed Project's potential significant adverse environmental impacts are avoided and consequently, no project alternative avoids a significant environmental impact caused by the Proposed Project after mitigation measures are applied.

- **Finding 72:** The GBUAPCD Governing Board makes each and every of the above findings on the basis of substantial evidence in the record. The GBUAPCD is the custodian of the materials which constitute the record of proceedings upon which the decision to approve the Proposed Project is based. These materials are located at the District's offices at 157 Short Street, Bishop, California 93514.

OTHER FINDINGS OF FACT

- **Finding 73:** Based upon the fact that the Owens Valley PM_{10} Planning Area (Owens Valley) has been designated a serious non-attainment area by the USEPA, and that this area is required by the Clean Air Act Amendments of 1990 to attain the PM_{10} 24-hour standard by December 31, 2001, the GBUAPCD Governing Board finds that the adoption of the 1998 Revisions to the *Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order* is necessary.

- **Finding 74:** Based upon the fact that Health and Safety Code Section 42316 allows the District to require the City of Los Angeles to undertake reasonable measures to mitigate the air quality impacts of the City's water-gathering activities, the GBUAPCD Governing Board finds that the District has the authority to adopt the 1998 Revisions to the *Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order*, including the adoption and issuance of GBUAPCD Order No. 981116-01.

- **Finding 75:** Based upon extensive public comment on the Plan, the GBUAPCD Governing Board finds that the 1998 SIP Revision, and the SIP and Incorporated Board Order as revised by the 1998 SIP Revision, are written clearly so that they can be easily understood by the persons affected.

- **Finding 76:** Based upon an examination of the legal and regulatory history of the Owens Valley PM_{10} Planning Area, and the above findings on the compatibility of the Plan and Order with Section 42316, the GBUAPCD Governing Board finds that the 1998 SIP Revision, and the *Owens Valley PM_{10} Planning Area State Implementation Plan and Incorporated Board Order* as revised by the 1998 SIP Revision are consistent with existing statutes, court decisions, and state and federal regulations.

- **Finding 77:** Based upon the fact that state law delegates to the District the responsibility for control of stationary sources of air pollution, the GBUAPCD Governing Board finds that the 1998 SIP Revision, and the *Owens Valley PM_{10} Planning Area State Implementation Plan and Incorporated Board Order* as revised by the 1998 SIP Revision do not duplicate an existing state or federal regulation.

- **Finding 78:** The GBUAPCD Governing Board references the Clean Air Act Amendments of 1990 and State of California Health and Safety Code Section 42316 as the laws that the District implements through the 1998 SIP Revision and the *Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order* as revised by the 1998 SIP Revision.

- **Finding 79:** The GBUAPCD Governing Board finds that reasonable notice of the Governing Board's intention to hold a public hearing to adopt the 1998 SIP Revision to the *Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order* was given in compliance with the provisions of Title 40 of the Code of Federal Regulations, Section 51.102.

- **Finding 80:** The GBUAPCD Governing Board finds that notice of the public hearing to adopt the 1998 SIP Revision to the *Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan and Incorporated Board Order* was published in the following newspapers more than 30 days in advance of the hearing: the *Inyo Register* (Inyo County), the *Review Herald* (Mono County) and the *Tahoe Daily Tribune* (for Alpine County).

- **Finding 81:** The GBUAPCD Governing Board finds that the *Draft 1998 Revision to the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan* was available for public inspection at the GBUAPCD office in Bishop, California at least 30 days in advance of the public hearing to adopt the 1998 SIP Revision.

- **Finding 82:** The GBUAPCD Governing Board finds that the Administrator of the U.S. Environmental Protection Agency (through the Regional Administrator) was given notice of the public hearing and a copy of the *Draft 1998 Revision to the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan* at least 30 days in advance of the hearing.

- **Finding 83:** The GBUAPCD Governing Board finds that the Kern County Air Pollution Control District was given notice of the public hearing and a copy of the *Draft 1998 Revision to the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan* at least 30 days in advance of the hearing.

- **Finding 84:** The GBUAPCD Governing Board finds that the City of Los Angeles was given notice of the public hearing and a copy of the *Draft 1998 Revision to the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan* at least 30 days in advance of the hearing.

- **Finding 85:** The GBUAPCD Governing Board finds that for the reasons and based on the facts set forth in the text of the Addendum, an addendum to the Final EIR is the necessary and sufficient environmental review document required to be prepared under the California Environmental Quality Act for adoption of the 1998 SIP Revision, and the District's decision not to prepare a subsequent environmental impact report pursuant to Section 15162 of the State CEQA Guidelines is both correct and adequately explained in the text of the Addendum. The GBUAPCD Governing Board finds as true the facts cited in the Addendum to support the District's decision to prepare the Addendum in lieu of a subsequent environmental impact report or other CEQA environmental document.

- **Finding 86:** The GBUAPCD Governing Board makes each and every of the above findings on the basis of substantial evidence in the record. The GBUAPCD is the custodian of the materials which constitute the record of proceedings upon which the decision to approve the Proposed Project is based. These materials are located at the District's offices at 157 Short Street, Bishop, California 93514.

RESOLUTION 98-05, EXHIBIT B

OWENS VALLEY PM_{10} PLANNING AREA
DEMONSTRATION OF ATTAINMENT STATE IMPLEMENTATION PLAN

MITIGATION MONITORING AND REPORTING PROGRAM

RELATED DOCUMENTATION:

JULY 2, 1997 FINAL ENVIRONMENTAL IMPACT REPORT
(STATE CLEARINGHOUSE NUMBER 96122077)

NOVEMBER 16, 1998 ADDENDUM NUMBER 1
TO THE FINAL ENVIRONMENTAL IMPACT REPORT

PROJECT FILES MAY BE REVIEWED AT:

GREAT BASIN UNIFIED AIR POLLUTION CONTROL DISTRICT
157 SHORT STREET, BISHOP, CALIFORNIA 93514

NOVEMBER 16, 1998

RESOLUTION 98-05, EXHIBIT B
MITIGATION MONITORING AND REPORTING PROGRAM

Section 21081.6 of the Public Resources Code requires all state and local agencies to establish monitoring or reporting programs whenever approval of a project relies upon a mitigated negative declaration or an environmental impact report (EIR). The monitoring or reporting program must ensure implementation of the measures being imposed to mitigate or avoid the significant adverse environmental impacts identified in the mitigated negative declaration or EIR. [Tracking CEQA Mitigation Measures Under AB 1380, Third Edition, March 1996]

The following Mitigation Monitoring and Reporting Program (MMRP) has been prepared to meet the California Environmental Quality Act (CEQA) requirements for preparing a MMRP for the *Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan* [SIP], *Final Environmental Impact Report* and *Addendum Number 1 to the Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan* [SIP], *Final Environmental Impact Report*. The MMRP will be administered by the Great Basin Unified Air Pollution District (GBUAPCD). The GBUAPCD will be responsible for monitoring activities throughout the construction and operational phases of the project.

All major reporting and monitoring activities will be outlined in a master schedule. Enforcement responsibilities for each mitigation measure would vary depending upon the agency(ies) designated in the MMRP as the Responsible Agency. Methods for enforcement of mitigation measures, resolution of conflicts, and notification of violations will vary and be determined by the designated Responsible Agency. Enforcement measures may include written notification to the City of Los Angeles (which will be performing work related to the proposed project) of violation or non-compliance, fines levied for exceedance of specified environmental standards, and/or suspension of activities that may affect endangered species, significant cultural resources or human health and safety.

The City of Los Angeles will be responsible for preparing an Environmental Compliance Report to document environmental actions taken to comply with the mitigation-monitoring requirements of the MMRP. The Environmental Compliance Report will be the principal means for documenting monitoring activities, but other documentation, such as memoranda and field logs would also be generated and compiled by the monitoring entity. Copies of the Environmental Compliance Report shall be submitted to the GBUAPCD, State Lands Commission (SLC), and Inyo County on a quarterly basis during site construction, and annually during normal SIP operations. The Environmental Compliance Report will document both compliance and non-compliance. A consistent form shall be developed on which to record and document all observations. The form should contain all information needed for periodic (i.e., weekly, monthly, quarterly, and/or annual) summaries of compliance status. The Environmental Compliance Report is intended as an individual, operations, as necessary. All documents or other materials which constitute the record of the MMRP shall be filed with the GBUAPCD.

The MMRP is arranged in a tabular format listing each of the mitigation measures identified in the EIR which was adopted. The MMRP is organized to provide the following information:

Mitigation Measure: The EIR mitigation measures, identified by the number code used in the Draft EIR, which have a monitoring or reporting requirement.

Implementation Procedure: Additional information on how the mitigation measure would be implemented, as needed.

Monitoring and Reporting Actions: An outline of the appropriate monitoring and/or reporting actions required to verify implementation of the mitigation measure.

Standard of Compliance: Criteria for determining compliance with the mitigation measure.

Responsible Agency: The agency(ies) which would be involved with the review and approval of actions required to implement the mitigation measure, reporting tasks, and/or implementing enforcement actions, as necessary.

Monitoring Schedule: A schedule for conducting each mitigation measure monitoring and reporting requirement.

Mitigation Monitor: The City of Los Angeles or an independent third-party consultant retained by the City.

Mitigation measures and, therefore, mitigation monitoring are only required for those resource areas for which significant environmental impacts have been identified. For the Proposed Project this includes: air quality, vegetation resources, wildlife resources, cultural resources and transportation. For all other resources areas (geology and soils, hydrology and water resources, visual resources, noise, land use, economic and social impacts and public health/risk of upset), the Proposed Project will not cause any associated significant environmental impacts and, therefore, as a result of the approval of the Proposed Project, these resource areas do not have any mitigation monitoring requirements.

MITIGATION MEASURE	IMPLEMENTATION PROCEDURE	MONITORING AND REPORTING ACTIONS	STANDARD OF COMPLIANCE	RESPONSIBLE AGENCY(IES)	MONITORING SCHEDULE
METEOROLOGY & AIR QUALITY:					
Mitigation Measures (MM) 5-3.1 and 5-3.2: Fugitive dust emissions from lake bed construction activities and gravel mining activities will be controlled through the application of Best Available Control Measures (BACM) for fugitive dust emissions. Any gravel plant will be required to comply with the New Source Performance Standard for non-metallic mineral processing plants. Construction activities will comply with GBUAPCD Rules 400 and 402. This may include, but would not be limited to, use of chemical soil stabilizers, surface coverings, water trucks and water sprays.	Add requirement for fugitive dust control to all construction contracts let for work associated with control measure implementation. Apply BACM for fugitive dust emissions during construction. Any gravel plant will be required to comply with the New Source Performance Standard for non-metallic mineral processing plants.	1) Provide copy of all construction contracts. 2) Provide a report of fugitive dust mitigation measures applied during construction phase. 3) Inspect construction activities.	Comply with District Rules 400 and 402.	1) Mitigation Monitor and GBUAPCD. 2) Mitigation Monitor. 3) GBUAPCD.	1) Prior to commencement of construction activities. 2) File quarterly compliance report. 3) Throughout construction activities.
VEGETATION RESOURCES:					
MM 5-4.1: A total of 121 acres of Transmontane Alkaline Meadow (TAM) shall be established and maintained to replace vegetation lost as a result of control measure implementation and operation. The TAM will be vegetated to achieve species diversity and percent cover comparable to the TAM lost as a result of direct or indirect impacts. 89 acres will be established in the Managed Vegetation control area and 32 acres will be established in the shallow flood control area.	LADWP and GBUAPCD will coordinate with the Army Corps of Engineers (ACOE) and Calif. Dept. of Fish and Game (CDFG) to determine the appropriate methods and locations for providing compensatory TAM replacement. LADWP will then implement the agreed upon method for TAM replacement.	Verify submittal of plans for wetland compensation to ACOE and CDFG for review and approval. Verify implementation and effectiveness of implementation.	The replacement TAM will be vegetated to achieve species diversity and percent cover comparable to the TAM lost as a result of direct or indirect impacts.	Mitigation Monitor, ACOE and CDFG. Verifications submitted to GBUAPCD.	Prior to completion of construction of Managed Vegetation control area.

MITIGATION MEASURE	IMPLEMENTATION PROCEDURE	MONITORING AND REPORTING ACTIONS	STANDARD OF COMPLIANCE	RESPONSIBLE AGENCY(IES)	MONITORING SCHEDULE
MM 5-4.2: Areas subject to shallow flood and managed vegetation control measures will be surveyed annually after implementation to identify locations where exotic pest plants have encroached into the project area. Where exotic pest plants such as salt cedar, puncture weed, Russian olive and noxious grasses such as *Cenchrus* are identified as a result of annual monitoring, an exotic pest plant control program will be developed and implemented to eradicate exotic pest plant and noxious weeds.	Exotic pest plant control program will be accomplished through an appropriate combination of biological, mechanical, and chemical control methods. The exotic pest plant control program will focus on early removal of plants and will be coordinated with other control programs undertaken in Inyo County to ensure most effective utilization of resources.	1) Verify program establishment. 2) Provide reports on program activities and effectiveness.	To be established during program development.	1) Mitigation Monitor, CDFG and Inyo County. 2) Mitigation Monitor. Verifications and reports submitted to GBUAPCD.	1) Prior to initiation of any water releases for water-based control measures.
MM 5-4.3: Prior to final siting of projected infrastructure, such as a buried water transmission line in shadscale scrub and transmontane alkaline meadow, and roads, power lines, and the gravel conveyor within shadscale scrub, a focused pre-construction survey will be conducted during the optimal flowering period for Owens Valley checkerbloom, Inyo County mariposa lily, Booth's evening primrose, Kern County evening primrose, Ripley's cymopterus, Mono buckwheat, sand linanthus, and Nevada oryctes. Final alignments will be reconfigured as necessary to avoid populations of sensitive plant species if they are detected as a result of directed surveys.	After final design is complete, but prior to contract awards, focused pre-construction surveys will be conducted during the optimal flowering period for the subject species. Final infrastructure alignments shall be adjusted, if necessary to avoid subject species, if encountered.	Provide a report of all surveys. If necessary, revise plans to prevent impacts.	Avoid subject plant species to the extent possible.	Mitigation Monitor. Reports and plans submitted to GBUAPCD.	Prior to construction.

MITIGATION MEASURE	IMPLEMENTATION PROCEDURE	MONITORING AND REPORTING ACTIONS	STANDARD OF COMPLIANCE	RESPONSIBLE AGENCY(IES)	MONITORING SCHEDULE
WILDLIFE RESOURCES:					
MM 5-5.2: A total of 121 acres of Transmontane Alkaline Meadow (TAM) shall be established and maintained to replace the alkali skipper and the Owens Valley tiger beetle habitat lost as a result of control measure implementation and operation. The TAM will be vegetated to achieve species diversity and percent cover comparable to the TAM lost as a result of direct or indirect impacts. 89 acres will be established in the Managed Vegetation control area and 32 acres will be established in the shallow flood control area.	LADWP and GBUAPCD will coordinate with the Army Corps of Engineers (ACOE) and Calif. Dept. of Fish and Game (CDFG) to determine the appropriate methods and locations for providing compensatory TAM replacement. LADWP will then implement the agreed upon method for TAM replacement.	Verify submittal of plans for wetland compensation to ACOE and CDFG for review and approval. Verify and report on implementation and effectiveness of implementation.	The replacement TAM will be vegetated to achieve species diversity and percent cover comparable to the TAM lost as a result of direct or indirect impacts.	Mitigation Monitor, ACOE and CDFG. Verifications, plans and reports submitted to GBUAPCD.	Prior to completion of construction of Managed Vegetation control area.
MM 5-5.3:. Potential impacts on nesting northern harriers in TAM shall be avoided and reduced to below the level of significance by scheduling construction of the buried water transmission pipeline outside of the breeding season of northern harrier (mid-March to mid-September), in accordance with Table 4.2. If the breeding season cannot be avoided, surveys shall be conducted within and adjacent to the 2 acres of TAM prior to construction. If northern harriers are observed nesting within the area that would be impacted in the construction of the buried water transmission pipeline, construction will be sited so as to avoid nesting individuals of this species.	Schedule construction in two acres of TAM to occur outside the period from March 15 to September 15. If this period cannot be avoided, surveys shall be conducted within and adjacent to the 2 acres of TAM prior to construction. If northern harriers are observed nesting within the area that would be impacted, construction will be rescheduled or re-sited so as to avoid nesting individuals.	Provide construction schedules. If necessary, provide a survey report. If necessary, provide revised construction schedule or revised plans.	Avoid construction in 2 acres of TAM at the southern end of the Owens River delta during the period from March 15 to September 15, unless preconstruction surveys are performed and nesting individuals are avoided.	Mitigation Monitor and CDFG. Schedules, reports and plans submitted to GBUAPCD.	Prior to construction in 2 acres of TAM at the southern end of the Owens River delta.

MITIGATION MEASURE	IMPLEMENTATION PROCEDURE	MONITORING AND REPORTING ACTIONS	STANDARD OF COMPLIANCE	RESPONSIBLE AGENCY(IES)	MONITORING SCHEDULE
MM 5-5.4: Potential impacts on breeding Le Conte's thrasher and loggerhead shrike would be avoided and reduced below the level of significance by scheduling construction of all improvements in Shadscale Scrub in the vicinity of suitable nesting habitat outside the breeding season (mid-January to late July), in accordance with Table 4.2. If the breeding season could not be avoided, surveys in the areas in which construction would take place would be conducted and areas containing breeding individuals would be avoided.	Schedule construction in Shadscale Scrub to occur outside the period from January 15 to July 31. If this period cannot be avoided, surveys shall be conducted in areas proposed for construction prior to the start of construction. If Le Conte's thrashers or loggerhead shrikes are observed nesting within the area that would be impacted, construction will be rescheduled or re-sited so as to avoid nesting individuals.	Provide construction schedules. If necessary, provide a survey report. If necessary, provide revised construction schedule or revised plans.	Avoid construction in Shadscale Scrub during the period from January 15 to July 31, unless preconstruction surveys are performed and nesting individuals are avoided.	Mitigation Monitor and CDFG. Schedules, reports and plans submitted to GBUAPCD.	Prior to construction in Shadscale Scrub habitat.
MM 5-5.5(a): A pre-construction directed survey for breeding western snowy plovers at Owens Lake will be undertaken during the breeding season in the year proceeding implementation of PM_{10} control measures. The pre-construction survey will include all known or expected nesting areas at Owens Lake. The purpose of the survey will be to census: number and location of adults, number and location of juveniles, numbers and location of chicks, and locations of nests or expected nests.	Conduct pre-construction surveys as per protocol.	Provide a survey report.	Directed surveys to be conducted in accordance with the protocol established for the GBUAPCD 1996 survey.	Mitigation Monitor, CDFG and GBUAPCD. Survey report submitted to GBUAPCD.	Breeding season survey (March 15 to August 31) prior to the start of any lake bed construction.

MITIGATION MEASURE	IMPLEMENTATION PROCEDURE	MONITORING AND REPORTING ACTIONS	STANDARD OF COMPLIANCE	RESPONSIBLE AGENCY(IES)	MONITORING SCHEDULE
MM 5-5.5(b): A pre-construction survey to delineate the distribution of suitable foraging habitat for western snowy plovers in and adjacent to areas where PM_{10} Control Measures will be implemented will be undertaken in the year immediately proceeding project implementation. Suitable foraging habitat will include all areas supporting ephydrids. Density of March 10, 1997 ephydrids can be used as a measure of the quality of habitat. The results of directed surveys will be used as the basis for performance criteria in evaluating the quality of foraging habitat created as a result of project implementation.	Conduct pre-construction surveys as per protocol.	Provide a survey report.	Pre-construction surveys to be conducted in accordance with the protocol established for the GBUAPCD 1996 survey.	Mitigation Monitor, CDFG and GBUAPCD. Survey report submitted to GBUAPCD.	Breeding season survey (March 15 to August 31) prior to the start of any lake bed construction.
MM 5-5.5(c): Ground-disturbing activities associated with the implementation of PM_{10} control measures will not be undertaken in known or expected western snowy plover nesting areas identified as a result of the pre-construction surveys for breeding snowy plover during the breeding season, between march 15 and August 31.	Construction schedule development shall take into account the results of pre-construction surveys in order to avoid sensitive areas during the breeding season.	Provide a report and copies of all construction schedules.	Avoid construction in identified sensitive areas during breeding season.	Mitigation Monitor, CDFG and GBUAPCD. Submit report and copies of all construction schedules to GBUAPCD.	Prior to commencement of construction activities.

MITIGATION MEASURE	IMPLEMENTATION PROCEDURE	MONITORING AND REPORTING ACTIONS	STANDARD OF COMPLIANCE	RESPONSIBLE AGENCY(IES)	MONITORING SCHEDULE
MM 5-5.5(d): Construction avoidance measures to protect nesting and foraging habitat for western snowy plovers will be exercised when ground-disturbing activities associated with construction of shallow flooding, managed vegetation, gravel and associated development must be undertaken between March 15 and August 31.	A qualified wildlife biologist shall survey work areas that approach known or expected nesting areas identified during the pre-construction survey. A 500 ft radius buffer areas will be established to protect all known or expected nesting sites and associated foraging areas. The biologist will flag these areas with to ensure that they are avoided during construction.	Provide a survey report and plan of all buffer areas. Inspect for flagging. Inspect for compliance with buffer-zone avoidance.	Surveys to be conducted in accordance with the protocol established for the GBUAPCD 1996 survey.	Mitigation Monitor, CDFG and GBUAPCD. Survey report and plan submitted to GBUAPCD.	Prior to start of construction activities during breeding season (March 15 to August 31).
MM 5-5.5(e): (1) Post-construction surveys for western snowy plovers shall be undertaken in following implementation of water-based control measures. (2) The results of the post-construction surveys will be analyzed in relation to pre-construction surveys and results for control sites established as part of the overall monitoring program for the project. (3) Where the monitoring program indicates that western snowy plover population numbers are declining as a result of implementation and maintenance of the PM_{10} Control Measures, habitat restoration shall be undertaken to compensate for reduced numbers of potential nesting sites that occur as a result of the control measures that displace nesting sites.	(1) Post-construction surveys for western snowy plovers shall be undertaken in the first, second, third, fifth, tenth, fifteenth, twentieth, and twenty-fifth years following implementation of water-based control measures. (2) Establish control sites. (3) Sufficient breeding habitat restoration shall be undertaken to maintain population levels at sites on the east side of Owens Lake consistent with the average population numbers established as a result of the 1996 and 1997 directed surveys.	(1) Provide survey reports. (2) Provide plan for control sites. (3) If necessary, provide plan for habitat restoration.	Maintenance of population levels at sites on the east side of Owens lake consistent with average population numbers established as a result of the 1996 and 1997 directed surveys.	Mitigation Monitor, CDFG and GBUAPCD. Submit reports and plans to CDFG and GBUAPCD.	First, second, third, fifth, tenth, fifteenth, twentieth and twenty-fifth years following implementation of water-based control measures.

MITIGATION MEASURE	IMPLEMENTATION PROCEDURE	MONITORING AND REPORTING ACTIONS	STANDARD OF COMPLIANCE	RESPONSIBLE AGENCY(IES)	MONITORING SCHEDULE
CULTURAL RESOURCES:					
MM 5-6.1(a): Prior to any ground disturbance in the area identified as GB JSA-1, additional research and test excavation will be undertaken to determine whether this prehistoric resource is significant. If it is determined to be significant, it will be subjected to a data recovery program consisting of archaeological excavation to retrieve the important data from the site.	If ground disturbance is required in vicinity of GB JSA-1, attempt to revise project design to avoid. If avoidance is not possible, a qualified archaeologist will conduct research and test excavations. If site is significant, data recovery will take place.	Submit construction plans to check for site impact. If necessary, provide report on ability to modify plans to avoid. If necessary, submit report on site significance. If necessary, submit data recovery plan.	National Historic Preservation Act and State Historic Preservation Office Guidelines.	Mitigation Monitor, ACOE, BLM and Calif. State Lands Commission.	Prior to ground disturbance in vicinity of GB JSA-1.
MM 5-6.1(b): Prior to any ground disturbance in areas identified as sensitive for prehistoric resources, archaeological surveys will be conducted to locate and record prehistoric resources. If the surveys result in identification of resources that cannot be avoided, additional research or test excavations, where appropriate, will be undertaken to determine whether the resource(s) are significant. Significant resources that cannot be avoided will be subjected to data recovery program consisting of archaeological excavation to retrieve the important site data.	A qualified archaeologist shall conduct pre-construction surveys. Identify potentially significant cultural resources. Determine significance. If significant, avoid if possible. If avoidance is not possible recover important site data.	Submit construction plans to allow planning of site surveys. Submit survey report. If necessary, provide report on ability to modify plans to avoid. If necessary, submit data recovery plan. If necessary, submit recovery result report.	National Historic Preservation Act and State Historic Preservation Office Guidelines.	Mitigation Monitor, ACOE, BLM and Calif. State Lands Commission.	Prior to ground disturbance in areas identified as sensitive for prehistoric resources.

MITIGATION MEASURE	IMPLEMENTATION PROCEDURE	MONITORING AND REPORTING ACTIONS	STANDARD OF COMPLIANCE	RESPONSIBLE AGENCY(IES)	MONITORING SCHEDULE
TRANSPORTATION:					
MM 5-10.5: Warning lights and signs shall be installed by CalTrans at any side road entrances or overweight vehicle crossings constructed on SR 136 or SR 190 that would be used by delivery trucks hauling gravel from sites above the highways.	Lights and signs should be installed along the highways on either side of the crossings to warn motorists that there may be large, slow-moving trucks ahead. If CalTrans requires installation of traffic signals at the crossings, the warning signs and lights could be used in conjunction with the signals.	Provide gravel hauling plan. Provide sign/light/signal plan. Provide copies of CalTrans permits. Provide as-built plans.	CalTrans specifications.	Mitigation Monitor and CalTrans.	**Prior to commencement of gravel hauling activities.**
MM 5-10.8: All public roadways damaged by gravel hauling shall be repaired as required to maintain safe operating conditions throughout the gravel hauling period, as well as at the end of this period.	Public roadways utilized to haul gravel shall be inspected daily during gravel hauling operations. Repairs shall be made as soon as road damage occurs. Safe operating conditions shall be maintained at all times. Upon completion of gravel hauling operations, roadways shall be repaired to pre-project conditions.	Provide road repair plan prior to start of gravel hauling operations. Secure repair permits. Provide quarterly reports of daily inspections and repairs made.	CalTrans and Inyo County specifications.	Mitigation Monitor, CalTrans and Inyo County.	**Daily during gravel hauling. At the conclusion of gravel hauling.**

Appendix A

PM_{10} Monitoring Data

A1 – All Sites 1987 through 1995
A2 – Off-Lake March 1993 through June 1995
A3 – Days that Exceed 150 $\mu g/m^3$
A4 – Summary of Quarterly and Annual Averages

Appendix A1

PM_{10} Monitoring Data
All Sites 1987 through 1995

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

					Lone	Lone	Coso	Coso	Pearson	Inyo	Ridge
	Keeler	Keeler	Olancha	Olancha	Pine	Pine	Junction	Navy	-ville	-kern	-crest
DATE	SSI	TEOM	SSI	TEOM	SSI	TEOM	SSI	SSI	SSI	SSI	SSI
1/3/1987	121		35		45		16				
1/9/1987	6		15		16		27				
1/15/1987	100		115		25		196				
1/19/1987							19				
1/21/1987	13		57		28		25				
1/27/1987	672		37		178						
2/2/1987	251		21		140		27				
2/8/1987	13		25		19		19				
2/9/1987					19						
2/14/1987	9		4		8		12				
2/18/1987	22										
2/20/1987	54		145		7						
2/21/1987							11				
2/26/1987	39		33		8		36				
3/4/1987	71		19		38		33				
3/10/1987	230		13		17		8				
3/16/1987	55		68				32				
3/22/1987	166		110		13		65				
3/28/1987	31		24		13		15				
4/3/1987	33		29		18		32				
4/9/1987	11		28		14		56				
4/15/1987	23		45		25		47				
4/21/1987	18		124		20		48				
4/27/1987	25		29		19		23				
5/3/1987	10		21		15		19				
5/9/1987	7		14		9		13				
5/15/1987	24		33		13		15				
5/21/1987	8		14		11		28				
5/27/1987	10		20		9		21				
6/2/1987	13		27		17		41				
6/8/1987	15		30				124				
6/12/1987					21						
6/14/1987	54		42		35		29				
6/20/1987	17		18		21		30				
6/26/1987	76		33		29		115				
7/2/1987			15		24						
7/8/1987	20		27		27		47				
7/14/1987	22		26		20		36				
7/20/1987	25		13		48		13				
7/26/1987	24		14		26		27				
8/1/1987	17		16		17						
8/7/1987	22		25		27						
8/10/1987							59				
8/13/1987	18		25		25		43				
8/19/1987	19		23		23		37				
8/25/1987	13		23		20		40				

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
8/31/1987			16				37				
9/3/1987	42										
9/6/1987	17		26		38		33				
9/12/1987			31		47		36				
9/18/1987	21		28		23		42				
9/24/1987	12		15		16		20				
9/30/1987	12		23		16		36				
10/6/1987	16		31		17		42				
10/12/1987	53		15		28		73				
10/18/1987	12		19		18		18				
10/24/1987	7		10		8		12				
10/30/1987	6		10		5		16				
11/5/1987	5		5				14				
11/11/1987	12		13		14		14				
11/14/1987					12						
11/17/1987	16		23		9		25				
11/23/1987	10		10		14		8				
11/29/1987	11		19		19		14				
12/5/1987	3		5		6		6				
12/11/1987	8		9		13		11				
12/17/1987	8		9		6						
12/19/1987							2				
12/23/1987	111		14		5		30				
12/29/1987	5		6		12		8				
1/4/1988	9		5		13		13				
1/10/1988	9		12		17		9				
1/16/1988	394		25		172		15	2			
1/22/1988	11		11		23		37	7			
1/28/1988	8		13		13		31				
2/3/1988	10		12		19						
2/9/1988	14		18				31	32			
2/15/1988	10		21		29		47	6			
2/21/1988	14		18		17		34	22			
2/27/1988	12		13		8		20	14			
3/4/1988	7		10		8		11	20			
3/9/1988	115		67		29						
3/14/1988							15				
3/15/1988	69		18		43						
3/16/1988							23	11			
3/22/1988			13		12		18	41			
3/28/1988	49		50		23		92	63			
4/3/1988	21		23		36		24	44			
4/9/1988	17		24		22		17				
4/12/1988								6			
4/15/1988	3		3		6		4				

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
4/21/1988	8		7		7		9	12			
4/27/1988	18		16		18		27	32			
5/3/1988	15		14		22		22				
5/4/1988								11			
5/5/1988	56		13		50						
5/9/1988							22				
5/15/1988	17		16		26		25				
5/21/1988	13		18		18		20	53			
5/27/1988	20		23		21		32	48			
6/2/1988	12		17		19		43	23			
6/8/1988	12		9		9		14	17			
6/13/1988	12										
6/14/1988			23		19		31	118			
6/20/1988	30		15				17	36			
6/23/1988					4						
6/26/1988	20		18		7		16	62			
7/2/1988	16		20		11		14	30			
7/8/1988	21		22		20		23	37			
7/14/1988	21		25		21		28	42			
7/20/1988	20		29		19		29	76			
7/26/1988	20		19		12		16	55			
8/1/1988	70		23		20		25	47			
8/7/1988	20		17		10		20	29			
8/13/1988	20		15		12		28	50			
8/19/1988	20		21		19		33	58			
8/25/1988	12		12		8		9	113			
8/31/1988	14		17		15		20				
9/2/1988								50			
9/6/1988	24		29		31						
9/7/1988								71			
9/8/1988											
9/12/1988	52				29			119			
9/13/1988							24				
9/18/1988	38		40		43		49	78			
9/24/1988	18		22		20		31	86			
9/30/1988	4		14		12		13	24			
10/6/1988	14		24		18		26	27			
10/12/1988	15		40		15		28	34			
10/18/1988	12		18		9		16	22			
10/24/1988	19		29		21		20	41			
10/30/1988	18		29		18		20	31			
11/5/1988	13		18		14		18	42			
11/11/1988	12		14		19		12	30			
11/17/1988	123		55		19		17	117			
11/23/1988	324		44		64		12	26			

Summary of GBUAPCD PM_{10} Monitoring 1987-1995
(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
11/29/1988	11		10		5		5	25			
12/5/1988	11		29		36		17	23			
12/11/1988	8		13		19		8	47			
12/17/1988	8		8		11						
12/20/1988							8	11			
12/23/1988	7		5		10		5	8			
12/29/1988							7	14			
12/30/1988	11		13		12						
1/4/1989	9		12		16		25	12			
1/10/1989	98		22		65		37	31			
1/16/1989			13		15		4	23			
1/22/1989			13		22		11	17			
1/28/1989	12		107		14		30	33			
1/29/1989								23			
2/1/1989											
2/3/1989	1861				126		101	227			
2/9/1989	5				4		16	16			
2/15/1989					14		13	10			
2/21/1989	8				12		16	13			
2/24/1989	32				16						
2/27/1989							37	12			
3/5/1989	12				17		13	20			
3/9/1989	11				78						
3/11/1989							10	22			
3/17/1989	12				14		13	10			
3/20/1989							11				
3/23/1989	44				29		16	13			
3/29/1989	13		26		12		17	9			
4/4/1989	9		20		8		41	29			
4/10/1989	15		26		12		50	17			
4/16/1989	15		17		20		22	20			
4/22/1989	326		25		87		37	45			
4/28/1989	10		14		8		18	15			
5/4/1989	15		17		14		65	46			
5/10/1989	44		20		85		17	44			
5/16/1989	11		11		8		11	15			
5/22/1989	165		19		34		16	16			
5/28/1989	587		13		96		15	18			
6/3/1989	97		19		10		38	43			
6/9/1989	29		21		16		34	42			
6/15/1989	24		36		18		47	44			
6/21/1989	104		109		24		69	36			
6/27/1989	84		21		27		23	45			
7/3/1989	12		13		30		43	45			
7/9/1989	43		32		13		52	37			

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
7/15/1989	22		19		18		36	28			
7/21/1989	20		25		21		31	29			
7/27/1989	15		17		15		26	26			
8/2/1989	15		17		18		26	27			
8/8/1989	20		32		18		27	66			
8/14/1989	10		38		9		19	17			
8/20/1989	115		27		16		30	30			
8/26/1989	16		19		13		31	31			
9/1/1989	19		25		18		41	29			
9/7/1989	21		38		18		22	21			
9/13/1989	12		18		6		19	16			
9/19/1989	59		13		3		22	10			
9/25/1989	11		12		9		26	15			
10/1/1989	16		12		5		11	17			
10/7/1989	14		24		12		14	15			
10/13/1989	13		20		12		25	15			
10/19/1989	15		18		9		37	14			
10/25/1989	23		63		7		9	11			
10/31/1989			32		17		15	17			
11/6/1989	10		16		17		18	11			
11/12/1989	7		21		16		15	11			
11/18/1989	6		19		10		2	7			
11/24/1989	18		22		26		18	22			
11/30/1989	11		16		16		6	4			
12/6/1989	103		58		20		27	25			
12/12/1989	9		36		26		17	8			
12/18/1989							15	14			
12/19/1989	13		24		31						
12/24/1989	11		16		22		5	6			
12/30/1989	120		27		12		25	43			
1/5/1990	4		11		19		6	3			
1/11/1990	11		16		27		16	10			
1/17/1990	4		2		10		1	1			
1/23/1990	8		11		22		4	5			
1/29/1990	7		10		19		14	7			
2/4/1990	43		14		21		28	10			
2/10/1990	4		9		4		2	5			
2/16/1990	533		6		52		11	3			
2/22/1990	4		7		10		7	4			
2/28/1990	14		14		17		13	15			
3/6/1990	49		12		15			55			
3/12/1990	2		4		9		10	2			
3/18/1990	11		0		9		8	4			
3/24/1990	9		15		11		10	11			
3/30/1990	8		9		18		15	12			

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
4/1/1990								12			
4/5/1990	13		20		29		15	15			
4/11/1990	12		21		15		15	14			
4/17/1990	7		11		6		9	10			
4/23/1990	85		200				866	94			
4/26/1990					9						
4/28/1990	95										
4/29/1990			44		28		9	23			
5/5/1990	8		15		9		11	10			
5/11/1990	14		16		13		18	23			
5/17/1990	43		200		26		26	33			
5/23/1990	181		65		27		22				
5/29/1990	27		11		6		14	8			
6/4/1990	13		17		13		15				
6/10/1990	10		18		21		13	14			
6/16/1990	11		14		15		11	12			
6/22/1990	22		24		34		33	32			
6/28/1990	15		24		15		21	20			
7/4/1990	14		16		15		18	17			
7/10/1990	15		19		20		29				
7/16/1990	14		19		19		24	23			
7/22/1990	12		15		15		14	18			
7/28/1990	12		18		12		20	24			
8/3/1990	23		25		25		35				
8/9/1990	16		15		13		12	29			
8/15/1990			58		68		69				
8/21/1990	10		18		15		12	14			
8/27/1990	11		8		11		14	12			
9/2/1990	12		13		13		12	22			
9/8/1990	15		18		17		18	19			
9/14/1990	16		17		7		10	16			
9/20/1990	4		7		5		6	9			
9/26/1990	7		10		7		12				
10/2/1990	13		14		12		16				
10/3/1990								8			
10/8/1990	3		13		6		4	5			
10/11/1990					26						
10/14/1990	11		15		13		16	16			
10/20/1990	4		8		6		5	5			
10/26/1990	9		12		7		10	19			
11/1/1990	7		10		13		7	11			
11/7/1990	138		21		0		45	85			
11/13/1990	8		11		2		14				
11/15/1990								18			
11/19/1990	20		16		18		23				

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
11/25/1990	858		40		59		14				
11/28/1990								14			
12/1/1990	11		14		22		6	5			
12/7/1990	14		17		23		7	8			
12/13/1990	15		16		14		16	16			
12/19/1990	693		59		18		9	12			
12/25/1990	6				14		6	14			
12/28/1990			13								
12/31/1990	13		15		27		9				
1/6/1991	9		10		15		4	4			
1/12/1991	12		12		23		8	7			
1/18/1991	26		7		18		9	13			
1/24/1991			13		20		10	10			
1/30/1991	40		32		51		45	37			
2/5/1991	10		12		17		13	10			
2/11/1991	18		17		23		17	13			
2/17/1991	13		23		26		19	26			
2/23/1991	35		14		13		14	13			
3/1/1991	10				0		2	3			
3/7/1991	14		5		8		5	9			
3/13/1991	144		181		29		8	6			
3/15/1991			12								
3/19/1991	4		5		9		6	9			
3/25/1991	134		6		5		5	5			
3/31/1991	46		9		10		12	12			
4/6/1991	181		25		17		15	15			
4/12/1991	21		15		9		18	42			
4/18/1991	10		10		10		13	20			
4/24/1991	29		11				14	28			
4/30/1991	49						30	42			
5/1/1991					82						
5/6/1991	12				30		17	26			
5/7/1991			11								
5/12/1991	10				11		12	16			
5/14/1991			23								
5/18/1991	68		17		14		14	19			
5/24/1991	19		16		15		18	22			
5/30/1991			49				64	150			
5/31/1991	335				19						
6/5/1991	32		24		30		31	33			
6/11/1991	15		18		21		22	36			
6/17/1991	18		12		12		15	29			
6/23/1991	26		13		18		14	17			
6/29/1991	9		10		9		12	15			
7/5/1991			19		21		17	22			

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
7/11/1991					20		30	24			
7/17/1991			7		18		19	24			
7/23/1991			13		15		26	28			
7/29/1991			20		16		18	24			
7/31/1991			18								
8/4/1991	14		11		14		42	25			
8/10/1991	12		14		15		33	39			
8/16/1991	14		13		15		26	26			
8/22/1991	16		15		19		31	25			
8/28/1991	13		13		15		27	20			
9/3/1991			18		15			19			
9/9/1991			14		21			13			
9/15/1991	13		13		17			11			
9/21/1991	28		24		25			12			
9/27/1991	17		12		17			19			
10/1/1991							10				
10/3/1991			17		16		20				
10/9/1991	10		16		14		14				
10/15/1991	9		12		15		15				
10/21/1991	10		10		13		12				
10/27/1991	143		7		12		22				
11/2/1991	10				13		7	16			
11/5/1991			13								
11/8/1991	14		12		16		16	18			
11/14/1991	48		9		15		16	32			
11/20/1991	9		10		17		13	10			
11/26/1991	13		16		22		9	9			
12/2/1991	12				12		16	22			
12/5/1991			14								
12/8/1991	46		6		7		9	7			
12/14/1991	10		14		22		6	13			
12/20/1991	142		61		9		93	112			
12/26/1991	11		11		23		13	9			
1/1/1992	7		10		11						
1/4/1992								4			
1/7/1992	8		7		9		5	4			
1/13/1992	14		10		19		7	9			
1/19/1992	7		9		9		10	4			
1/25/1992	11		10				8	13			
1/31/1992	14		9		14		13	6			
2/6/1992	6				9						
2/12/1992	5				5						
2/18/1992	6				12						
2/24/1992	10				6						
3/1/1992	15				21						

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson -ville SSI	Inyo -kern SSI	Ridge -crest SSI
3/7/1992	6				4						
3/13/1992			18				20				
3/14/1992								23			
3/19/1992	20		13		21		20	12			
3/25/1992	6		6		9		8				
3/31/1992	7		6		3						
4/6/1992	15		14		14						
4/12/1992	62		13		32						
4/18/1992	151		366		31						
4/24/1992	17		19		21						
4/30/1992	350		19		63						
5/6/1992	5		10		6						
5/12/1992	19		20		17						
5/18/1992	18		18		22						
5/24/1992	13		17		13						
5/30/1992	22		20		20						
6/5/1992	25		21		22						
6/11/1992	26		21		28						
6/17/1992	13		12		11						
6/23/1992	13		14		24						
6/29/1992	526		13		61						
7/5/1992	18		11		10						
7/11/1992	19		17		19						
7/17/1992			10		16						
7/23/1992	16		17		16						
7/29/1992	15		19		17						
8/4/1992	20		19				38	43			
8/10/1992	12		14		15		32	46			
8/16/1992	11		14		9		10	60			
8/22/1992	39		19		23			50			
8/28/1992	19		33		18		26	26			
9/3/1992	242		22		23		29	36			
9/9/1992	14		17		14		23	26			
9/15/1992	15		14		13		24	24			
9/21/1992	13		15		12		22	29			
9/27/1992	14		16		15		21	21			
10/3/1992	10		10		8		12	14			
10/9/1992	19		21		21		25	25			
10/15/1992	35		24		20		38				
10/21/1992	13		12		13		22	20			
10/27/1992							8				
10/28/1992	5		5		8						
11/2/1992	16		6		6		6	5			
11/8/1992	16		12		15		14	11			
11/14/1992	11		12		15		7	7			

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
11/20/1992	100		39		21		38	37			
11/26/1992	7		10		17		6				
12/2/1992	48				31		22	16			
12/3/1992			13								
12/8/1992	7		6		13			6			
12/13/1992			365				50				
12/14/1992	18										
12/20/1992	7		5		16		4	6			
12/26/1992	11		4		25		5	10			
1/1/1993	781		4		13		6				
1/7/1993	6		2		5		1				
1/13/1993	2		1		3		2				
1/19/1993	9		5		7		2				
1/25/1993	8		6		11		3				
1/31/1993	7		6		3		3	6			
2/6/1993	11		8		18		10	11			
2/12/1993	6		5		14		8	6			
2/18/1993	8		5		6		6	3			
2/24/1993	11		4		2		4	8			
3/2/1993	5		7		10		5	9			
3/8/1993	9				8		11	9			
3/11/1993			37				11				
3/12/1993		8									
3/13/1993		12									
3/14/1993	10	13			10		8	10		18	
3/15/1993		18									
3/16/1993		46									
3/17/1993		513									
3/18/1993		8									
3/19/1993		61									
3/20/1993	5	9			9		23	16			
3/21/1993		9									
3/22/1993		35									
3/23/1993		276									
3/24/1993		257									
3/25/1993		24									
3/26/1993	3	5	1		7		1	1	7	3	4
3/27/1993		7									
3/28/1993		5									
3/29/1993		6									
3/30/1993		7									
3/31/1993		13									
4/1/1993	19	19	14				17	10			
4/2/1993		10									
4/3/1993		10									

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
4/4/1993		225									
4/5/1993		49									
4/6/1993		15									
4/7/1993	14	15	13		16			18			
4/8/1993		40									
4/9/1993		23									
4/10/1993		22									
4/11/1993		22									
4/12/1993		121									
4/13/1993	10	11			10			13			
4/14/1993		13									
4/15/1993		18									
4/16/1993		19									
4/17/1993		578									
4/18/1993		21									
4/19/1993	12	11			9		25	11			
4/20/1993		36	14								
4/21/1993		479									
4/22/1993		172									
4/23/1993		155									
4/24/1993		5									
4/25/1993	13	11	10		9		12	16			
4/26/1993		11									
4/27/1993		19									
4/28/1993		19									
4/29/1993		18									
4/30/1993		35									
5/1/1993	46	57	153		31		94	35			
5/2/1993		32									
5/3/1993		412									
5/4/1993		231					165		75	48	
5/5/1993		18									
5/6/1993		23									
5/7/1993	17	17	18		16		23	20			
5/8/1993		30							30	27	27
5/9/1993		25									
5/10/1993		32									
5/11/1993		43									
5/12/1993		64									
5/13/1993	48	65	15		28			20			
5/14/1993		19									
5/15/1993		68									
5/16/1993		24									
5/17/1993		14									
5/18/1993		24									

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
5/19/1993	18	23	17		17		34	23			
5/20/1993		20									
5/21/1993		22									
5/22/1993		18									
5/23/1993		25									
5/24/1993		43									
5/25/1993	16	20	17		33		26	37			
5/26/1993		24									
5/27/1993		22									
5/28/1993		17									
5/29/1993		18									
5/30/1993		24									
5/31/1993	80	127	18		18		21	31			
6/1/1993		15									
6/2/1993		72									
6/3/1993		13									
6/4/1993		285									
6/5/1993		27									
6/6/1993	8	9	8		5		9				
6/7/1993		7									
6/8/1993		10									
6/9/1993		10									
6/10/1993		55									
6/11/1993		14									
6/12/1993	41	45	10		43		51	29	44	24	17
6/13/1993		25									
6/14/1993		24									
6/15/1993		20									
6/16/1993		92									
6/17/1993		34									
6/18/1993	9	12			12		16	14			
6/19/1993		14									
6/20/1993		28									
6/21/1993		36									
6/22/1993		18									
6/23/1993		17									
6/24/1993	13	19			15		59	14			
6/25/1993		14									
6/26/1993		23									
6/27/1993		18									
6/28/1993		25									
6/29/1993		20									
6/30/1993	16	21			16		24	19			
7/1/1993		24									
7/2/1993		38									

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson -ville SSI	Inyo -kern SSI	Ridge -crest SSI
7/3/1993		25									
7/4/1993		24									
7/5/1993		22									
7/6/1993	27	30			23		40	33			
7/7/1993		30									
7/8/1993		21									
7/9/1993		22									
7/10/1993		23									
7/11/1993		30									
7/12/1993	27	32			21		41	28			
7/13/1993		33									
7/14/1993		41									
7/15/1993		46									
7/16/1993		32									
7/17/1993		22									
7/18/1993	19	22			18		32	19			
7/19/1993		22									
7/20/1993		26									
7/21/1993		20									
7/22/1993		21									
7/23/1993		40									
7/24/1993	27	26			13			23			
7/25/1993		31									
7/26/1993		27									
7/27/1993		22									
7/28/1993		24									
7/29/1993		26									
7/30/1993	18	18			12		28	19			
7/31/1993		13							20		18
8/1/1993		14									
8/2/1993		26									
8/3/1993		31									
8/4/1993		20									
8/5/1993	13	16			13		24	35			
8/6/1993		14									
8/7/1993		16									
8/8/1993		18									
8/9/1993		16									
8/10/1993		15									
8/11/1993	17	27			8		18	23			
8/12/1993		19									
8/13/1993		22									
8/14/1993		27									
8/15/1993		74									
8/16/1993		15									

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
8/17/1993	11	14			11		27	26			
8/18/1993		24									
8/19/1993											
8/20/1993											
8/21/1993		14									
8/22/1993		14									
8/23/1993	18	22			17		37	31			
8/24/1993		21									
8/25/1993		20									
8/26/1993		18									
8/27/1993		16									
8/28/1993		42									
8/29/1993	15	16			15		23	19			
8/30/1993		20									
8/31/1993		15									
9/1/1993		15									
9/2/1993											
9/3/1993		17									
9/4/1993		15			11		22	26			
9/5/1993		18									
9/6/1993		17									
9/7/1993		17									
9/8/1993		14									
9/9/1993		14									
9/10/1993	18	17			16		22	29			
9/11/1993		25									
9/12/1993		87									
9/13/1993		77									
9/14/1993		30									
9/15/1993		28									
9/16/1993	26	28			15		33	29			
9/17/1993		38									
9/18/1993		13									
9/19/1993		17									
9/20/1993		22									
9/21/1993		22									
9/22/1993	32	33			16			22			
9/23/1993		16									
9/24/1993		11									
9/25/1993		10									
9/26/1993		10									
9/27/1993		13									
9/28/1993		16					22	18			
9/29/1993	13	16			15						
9/30/1993		19					22				

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

					Lone	Lone	Coso	Coso	Pearson	Inyo	Ridge
	Keeler	Keeler	Olancha	Olancha	Pine	Pine	Junction	Navy	-ville	-kern	-crest
DATE	SSI	TEOM	SSI	TEOM	SSI	TEOM	SSI	SSI	SSI	SSI	SSI
10/1/1993		16									
10/2/1993		15									
10/3/1993		17									
10/4/1993	41	52			24		28	26			
10/5/1993		22									
10/6/1993		15									
10/7/1993		14									
10/8/1993		15									
10/9/1993		18									
10/10/1993	22	26	18		20		26	18			
10/11/1993		10									
10/12/1993		7									
10/13/1993		70									
10/14/1993		12									
10/15/1993		10									
10/16/1993	9	9	8		7		7	7			
10/17/1993		8									
10/18/1993		6									
10/19/1993		5									
10/20/1993		8									
10/21/1993		9				13					
10/22/1993	9	10	15		13	15	12	13			
10/23/1993		9				12					
10/24/1993		8				13					
10/25/1993		15				12					
10/26/1993		112									
10/27/1993		10									
10/28/1993	9	10	22		16		16	15			
10/29/1993		11									
10/30/1993		9				10					
10/31/1993		10				19					
11/1/1993		35				20					
11/2/1993		16				17					
11/3/1993	12	11	14		18	18	15	10			
11/4/1993		12				17					
11/5/1993		11				18					
11/6/1993		11				16					
11/7/1993		11				17					
11/8/1993		12				18					
11/9/1993	19	16	17		44	23	26				
11/10/1993		34				53		17			
11/11/1993		37				16					
11/12/1993		98				26					
11/13/1993		98				85					
11/14/1993		390				62					

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson -ville SSI	Inyo -kern SSI	Ridge -crest SSI
11/15/1993	67	101				20		19			
11/16/1993		17				20					
11/17/1993		22				17					
11/18/1993		17				20					
11/19/1993		14				19					
11/20/1993		14				17					
11/21/1993	16	14	7		29	24	19	7			
11/22/1993		15				19					
11/23/1993		40				44					
11/24/1993		114				88					
11/25/1993		23				27					
11/26/1993		16				18					
11/27/1993	23	16				22					
11/28/1993		168				48					
11/29/1993		30				65					
11/30/1993		78				13					
12/1/1993		40				16					
12/2/1993		41				13					
12/3/1993	9	8	7		18	18		7			
12/4/1993		8				21					
12/5/1993		11				16					
12/6/1993		21				25					
12/7/1993		15				27					
12/8/1993		24				25					
12/9/1993		39	18		33	36	20	4			
12/10/1993		13				17					
12/11/1993		293				113					
12/12/1993		0				9					
12/13/1993		15				15					
12/14/1993		259				170					
12/15/1993		54				15					
12/16/1993		35				15					
12/17/1993		7				16					
12/18/1993		9				19					
12/19/1993		9				15					
12/20/1993		16				16					
12/21/1993	12	17	68		17	19	67				
12/22/1993		20				15					
12/23/1993		412				58					
12/24/1993		13				15		11			
12/25/1993		9				15					
12/26/1993		41				25					
12/27/1993	13	14				24					
12/28/1993		20				16					
12/29/1993		8				18					

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
12/30/1993		8				21					
12/31/1993		11				24		3			
1/1/1994		10				21					
1/2/1994	12	12	9		26	24	9	3			
1/3/1994		13				23	6				
1/4/1994		17				21					
1/5/1994		183				76					
1/6/1994		20				24					
1/7/1994		12				19					
1/8/1994	14	13				22		8			
1/9/1994		16				32					
1/10/1994		16				15					
1/11/1994		24				20					
1/12/1994		17				19					
1/13/1994						23					
1/14/1994	14		11		21	19	7	5			
1/15/1994						18					
1/16/1994						16					
1/17/1994						14					
1/18/1994						17					
1/19/1994		22				20					
1/20/1994	12	11	16		21	21	9	5			
1/21/1994		10				22					
1/22/1994		15				20					
1/23/1994		259				307					
1/24/1994		247				82					
1/25/1994		9				9					
1/26/1994	7	11	6		12	12	5	1			
1/27/1994		24				7					
1/28/1994		9				9					
1/29/1994		23				10					
1/30/1994		14				11					
1/31/1994		16				16					
2/1/1994	11	14	6		19	17	9	4			
2/2/1994		10				15					
2/3/1994		82				17					
2/4/1994						11					
2/5/1994		7				11					
2/6/1994		50				15					
2/7/1994	3	6	3		4	4	2	2			
2/8/1994		6				5					
2/9/1994		13				13					
2/10/1994		249				6					
2/11/1994		345				22					
2/12/1994		6				11					

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
2/13/1994	8	6				10		7			
2/14/1994		7				14					
2/15/1994		14				13					
2/16/1994		292				122					
2/17/1994		1381				85					
2/18/1994		119				9					
2/19/1994	22	30	8		4	9	1	1			
2/20/1994		6				5					
2/21/1994		4				5					
2/22/1994		13				9					
2/23/1994		13				14					
2/24/1994		13				12					
2/25/1994	8	12	9		8	10	6	6			
2/26/1994		11				12					
2/27/1994		7				12					
2/28/1994		36				12					
3/1/1994		9				10					
3/2/1994		7				9					
3/3/1994	7	9	6		12	13		7			
3/4/1994		10				12					
3/5/1994		146				46	7				
3/6/1994		103				9					
3/7/1994		25				8					
3/8/1994						9					
3/9/1994	8	12				10		7			
3/10/1994		6				13					
3/11/1994		56				30					
3/12/1994		183				23					
3/13/1994		10				10					
3/14/1994		7				11					
3/15/1994	117	164				13		8			
3/16/1994		75				92					
3/17/1994						30					
3/18/1994		1226				499					
3/19/1994		7				95					
3/20/1994		14				13					
3/21/1994	12	4	11		19	21	12	12			
3/22/1994		961				91					
3/23/1994		25				30					
3/24/1994		74				27					
3/25/1994		5				5	9				
3/26/1994		54				8					
3/27/1994	8	8				10					
3/28/1994		85				13					
3/29/1994		12				12					

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson -ville SSI	Inyo -kern SSI	Ridge -crest SSI
3/30/1994		22				15					
3/31/1994		13				13					
4/1/1994		10				18					
4/2/1994		17	8			11	8				
4/3/1994		94				25					
4/4/1994	14	34				11					
4/5/1994		14				12					
4/6/1994		14				11					
4/7/1994		14				12					
4/8/1994	14	20				10					
4/9/1994		33				12					
4/10/1994		27				9					
4/11/1994		8				10					
4/12/1994		9				12					
4/13/1994		18				15					
4/14/1994	33	27	23			36	32	24			
4/15/1994		27				26					
4/16/1994		32				32					
4/17/1994		20				24					
4/18/1994		28				19					
4/19/1994		17				23					
4/20/1994	21	20	18			24	20	22			
4/21/1994		134				180					
4/22/1994		70				25					
4/23/1994		572				93					
4/24/1994		12				24					
4/25/1994		205				28					
4/26/1994	8	9	3			13	0	2			
4/27/1994		8				12					
4/28/1994		4				6					
4/29/1994		11				13					
4/30/1994		14				16					
5/1/1994		11				14					
5/2/1994	20	21	17		16	22	16	20			
5/3/1994		18				19					
5/4/1994		20				19					
5/5/1994		13				20					
5/6/1994		19				16					
5/7/1994		8				12					
5/8/1994	28	33	7		2	8	4	4			
5/9/1994		35				12					
5/10/1994		15				17					
5/11/1994		20				20					
5/12/1994		30				29					
5/13/1994		21				18					

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson -ville SSI	Inyo -kern SSI	Ridge -crest SSI
5/14/1994	23	21	21		21	30	22	21			
5/15/1994		387				25					
5/16/1994		151				18					
5/17/1994		23				16					
5/18/1994		5				7					
5/19/1994		4				7					
5/20/1994	7	5	6		3	6	6	10			
5/21/1994		10				16					
5/22/1994		15				18					
5/23/1994		13				17					
5/24/1994		15				19					
5/25/1994		23				19					
5/26/1994	16	20	15		13		20				
5/27/1994		20						23			
5/28/1994		-19									
5/29/1994		8									
5/30/1994		51									
5/31/1994		11									
6/1/1994	14	12	13		9	14	16	17			
6/2/1994		14				21					
6/3/1994		13				16					
6/4/1994		7				12					
6/5/1994		19				34					
6/6/1994		33				20					
6/7/1994	10	10			6	13	11	15			
6/8/1994		9	10			16					
6/9/1994		10				18					
6/10/1994		21				23					
6/11/1994		32				24					
6/12/1994		21				22					
6/13/1994		20	55		20	28	22	20			
6/14/1994		46				31					
6/15/1994		64				25					
6/16/1994		27				25					
6/17/1994		26				39					
6/18/1994		14				16					
6/19/1994		13	13		13	18	14	13			
6/20/1994		18				23					
6/21/1994		11				19					
6/22/1994		20				25					
6/23/1994		11				16					
6/24/1994		16				22					
6/25/1994		27	16		12	15	22	17			
6/26/1994		27				12					
6/27/1994		17				16					

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson -ville SSI	Inyo -kern SSI	Ridge -crest SSI
6/28/1994		31				21					
6/29/1994		13				17					
6/30/1994		21				19					
7/1/1994		24			16	21	22	17			
7/2/1994		25				14					
7/3/1994		15				18					
7/4/1994		19				17					
7/5/1994		21				24					
7/6/1994		28				30					
7/7/1994		12			11	15	17	13			
7/8/1994		20				21					
7/9/1994		23				26					
7/10/1994		22				24					
7/11/1994		20				24					
7/12/1994		17				21					
7/13/1994		19	19			22	20	18			
7/14/1994						27					
7/15/1994					20	23					
7/16/1994						28					
7/17/1994						17					
7/18/1994						19					
7/19/1994			23		27	32	28	25			
7/20/1994						58					
7/21/1994						28					
7/22/1994						19					
7/23/1994						20					
7/24/1994						15					
7/25/1994			11		10	14	16	11			
7/26/1994						14					
7/27/1994						15					
7/28/1994						21					
7/29/1994						26					
7/30/1994						23					
7/31/1994	11				10	14		15			
8/1/1994						15					
8/2/1994			12			15	17				
8/3/1994						14					
8/4/1994						20					
8/5/1994						19					
8/6/1994			12		10	16		10			
8/7/1994						14					
8/8/1994						18					
8/9/1994						18					
8/10/1994						19	22				
8/11/1994						15					

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

	Keeler	Keeler	Olancha	Olancha	Lone Pine	Lone Pine	Coso Junction	Coso Navy	Pearson -ville	Inyo -kern	Ridge -crest
DATE	SSI	TEOM	SSI	TEOM	SSI	TEOM	SSI	SSI	SSI	SSI	SSI
8/12/1994			11		12	16	18	14			
8/13/1994						18					
8/14/1994						20					
8/15/1994						22					
8/16/1994						18					
8/17/1994						58					
8/18/1994	29		24		26	31	33	28			
8/19/1994						24					
8/20/1994						23					
8/21/1994						23					
8/22/1994						18					
8/23/1994						21					
8/24/1994			10		7	14	21	11			
8/25/1994						23					
8/26/1994						17					
8/27/1994	15					20					
8/28/1994						20					
8/29/1994						15					
8/30/1994	15		12		14	17	14	15			
8/31/1994						19					
9/1/1994						25					
9/2/1994						26					
9/3/1994						17					
9/4/1994						17					
9/5/1994	12		11		7	15	17	11			
9/6/1994						12					
9/7/1994						13					
9/8/1994						16					
9/9/1994						21					
9/10/1994						17					
9/11/1994	15		14		10	45	14	22			
9/12/1994						31					
9/13/1994											
9/14/1994		18									
9/15/1994		20									
9/16/1994		12									
9/17/1994	11	21	21		9		15	11			
9/18/1994		12									
9/19/1994		70									
9/20/1994		11									
9/21/1994		14									
9/22/1994		14				14					
9/23/1994		20	12		16	23	11	13			
9/24/1994		11				9					
9/25/1994		9				12					

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
9/26/1994		11				12					
9/27/1994		10				15					
9/28/1994		98				17					
9/29/1994	10	12	5		9	4	3	6			
9/30/1994		7				7					
10/1/1994		7				11					
10/2/1994		9				11					
10/3/1994		57				50					
10/4/1994		193				69					
10/5/1994	6	7				8		0			
10/6/1994		10				8					
10/7/1994		11				10					
10/8/1994		7				12					
10/9/1994		11				11					
10/10/1994		16				18					
10/11/1994		13			13	16	10	11			
10/12/1994	14	24				31					
10/13/1994		124				16					
10/14/1994		36				16					
10/15/1994		17				13					
10/16/1994		11				6					
10/17/1994	6	7				10		4			
10/18/1994		10				13					
10/19/1994						17					
10/20/1994		16				19					
10/21/1994		18				19					
10/22/1994		14				17					
10/23/1994	13	15	4		13	16	27	13			
10/24/1994		18				19					
10/25/1994		19				20					
10/26/1994		19				18					
10/27/1994		19				21					
10/28/1994		19				19					
10/29/1994	14	19	7		15	18	15	17			
10/30/1994		12				13					
10/31/1994		12				19					
11/1/1994		27				21					
11/2/1994		53				32					
11/3/1994		29				13					
11/4/1994	10	9				13		4			
11/5/1994		10				16					
11/6/1994		53				27					
11/7/1994		17				19					
11/8/1994		8		5		9					
11/9/1994		74		21		95					

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
11/10/1994	13	24	2	5	9	14	8				
11/11/1994		8		3		9					
11/12/1994		6		5		13					
11/13/1994		5		14		10					
11/14/1994		6		5		14					
11/15/1994		72		13		49					
11/16/1994	23	31		8	24	24	14	8			
11/17/1994		402		33		10					
11/18/1994		32		57		20					
11/19/1994		36		68		18					
11/20/1994		9		9		18					
11/21/1994		12		10		16					
11/22/1994	9	9	5	8		14					
11/23/1994		10		9		17					
11/24/1994		10		8		17					
11/25/1994		421		93		55					
11/26/1994		130		11		12					
11/27/1994		3		5		8					
11/28/1994		7		8		13					
11/29/1994		10		11		15					
11/30/1994		13		11		15		3			
12/1/1994		10		9		14					
12/2/1994		9		14		15					
12/3/1994		28		22		40					
12/4/1994	158	208	3	7	32	40	4	2			
12/5/1994		11		10		18					
12/6/1994		14		10		15					
12/7/1994		13		10		17					
12/8/1994		24		262		26					
12/9/1994		13		11		19					
12/10/1994	14	16	6	16	11	13	17	3			
12/11/1994		13		13		15					
12/12/1994		680		29		61					
12/13/1994		62		9		23					
12/14/1994		7		9		11					
12/15/1994		12		9		16					
12/16/1994	10	12	7	10		19	5				
12/17/1994		14		18		21					
12/18/1994		18		16		16					
12/19/1994		14		14		22					
12/20/1994		11		11		24					
12/21/1994		17		17		23					
12/22/1994	14	16	21	27	23	21	11	8			
12/23/1994		12		11		12					
12/24/1994		87		10		19					

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
12/25/1994		97		44		9					
12/26/1994		9		12		9					
12/27/1994		6		7		9					
12/28/1994	25	38		25		37					
12/29/1994		6		4		6					
12/30/1994		7		5		9					
12/31/1994		8		7		13					
1/1/1995		8		6		10					
1/2/1995		9		7		13					
1/3/1995		7		6		7					
1/4/1995		3		2		4					
1/5/1995		4		2		7					
1/6/1995		8		9		13					
1/7/1995		6		6		6					
1/8/1995		6		6		8					
1/9/1995	4	3	2	3	6	8	1	2			
1/10/1995		4		3		4					
1/11/1995		3		2		8					
1/12/1995		7	5	7	11	11	4	3			
1/13/1995		6		6		13					
1/14/1995		8		4		7					
1/15/1995	3	4	1	1	1	4	1	1			
1/16/1995		5		4		8					
1/17/1995		4				10					
1/18/1995		7		6		12					
1/19/1995		7		6		14					
1/20/1995		11		6		19					
1/21/1995	5	10	4	6	6	8	5	5			
1/22/1995		9		6		8					
1/23/1995		4		3		5					
1/24/1995		4		3		4					
1/25/1995		4		3		4					
1/26/1995		4		4		10					
1/27/1995	7	6	4	6	15	12	5				
1/28/1995		9		6		11					
1/29/1995		7		6		12					
1/30/1995		7		6		7					
1/31/1995		7		6		12					
2/1/1995		5		6		9					
2/2/1995	7	5	5	4	8	8	4	8			
2/3/1995		7		7		9					
2/4/1995		8		8		11					
2/5/1995		8		6		10					
2/6/1995		7		6		11					
2/7/1995		17		10		68					

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
2/8/1995	5	9	5	9	11	11	6	4			
2/9/1995		8		4		5					
2/10/1995		6		5		8					
2/11/1995		9		6		9					
2/12/1995		15		6		14					
2/13/1995		3883		19		228					
2/14/1995			2		2		2	2			
2/16/1995											
2/17/1995		9		7		9					
2/18/1995		6		6		6					
2/19/1995		8		6		9					
2/20/1995	6	8		5	7	9	7	6			
2/21/1995		8		7		10					
2/22/1995		10		9		12					
2/23/1995	5	8		8		12					
2/24/1995		168		10		61					
2/25/1995		19		15		30					
2/26/1995	17	22		11	10	13	9	10			
2/27/1995		13		10		12					
2/28/1995		12		11		15					
3/1/1995		9		8		10					
3/2/1995		9		7		9					
3/3/1995		665		6		228					
3/4/1995	8	8	6	10		18	5	3			
3/5/1995		66		45		23					
3/6/1995		55		170		28					
3/7/1995		21		11		14					
3/8/1995		90		18		137					
3/9/1995		323		26		392					
3/10/1995	4	5	3	4	3	4					
3/11/1995		1		2		0	0	11			
3/12/1995		6		5		6					
3/13/1995		7		8		9					
3/14/1995		9		8		9					
3/15/1995		7		5		9					
3/16/1995	8	9	6	6	27	36	8	7			
3/17/1995		9		9		10					
3/18/1995		11		9		10					
3/19/1995		10		7		8					
3/20/1995		408		36		153					
3/21/1995		2204		21		94					
3/22/1995	238	327	5	8	138	174	4	9			
3/23/1995		75		4		21					
3/24/1995		28		16		26					
3/25/1995		8		24		6					

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
3/26/1995		7		8		6					
3/27/1995		16				9					
3/28/1995	30	44			6	10		50			
3/29/1995		11		28		9					
3/30/1995		13		21		13					
3/31/1995		16		11		15					
4/1/1995		65		558		20					
4/2/1995		65		112		15					
4/3/1995	7	9		41		12		8			
4/4/1995		58	7	10		45					
4/5/1995		22		13	14	12					
4/6/1995		23		14		17					
4/7/1995		120		18		33					
4/8/1995		158		128		107					
4/9/1995	222	331		2252		52		567			
4/10/1995		37		39		20					
4/11/1995		46	13	23		18					
4/12/1995		338		32		149					
4/13/1995		3929		62		117					
4/14/1995		0		21		13					
4/15/1995	52	69	16	23	121	148	22	27			
4/16/1995		22		18		36					
4/17/1995		41		9		13					
4/18/1995		17		10		10					
4/19/1995		5		13		9					
4/20/1995		94		39		21					
4/21/1995	31	51	55	119	19	16	337	268			
4/22/1995		12		81		12					
4/23/1995		11		15		12					
4/24/1995		20		12		16					
4/25/1995		9		39		14					
4/26/1995		307		14		42					
4/27/1995	316	454		18	54	54	11	34			
4/28/1995		62		43		40					
4/29/1995		373		52		89					
4/30/1995		154		30		106					
5/1/1995		208		45		82					
5/2/1995		-8		12		5					
5/3/1995	17	22		11	12	14		19			
5/4/1995		83		42		22					
5/5/1995		157		169		48					
5/6/1995		13		14		17					
5/7/1995		5		5		5					
5/8/1995		11		11		11					
5/9/1995	10	14		14	12	15	14	14			

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
5/10/1995		11		14		17					
5/11/1995		95		21		21					
5/12/1995		76		9		13					
5/13/1995		23		13		14					
5/14/1995		13		8		7					
5/15/1995	6	7		7	7	7	5	7			
5/16/1995		12		7		9					
5/17/1995		9		10		10					
5/18/1995		13		11		13					
5/19/1995		14		14		17					
5/20/1995		18		18		19					
5/21/1995		24		21		23	20	33			
5/22/1995		91		11		15					
5/23/1995	17	24	9	11	8	10		11			
5/24/1995		27		8		11					
5/25/1995		66		10		13					
5/26/1995		17		23		20					
5/27/1995	14	18	14	19	12	17	16	28			
5/28/1995		11		18		11					
5/29/1995		11		25		13					
5/30/1995		18		16		17					
5/31/1995		19		17		20					
6/1/1995		218		23		27					
6/2/1995	11	13	9	11	10	13	10	34			
6/3/1995		18		19		16					
6/4/1995		20		23		21					
6/5/1995		440		126		24					
6/6/1995		784				42			61	41	46
6/7/1995		15				10					
6/8/1995		10			7	11	14	72			
6/9/1995		14				14					
6/10/1995		20				18					
6/11/1995		19				19					
6/12/1995		12				13					
6/13/1995		26				16					
6/14/1995		72			49	70	15	43			
6/15/1995		192				29					
6/16/1995		16				8					
6/17/1995		8				9					
6/18/1995		11				22					
6/19/1995		15				13					
6/20/1995		23			9	14	27	46			
6/21/1995		108				14					
6/22/1995		11				16					
6/23/1995		11				15					

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
6/24/1995		12				14					
6/25/1995						16					
6/26/1995	12	23			11	16	13	21			
6/27/1995		17				18					
6/28/1995		22				23					
6/29/1995						26					
6/30/1995						16					
7/1/1995		18				15					
7/2/1995		16			11	15	16	20			
7/3/1995		16				13					
7/4/1995		19				23					
7/5/1995		31				20					
7/6/1995		31				29					
7/7/1995		33				27					
7/8/1995		28			19	25	21	55			
7/9/1995		14				17					
7/10/1995		34				16					
7/11/1995		77				18					
7/12/1995		19				28					
7/13/1995		20				22					
7/14/1995					15	17	14				
7/15/1995						22					
7/16/1995						27					
7/17/1995						12					
7/18/1995		8				10					
7/19/1995	11					13					
7/20/1995					14	18	20	27	15	15	
7/21/1995						21					
7/22/1995						15					
7/23/1995						16					
7/24/1995						14					
7/25/1995						15					
7/26/1995					9	13	14	30			
7/27/1995	8					20					
7/28/1995		20				23					
7/29/1995		37				22					
7/30/1995		18				19					
7/31/1995		23				27		31			
8/1/1995		34			20	25					
8/2/1995		22				22					
8/3/1995		22				21					
8/4/1995		20				23					
8/5/1995		17				19					
8/6/1995		11				13					
8/7/1995		56			12	19	22	13	12	12	16

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
8/8/1995		16				17					
8/9/1995		19				16					
8/10/1995		59				16					
8/11/1995		20				18					
8/12/1995		14				14					
8/13/1995		14			12	16	15	13			
8/14/1995		22				20					
8/15/1995		27				20					
8/16/1995		31				27					
8/17/1995		52				20					
8/18/1995		19				42					
8/19/1995		21			14	19		12			
8/20/1995		26				31					
8/21/1995		27				19					
8/22/1995		20				15	13				
8/23/1995		19				15					
8/24/1995		22				23					
8/25/1995	16	18	13		13	16	16	13			
8/26/1995		24				15					
8/27/1995		14				13					
8/28/1995		38				13					
8/29/1995		10				15					
8/30/1995		24				19					
8/31/1995	12	17	11		14	18		10			
9/1/1995		28				23					
9/2/1995		23				22					
9/3/1995		15				16					
9/4/1995		13				11					
9/5/1995		15				14					
9/6/1995	10	17	9			14	17	12	14	12	
9/7/1995		17				17					
9/8/1995		22				22					
9/9/1995		20				18					
9/10/1995		13				16					
9/11/1995		17				15					
9/12/1995		17	11		15	18	14	10			
9/13/1995	13	19				19					
9/14/1995		19				17					
9/15/1995		31				23					
9/16/1995		26				20					
9/17/1995		14				17					
9/18/1995		17	6		14	20	10	12			
9/19/1995		31				24					
9/20/1995		24				26					
9/21/1995		27				21					

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

					Lone	Lone	Coso	Coso	Pearson	Inyo	Ridge
	Keeler	Keeler	Olancha	Olancha	Pine	Pine	Junction	Navy	-ville	-kern	-crest
DATE	SSI	TEOM	SSI	TEOM	SSI	TEOM	SSI	SSI	SSI	SSI	SSI
9/22/1995		27				24					
9/23/1995		20				19					
9/24/1995		24	14		16	19	16	17			
9/25/1995		26				22					
9/26/1995		35				18					
9/27/1995		29				21					
9/28/1995		24				25					
9/29/1995		28				40					
9/30/1995		9	7			12	7	7			
10/1/1995		12				14					
10/2/1995		15				16					
10/3/1995		20			20	23					
10/4/1995	19	94				90					
10/5/1995		14				14					
10/6/1995		18	14		16	18	24	12			
10/7/1995		26				25					
10/8/1995		36				29					
10/9/1995		27				21					
10/10/1995		24				20				11	
10/11/1995		43				32					
10/12/1995		29	17		23	29	20	16		18	
10/13/1995		27				20					
10/14/1995		12				14					
10/15/1995		111				35					
10/16/1995		33				25					
10/17/1995		27				23					
10/18/1995		23	14		18	21	17	14			
10/19/1995	14					20					
10/20/1995						22					
10/21/1995	99					46					
10/22/1995						60					
10/23/1995						13					
10/24/1995			10		13	15	12	6			
10/25/1995						17					
10/26/1995						20					
10/27/1995						17					
10/28/1995						16					
10/29/1995						20					
10/30/1995	14		13		15	17	15	11			
10/31/1995						23					
11/1/1995						22					
11/2/1995						21					
11/3/1995						19					
11/4/1995						18					
11/5/1995	17		13		17	19	16	13			

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
11/6/1995						23					
11/7/1995						22					
11/8/1995						20					
11/9/1995						16					
11/10/1995						16					
11/11/1995	11		8		13	14	10	8			
11/12/1995						17					
11/13/1995						18					
11/14/1995						15					
11/15/1995						18					
11/16/1995						17					
11/17/1995	12		13		18	18	10	5			
11/18/1995						17					
11/19/1995						22					
11/20/1995		22				22					
11/21/1995		21		37		22					
11/22/1995		20		21		24					
11/23/1995	13	15	24	28	19	20	10	10			
11/24/1995		19		21		28					
11/25/1995		21		19		24					
11/26/1995		306									
11/27/1995		9		10		19					
11/28/1995		14		11		18					
11/29/1995	6	9	6	10	16	15	5	4			
11/30/1995		15		12		18					
12/1/1995		13		13		17					
12/2/1995		16		11		19					
12/3/1995		14		12		18					
12/4/1995		14		14		23					
12/5/1995	11	14	12	20	19	17	15	8			
12/6/1995		13		14		20					
12/7/1995		16		12							
12/8/1995	14	22		14		26					
12/9/1995		11		13		23					
12/10/1995		12		22		19					
12/11/1995		22	12	30	24	22	16	6			
12/12/1995		1100		46		125					
12/13/1995		0		3		8					
12/14/1995				4		10					
12/15/1995	10		13	4		5					
12/16/1995		152		48		10					
12/17/1995		28		6		8		3			
12/18/1995		4		6		10					
12/19/1995		7		7		10					
12/20/1995		8		6		6					

Summary of GBUAPCD PM_{10} Monitoring 1987-1995

(all values are $\mu g/m^3$)

DATE	Keeler SSI	Keeler TEOM	Olancha SSI	Olancha TEOM	Lone Pine SSI	Lone Pine TEOM	Coso Junction SSI	Coso Navy SSI	Pearson-ville SSI	Inyo-kern SSI	Ridge-crest SSI
12/21/1995		9		5		11					
12/22/1995		10		8		5					
12/23/1995	9	5	7	4		7	3	1			
12/24/1995		9		7		13					
12/25/1995		10		9		16					
12/26/1995		11		10		15					
12/27/1995		10		8		15					
12/28/1995		8		6		9					
12/29/1995	7	7	3	5		12	4	3			
12/30/1995		9		6		11					
12/31/1995		20		39		18					

Appendix A2

PM_{10} Monitoring Data
Off-Lake March 1993 through June 1995

Off-Lake PM_{10} Monitoring Data

RUN TIMES	DATE	Keeler	Olancha	LonePine	CosoJunction	CosoNavy	Pearson	Inyokern	Ridgecrest
		SSI	SSI	SSI	SSI	SSI	SSI	SSI	SSI
Midnight-Midnight	3/2/1993	5	7	10	5	9			
Midnight-Midnight	3/8/1993	9		8	11	9			
Olan 1245 - CJ 1600	3/11/1993		37		11				
Midnight-Midnight	3/14/1993	10		10	8	10		18	
Midnight-Midnight	3/20/1993	5		9	23	16			
Midnight-Midnight	3/26/1993	3	1	7	1	1	7	3	4
Midnight-Midnight	4/1/1993	19	14		17	10			
All 2100-2100	4/4/1993				14		9		14
CJ = 1800, others = Mid-Mid.	4/9/1993				10			17	18
Midnight-Midnight	4/13/1993	10		10		13			
Midnight-Midnight	4/19/1993	12		9	25	11			
make-up, Mid-Mid	4/20/1993		14						
Midnight-Midnight	4/25/1993	13	10	9	12	16			
Midnight-Midnight	5/1/1993	46	153	31	94	35			
Midnight-Midnight	5/4/1993				165		75	48	
Midnight-Midnight	5/7/1993	17	18	16	23	20			
All 1000-1000	5/8/1993						30	27	27
Midnight-Midnight	5/13/1993	48	15	28		20			
Midnight-Midnight	5/19/1993	18	17	17	34	23			
Midnight-Midnight	5/25/1993	16	17	33	26	37			
Midnight-Midnight	5/31/1993	80	18	18	21	31			
Midnight-Midnight	6/6/1993	8	8	5	9				
Midnight-Midnight	6/12/1993	41	10	43	51	29	44	24	17
Midnight-Midnight	6/18/1993	9		12	16	14			
Midnight-Midnight	6/24/1993	13		15	59	14			
Midnight-Midnight	6/30/1993	16		16	24	19			
Midnight-Midnight	7/6/1993	27		23	40	33			
Midnight-Midnight	7/12/1993	27		21	41	28			
Midnight-Midnight	7/18/1993	19		18	32	19			
Midnight-Midnight	7/24/1993	27		13		23			
Midnight-Midnight	7/30/1993	18		12	28	19			
Midnight-Midnight	7/31/1993						20		18

Off-Lake PM_{10} Monitoring Data

RUN TIMES	DATE	Keeler	Olancha	LonePine	CosoJunction	CosoNavy	Pearson	Inyokern	Ridgecrest
		SSI	SSI	SSI	SSI	SSI	SSI	SSI	SSI
Midnight-Midnight	8/5/1993	13		13	24	35			
Midnight-Midnight	8/11/1993	17		8	18	23			
Midnight-Midnight	8/17/1993	11		11	27	26			
Midnight-Midnight	8/23/1993	18		17	37	31			
Midnight-Midnight	8/29/1993	15		15	23	19			
Midnight-Midnight	9/4/1993			11	22	26			
Midnight-Midnight	9/10/1993	18		16	22	29			
All 1700-1700	9/12/1993						91	64	22
Midnight-Midnight	9/16/1993	26		15	33	29			
CJ=12:00, others mid-mid	9/22/1993	32		16	21	22			
Midnight-Midnight	9/28/1993				22	18			
Midnight-Midnight	9/30/1993				22				
Midnight-Midnight	10/4/1993	41		24	28	26			
Midnight-Midnight	10/10/1993	22	18	20	26	18			
Midnight-Midnight	10/16/1993	9	8	7	7	7			
Midnight-Midnight	10/22/1993	9	15	13	12	13			
All 8:00-8:00	10/26/1993		346		254		131	59	16
Midnight-Midnight	10/28/1993	9	22	16	16	15			
All 11:00-11:00	11/1/1993		32				28	9	
Midnight-Midnight	11/3/1993	12	14	18	15	10			
Midnight-Midnight	11/9/1993	19	17	44	26				
Midnight-Midnight	11/10/1993					17			
All 7:00-7:00	11/12/1993		15	21	41		15	13	14
Midnight-Midnight	11/15/1993	67				19			
Midnight-Midnight	11/21/1993	16	7	29	19	7			
All 9:00-9:00	11/24/1993			43	41			20	35
Midnight-Midnight	11/27/1993	23	15			11			
All 15:00-15:00	12/2/1993				19		19	13	20
Midnight-Midnight	12/3/1993	9	7	18		7			
Midnight-Midnight	12/9/1993		18	33	20	4			
Midnight-Midnight	12/15/1993		10		16		9	6	15
Midnight-Midnight	12/21/1993	12	68	17	67				

Off-Lake PM_{10} Monitoring Data

RUN TIMES	DATE	Keeler	Olancha	LonePine	CosoJunction	CosoNavy	Pearson	Inyokern	Ridgecrest
		SSI	SSI	SSI	SSI	SSI	SSI	SSI	SSI
All 10:00-10:00	12/23/1993		185	34	188		50	9	18
Midnight-Midnight	12/24/1993					11			
Midnight-Midnight	12/27/1993	13							
Midnight-Midnight	12/31/1993					3			
Midnight-Midnight	1/2/1994	12	9	26	9	3			
All 16:00-16:00	1/5/1994		365	51	388		239		75
Midnight-Midnight	1/8/1994	14				8			
Midnight-Midnight	1/14/1994	14	11	21	7	5			
Midnight-Midnight	1/20/1994	12	16	21	9	5			
Midnight-Midnight	1/26/1994	7	6	12	5	1			
All 12:00-12:00	1/28/1994		32	7			27		17
Midnight-Midnight	2/1/1994	11	6	19	9	4			
Midnight-Midnight	2/7/1994	3	3	4	2	2			
All 02:00-2:00	2/11/1994		70	11	80		90	116	73
Midnight-Midnight	2/13/1994	8				7			
Midnight-Midnight	2/19/1994	22	8	4	1	1			
Midnight-Midnight	2/25/1994	8	9	8	6	6			
CJ=9:30, others = 9:00-9:00	2/28/1994		13		39	19	39	17	14
Midnight-Midnight	3/3/1994	7	6	12	7	7			
All 12:00-12:00	3/7/1994			5	8		12	9	11
12:00-12:00	3/8/1994		10						
Midnight-Midnight	3/9/1994	8				7			
All 8:00-8:00	3/11/1994		48	18	65		58	55	52
Midnight-Midnight	3/15/1994	117				8			
Midnight-Midnight	3/21/1994	12	11	19	12	12			
All 14:0014:00	3/26/1994		9	4	9		12	21	17
Midnight-Midnight	3/27/1994	8							
Midnight-Midnight	4/2/1994		8		8				
Midnight-Midnight	4/4/1994	14							
Midnight-Midnight	4/8/1994	14							
All 13:00-13:00	4/9/1994		19		14		14	11	
Midnight-Midnight	4/14/1994	33	23		32	24			

Off-Lake PM_{10} Monitoring Data

RUN TIMES	DATE	Keeler	Olancha	LonePine	CosoJunction	CosoNavy	Pearson	Inyokern	Ridgecrest
		SSI	SSI	SSI	SSI	SSI	SSI	SSI	SSI
Midnight-Midnight	4/20/1994	21	18		20	22			
Midnight-Midnight	4/26/1994	8	3		0	2			
Midnight-Midnight	5/2/1994	20	17	16	16	20			
Midnight-Midnight	5/8/1994	28	7	2	4	4			
Midnight-Midnight	5/14/1994	23	21	21	22	21			
Midnight-Midnight	5/20/1994	7	6	3	6	10			
Midnight-Midnight	5/26/1994	16	15	13	20				
Midnight-Midnight	5/27/1994					23			
Midnight-Midnight	6/1/1994	14	13	9	16	17			
Midnight-Midnight	6/7/1994	10		6	11	15			
Midnight-Midnight	6/8/1994		10						
Midnight-Midnight	6/13/1994		55	20	22	20			
Midnight-Midnight	6/19/1994		13	13	14	13			
Midnight-Midnight	6/25/1994		16	12	22	17			
Midnight-Midnight	7/1/1994			16	22	17			
Midnight-Midnight	7/7/1994			11	17	13			
Midnight-Midnight	7/13/1994		19		20	18			
Midnight-Midnight	7/19/1994		23	27	28	25			
Midnight-Midnight	7/25/1994		11	10	16	11			
Midnight-Midnight	7/31/1994	11		10		15			
Midnight-Midnight	8/2/1994		12		17				
Midnight-Midnight	8/6/1994		12	10		10			
Midnight-Midnight	8/10/1994				22				
Midnight-Midnight	8/12/1994		11	12	18	14			
Midnight-Midnight	8/18/1994	29	24	26	33	28			
Midnight-Midnight	8/24/1994		10	7	21	11			
Make-up, Mid-mid	8/27/1994	15							
Midnight-Midnight	8/30/1994	15	12	14	14	15			
Midnight-Midnight	9/5/1994	12	11	7	17	11			
Midnight-Midnight	9/11/1994	15	14	10	14	22			
Midnight-Midnight	9/17/1994	11	21	9	15	11			
Midnight-Midnight	9/23/1994		12	16	11	13			

Off-Lake PM_{10} Monitoring Data

RUN TIMES	DATE	Keeler	Olancha	LonePine	CosoJunction	CosoNavy	Pearson	Inyokern	Ridgecrest
		SSI	SSI	SSI	SSI	SSI	SSI	SSI	SSI
Midnight-Midnight	9/29/1994	10	5	9	3	6			
All 11:00-11:00	10/3/1994		16	42	9			13	
Midnight-Midnight	10/5/1994	6				0.2			
Midnight-Midnight	10/11/1994			13	10	11			
Make-up, Mid-mid	10/12/1994	14							
All 11:00-11:00	10/13/1994		31		49			21	20
All 9:00-9:00	10/15/1994		1		3			3	4
Midnight-Midnight	10/17/1994	6				4			
Midnight-Midnight	10/23/1994	13	4	13	27	13			
Midnight-Midnight	10/29/1994	14	7	15	15	17			
All 9:00-9:00	11/3/1994		16	14	16			7	
Midnight-Midnight	11/4/1994	10				4			
Midnight-Midnight	11/10/1994	13	2	9	8				
All 15:00-15:00	11/16/1994	23		24	14	8	11	4	20
All 14:00-14:00	11/18/1994			19			98	77	35
Midnight-Midnight	11/22/1994	9	5						
All 13:00-13:00	11/26/1994		6	8	47			5	14
Midnight-Midnight	11/30/1994					3			
Midnight-Midnight	12/4/1994	158	3	32	4	2			
Midnight-Midnight	12/10/1994	14	6	11	17	3			
Midnight-Midnight	12/16/1994	10	7		5				
Midnight-Midnight	12/22/1994	14	21	23	11	8			
All 14:00-14:00	12/25/1994		10	3	24		16	10	6
Midnight-Midnight	12/28/1994	25							
Midnight-Midnight	1/9/1995	4	2	6	1	2			
Midnight-Midnight	1/12/1995		5	11	4	3			
Midnight-Midnight	1/15/1995	3	1	1	1	1			
Midnight-Midnight	1/21/1995	5	4	6	5	5			
Midnight-Midnight	1/27/1995	7	4	15	5				
Midnight-Midnight	2/2/1995	7	5	8	4	8			
Midnight-Midnight	2/5/1995						6	5	
Midnight-Midnight	2/8/1995	5	5	11	6	4			

Off-Lake PM_{10} Monitoring Data

RUN TIMES	DATE	Keeler	Olancha	LonePine	CosoJunction	CosoNavy	Pearson	Inyokern	Ridgecrest
		SSI	SSI	SSI	SSI	SSI	SSI	SSI	SSI
Midnight-Midnight	2/14/1995		2	2	2	2			
Midnight-Midnight	2/20/1995	6		7	7	6			
Make-up, Mid-mid	2/23/1995	5							
Midnight-Midnight	2/26/1995	17		10	9	10			
Midnight-Midnight	3/4/1995	8	6		5	3			
Midnight-Midnight	3/10/1995	4	3	3					
Midnight-Midnight	3/11/1995				0	11			
Midnight-Midnight	3/16/1995	8	6	27	8	7			
Midnight-Midnight	3/22/1995	238	5	138	4	9			
All 16:00-16:00	3/23/1995		7	39			9	3	4
All 9:00-9:00	3/27/1995				81		40	41	7
Midnight-Midnight	3/28/1995	30		6		50			
All 8:008:00	4/2/1995			8			116	102	29
Midnight-Midnight	4/3/1995	7				8			
Midnight-Midnight	4/4/1995		7						
All 15:00-15:00	4/8/1995			59	692		392		235
Midnight-Midnight	4/9/1995	222				567			
Make-up, Mid-mid	4/11/1995		13						
14:00-14:00	4/12/1995	2668							
15:00-15:00	4/13/1995	477							
Midnight-Midnight	4/15/1995	52	16	121	22	27			
Midnight-Midnight	4/21/1995	31	55	19	337	268			
Midnight-Midnight	4/27/1995	316		54	11	34			
Midnight-Midnight	5/3/1995	17		12		19			
Midnight-Midnight	5/9/1995	10		12	14	14			
Midnight-Midnight	5/15/1995	6		7	5	7			
Midnight-Midnight	5/21/1995				20	33			
Midnight-Midnight	5/23/1995	17	9	8		11			
Midnight-Midnight	5/27/1995	14	14	12	16	28			
Midnight-Midnight	6/2/1995	11	9	10	10	34			
Keel=19:00, Others=Mid-Mid	6/6/1995	93					61	41	46
Midnight-Midnight	6/8/1995			7	14	72			

Off-Lake PM_{10} Monitoring Data

RUN TIMES	DATE	Keeler	Olancha	LonePine	CosoJunction	CosoNavy	Pearson	Inyokern	Ridgecrest
		SSI	SSI	SSI	SSI	SSI	SSI	SSI	SSI
Midnight-Midnight	6/14/1995			49	15	43			
Midnight-Midnight	6/20/1995			9	27	46			
Midnight-Midnight	6/26/1995	12		11	13	21			
Midnight-Midnight	7/2/1995			11	16	20			
Midnight-Midnight	7/8/1995			19	21	55			
Midnight-Midnight	7/14/1995			15	14				
Make-up Mid-mid.	7/19/1995	11							
Midnight-Midnight	7/20/1995			14	20	27	15	15	
Midnight-Midnight	7/26/1995			9	14	30			
Midnight-Midnight	7/27/1995	8							
Midnight-Midnight	7/31/1995					31			
Midnight-Midnight	8/1/1995			20					
Midnight-Midnight	8/7/1995			12	22	13	12	12	16
Midnight-Midnight	8/13/1995			12	15	13			
Midnight-Midnight	8/19/1995			14		12			
Midnight-Midnight	8/22/1995				13				
Midnight-Midnight	8/25/1995	16	13	13	16	13			
Midnight-Midnight	8/31/1995	12	11	14		10			
Midnight-Midnight	9/6/1995	10	9		17	12	14	12	
Midnight-Midnight	9/12/1995		11	15	14	10			
Make-up, Mid-mid.	9/13/1995	13							
Midnight-Midnight	9/18/1995		6	14	10	12			
Midnight-Midnight	9/24/1995		14	16	16	17			
Midnight-Midnight	9/30/1995		7		7	7			
10:00-10:00	10/4/1995	19							
Midnight-Midnight	10/6/1995		14	16	24	12			
Midnight-Midnight	10/10/1995							11	
Midnight-Midnight	10/12/1995		17	23	20	16	30	18	
Midnight-Midnight	10/18/1995		14	18	17	14			
Midnight-Midnight	10/19/1995	14							
22:00-22:00	10/21/1995	99							
Midnight-Midnight	10/24/1995		10	13	12	6			

Off-Lake PM_{10} Monitoring Data

RUN TIMES	DATE	Keeler	Olancha	LonePine	CosoJunction	CosoNavy	Pearson	Inyokern	Ridgecrest
		SSI	SSI	SSI	SSI	SSI	SSI	SSI	SSI
Midnight-Midnight	10/30/1995	14	13	15	15	11			
Midnight-Midnight	11/5/1995	17	13	17	16	13			
Midnight-Midnight	11/11/1995	11	8	13	10	8			
Midnight-Midnight	11/17/1995	12	13	18	10	5			
Midnight-Midnight	11/23/1995	13	24	19	10	10			
All 8:00-8:00	11/26/1995						77	30	24
Midnight-Midnight	11/29/1995	6	6	16	5	4			
Midnight-Midnight	12/5/1995	11	12	19	15	8			
17:00-17:00	12/8/1995	14							
Midnight-Midnight	12/11/1995		12	24	16	6			
Keel=8:53-8:53	12/12/1995	106							
Keel-3:00-3:00	12/15/1995	10							
All 11:00-11:00	12/16/1995		13	2	7		7	3	7
Midnight-Midnight	12/17/1995					3			
Midnight-Midnight	12/23/1995	9	7		3	1			
Midnight-Midnight	12/29/1995	7	3		4	3			

Appendix A3

PM_{10} Monitoring Data
Days that Exceeded 150 $\mu g/m^3$

PM_{10} Monitoring Data

(PM_{10} and wind speed summary for days that exceeded 150 $\mu g/m^3$ at any monitoring site)

DATE	Keeler SSI ($\mu g/m^3$)	Keeler TEOM ($\mu g/m^3$)	Keeler Wind (mph)	Olancha SSI ($\mu g/m^3$)	Olancha TEOM ($\mu g/m^3$)	Olancha Wind (mph)	Lone Pine SSI ($\mu g/m^3$)	Lone Pine TEOM ($\mu g/m^3$)	Lone Pine Wind (mph)	Coso Junction SSI ($\mu g/m^3$)	Coso Junction Wind (mph)	Coso Navy SSI ($\mu g/m^3$)	Coso Navy Wind (mph)
1/15/1987	100		No data	115		40	25		30	196	36		No data
1/27/1987	672		25	37		31	178		25		14		No data
2/2/1987	251		20	21		27	140		19	27	13		No data
3/10/1987	230		24	13		25	17		20	8	No data		No data
3/22/1987	166		28	110		37	13		23	65	No data		No data
1/16/1988	394		17	25		37	172		17	15	47	2	27
11/23/1988	324		No data	44		32	64		26	12	9	26	23
2/3/1989	1861		33			38	126		27	101	50	227	36
4/22/1989	326		28	25		25	87		No data	37	17	45	23
5/22/1989	165		28	19		22	34		23	16	19	16	No data
5/28/1989	587		33	13		19	96		35	15	24	18	31
2/16/1990	533		26	6		33	52		34	11	28	3	21
4/23/1990	85		No data	200		26			24	866	No data	94	41
5/17/1990	43		No data	200		32	26		22	26	No data	33	33
5/23/1990	181		No data	65		27	27		25	22	No data		24
11/25/1990	858		33	40		18	59		19	14	No data		26
12/19/1990	693		27	59		23	18		18	9	26	12	23
3/13/1991	144		29	181		29	29		17	8	11	6	21
4/6/1991	181		27	25		19	17		24	15	9	15	22
5/31/1991	335		33			32	19		27		36		47
4/18/1992	151		No data	366		26	31		26		25		25
4/30/1992	350		30	19		27	63		22		14		22
6/29/1992	526		34	13		27	61		21		14		25
9/3/1992	242		25	22		24	23		27	29	16	36	27
1/1/1993	781		29	4		29	13		25	6	13		9
3/17/1993		513	18			33			21		28		27
3/23/1993		276	17			18			24		16		17
3/24/1993		257	26			27			31		18		19
4/4/1993		225	26			20			22	14	27		24
4/17/1993		578	33			24			24		24		25
4/21/1993		479	30			22			26		21		18
4/22/1993		172	26			27			21		21		33
5/3/1993		412	22			26			30		25		No data
5/4/1993		231	31			38			33	165	32		32

PM_{10} Monitoring Data

(PM_{10} and wind speed summary for days that exceeded 150 $\mu g/m^3$ at any monitoring site)

DATE	Keeler SSI ($\mu g/m^3$)	Keeler TEOM ($\mu g/m^3$)	Keeler Wind (mph)	Olancha SSI ($\mu g/m^3$)	Olancha TEOM ($\mu g/m^3$)	Olancha Wind (mph)	Lone Pine SSI ($\mu g/m^3$)	Lone Pine TEOM ($\mu g/m^3$)	Lone Pine Wind (mph)	Coso Junction SSI ($\mu g/m^3$)	Coso Junction Wind (mph)	Coso Navy SSI ($\mu g/m^3$)	Coso Navy Wind (mph)
6/4/1993		285	29			22			22		19		21
11/14/1993		390	29			37		62	26		43		No data
11/28/1993		168	16			25		48	24		14		9
12/11/1993		293	29			31		113	40		22		21
12/14/1993		259	21			29		170	29		21		11
12/23/1993		412	31			26		58	31		31		32
1/5/1994		183	26			31		76	29		26		29
1/23/1994		259	21			26		307	29		19		11
1/24/1994		247	21			28		82	30		19		13
2/10/1994		249	21			22		6	16		39		30
2/11/1994		345	30	70		33	11	22	27	80	28		31
2/16/1994		292	21			28		122	35		15		13
2/17/1994		1381	30			32		85	35		23		19
3/12/1994		183	29			30		23	28		25		36
3/15/1994	117	164	24			22		13	26		19	8	13
3/18/1994		1226	26			26		499	24		15		25
3/22/1994		961	24			26		91	32		27		32
4/21/1994		134	24			23		180	28		21		No data
4/23/1994		572	28			25		93	24		38		No data
4/25/1994		205	24			24		28	19		32		No data
5/15/1994		387	31			20		25	21		21		21
10/4/1994		193	24			26		69	33		26		23
11/17/1994		402	24		33	No data		10	14		32		21
11/25/1994		421	22		93	34		55	26		20		20
12/4/1994	158	208	25	3	7	27	32	40	25	4	18	2	9
12/8/1994		24	18		262	18		26	22		23		35
12/12/1994		680	24		29	27		61	23		15		16
2/13/1995		3883	No data		19	28		228	32		19		26
2/24/1995		168	No data		10	20		61	15		21		16
3/3/1995		665	No data		6	26		228	21		17		21
3/6/1995		55	No data		170	14		28	23		21		19
3/9/1995		323	No data		26	31		392	37		19		18
3/20/1995		408	No data		36	30		153	25		23		17
3/21/1995		2204	No data		21	29		94	30		28		24

PM_{10} Monitoring Data

(PM_{10} and wind speed summary for days that exceeded 150 $\mu g/m^3$ at any monitoring site)

DATE	Keeler SSI ($\mu g/m^3$)	Keeler TEOM ($\mu g/m^3$)	Keeler Wind (mph)	Olancha SSI ($\mu g/m^3$)	Olancha TEOM ($\mu g/m^3$)	Olancha Wind (mph)	Lone Pine SSI ($\mu g/m^3$)	Lone Pine TEOM ($\mu g/m^3$)	Lone Pine Wind (mph)	Coso Junction SSI ($\mu g/m^3$)	Coso Junction Wind (mph)	Coso Navy SSI ($\mu g/m^3$)	Coso Navy Wind (mph)
3/22/1995	238	327	No data	5	8	27	138	174	36	4	21	9	21
4/1/1995		65	No data		558	25		20	22		29		27
4/8/1995		158	29		128	No data		107	31		23		19
4/9/1995	222	331	29		2252	No data		52	33		37	567	25
4/12/1995		338	22		32	27		149	33		21		18
4/13/1995		3929	33		62	30		117	27		23		28
4/21/1995	31	51	24	55	119	29	19	16	25	337	29	268	36
4/26/1995		307	20		14	20		42	19		23		17
4/27/1995	316	454	20		18	20	54	54	24	11	17	34	23
4/29/1995		373	24		52	21		89	24		33		32
5/1/1995		208	21		45	22		82	24		No data		28
5/5/1995		157	23		169	21		48	22		No data		24
6/1/1995		218	30		23	17		27	26		No data		26
6/5/1995		440	31		126	28		24	30		No data		33
6/6/1995		784	37			34		42	38		No data		38
6/15/1995		192	28			No data		29	30		No data		26
11/26/1995		306	25			46			27		No data		29
12/12/1995		1100	40		46	36		125	33		19		15

Appendix A4

PM_{10} Monitoring Data
Summary of Quarterly and Annual Averages

Keeler PM_{10} Quarterly Averages ($\mu g/m^3$) 1987-1995

Quarter	TEOM Average (mg/m^3)	# of TEOM Days in Quarter	SSI Average (mg/m^3)	# of Samples in Quarter	Comments
1st-1987			115.81	15	
2nd-1987			22.93	15	
3rd-1987			20.29	14	
4th-1987			18.87	15	
Annual Avg.			44.47	59	
1st-1988			52.21	14	
2nd-1988			18.27	15	
3rd-1988			24.39	16	
4th-1988			40.41	15	
Annual Avg.			33.82	60	
1st-1989			176.53	12	
2nd-1989			102.21	15	
3rd-1989			27.41	15	
4th-1989			25.93	15	
Annual Avg.			83.02	57	
1st-1990			47.40	15	
2nd-1990			37.07	15	
3rd-1990			12.93	14	
4th-1990			113.94	16	
Annual Avg.			52.83	60	
1st-1991			36.79	14	
2nd-1991			55.60	15	
3rd-1991			15.88	8	SSI invalid.
4th-1991			34.79	14	
Annual Avg.			Invalid.	51	
1st-1992			9.47	15	
2nd-1992			85.00	15	
3rd-1992			33.36	14	
4th-1992			21.53	15	
Annual Avg.			37.34	59	
1st-1993			58.73	15	
2nd-1993	52.99	91	23.75	16	Teom begins.
3rd-1993	23.95	89	20.07	14	
4th-1993	38.57	92	20.08	13	
Annual Avg.	Invalid.	272	30.66	58	
1st-1994	87.70	81	17.53	15	
2nd-1994	34.86	91	17.33	12	
3rd-1994	21.26	30	14.75	8	Both invalid.
4th-1994	41.70	91	23.50	14	
Annual Avg.	Invalid.	293	Invalid.	49	
1st-1995	102.87	87	24.79	14	
2nd-1995	115.61	88	59.58	12	
3rd-1995	23.55	79	11.67	6	SSI invalid.
4th-1995	45.39	58	18.29	14	TEOM invalid.
Annual Avg.	Invalid.	312	Invalid.	46	

Lone Pine PM_{10} Quarterly Averages ($\mu g/m^3$) 1987-1995

Quarter	TEOM Average (mg/m^3)	# of TEOM Days in Quarter	SSI Average (mg/m^3)	# of Samples in Quarter	Comments
1st-1987			38.27	15	
2nd-1987			18.40	15	
3rd-1987			26.47	15	
4th-1987			12.40	15	
Annual Avg.			23.88	60	
1st-1988			30.43	14	
2nd-1988			18.93	15	
3rd-1988			18.85	16	
4th-1988			19.18	15	
Annual Avg.			21.85	60	
1st-1989			30.29	15	
2nd-1989			31.16	15	
3rd-1989			14.92	15	
4th-1989			16.13	16	
Annual Avg.			23.12	61	
1st-1990			17.53	15	
2nd-1990			17.73	15	
3rd-1990			17.47	15	
4th-1990			16.47	17	
Annual Avg.			17.30	62	
1st-1991			17.80	15	
2nd-1991			21.21	14	
3rd-1991			17.53	15	
4th-1991			15.07	15	
Annual Avg.			17.90	59	
1st-1992			10.86	14	
2nd-1992			25.67	15	
3rd-1992			15.71	14	
4th-1992			16.36	14	
Annual Avg.			17.15	57	
1st-1993			8.40	15	
2nd-1993			18.53	15	
3rd-1993			14.93	15	
4th-1993	27.14	68	21.73	11	SSI invalid.
Annual Avg.	Invalid.	68	Invalid.	56	
1st-1994	29.67	90	14.60	10	SSI invalid.
2nd-1994	21.26	85	11.50	10	SSI invalid.
3rd-1994	20.30	83	13.38	16	
4th-1994	19.58	92	16.57	7	SSI invalid.
Annual Avg.	22.70	350	Invalid.	43	
1st-1995	27.33	87	17.93	14	
2nd-1995	26.31	91	24.64	14	
3rd-1995	19.38	92	14.14	14	
4th-1995	20.70	90	16.64	14	
Annual Avg.	23.43	360	18.34	56	

Olancha PM_{10} Quarterly Averages (mg/m^3) 1987-1995

Quarter	TEOM Average (mg/m^3)	# of TEOM Days in Quarter	SSI Average (mg/m^3)	# of Samples in Quarter	Comments
1st-1987					No sampling.
2nd-1987			25.50	2	SSI invalid.
3rd-1987			21.63	16	
4th-1987			13.20	15	
Annual Avg.			Invalid.	33	
1st-1988			20.40	15	
2nd-1988			15.93	15	
3rd-1988			21.68	15	
4th-1988			23.28	15	
Annual Avg.			20.32	60	
1st-1989			32.07	6	SSI invalid.
2nd-1989			25.79	15	
3rd-1989			23.00	15	
4th-1989			26.50	16	
Annual Avg.			Invalid.	52	
1st-1990			9.33	15	
2nd-1990			46.67	15	
3rd-1990			18.40	15	
4th-1990			18.38	16	
Annual Avg.			23.19	61	
1st-1991			23.87	15	
2nd-1991			18.14	14	
3rd-1991			14.93	15	
4th-1991			15.20	15	
Annual Avg.			18.04	59	
1st-1992			9.80	10	SSI invalid.
2nd-1992			39.80	15	
3rd-1992			17.13	15	
4th-1992			36.27	15	
Annual Avg.			Invalid.	55	
1st-1993			4.50	12	
2nd-1993			24.69	13	
3rd-1993				0	SSI invalid.
4th-1993			19.00	11	
Annual Avg.			Invalid.	36	
1st-1994			8.50	10	SSI invalid.
2nd-1994			16.07	14	
3rd-1994			14.07	14	
4th-1994	18.30	54	7.89	9	Both invalid.
Annual Avg.	Invalid.	54	Invalid.	47	
1st-1995	10.14	84	4.00	12	
2nd-1995	68.50	66	17.57	7	Both invalid.
3rd-1995		0	10.14	7	Both invalid.
4th-1995	14.47	40	11.93	15	TEOM invalid.
Annual Avg.	Invalid.	190	Invalid.	41	

Appendix B

Attainment Demonstration
Top Ten PM_{10} Concentration Predictions
by Modeling Region

Run Date: 07/29/98

Keeler Modeling Region, 97.21% Controlled (Method 1), Vector Met
High 10 Tables
24-hr PM10 (ug/m3)

No.	xrec(m)	yrec(m)	1-hi PM10	(yrmndy)	2-hi PM10	(yrmndy)	3-hi PM10	(yrmndy)	4-hi PM10	(yrmndy)	5-hi PM10	(yrmndy)
1	710511.00	128874.00	129.91	(950303)	107.67	(950413)	97.75	(950321)	94.52	(951212)	85.11	(950213)
2	710786.00	128693.00	122.28	(950303)	102.80	(950413)	91.33	(950321)	80.60	(950213)	72.11	(951212)
3	708305.00	115290.00	166.48	(950606)	129.77	(950409)	120.48	(940312)	108.97	(940211)	94.33	(950421)
4	708760.00	115706.00	162.35	(950606)	127.76	(950409)	119.60	(940312)	107.50	(940211)	92.95	(950421)
5	709092.00	116155.00	164.49	(950606)	127.61	(950409)	120.22	(940312)	106.74	(940211)	93.10	(950421)
6	710475.00	119485.00	165.86	(950606)	135.40	(940312)	128.39	(950409)	112.81	(940211)	100.08	(941225)
7	709262.00	117065.00	173.21	(950606)	130.89	(950409)	121.93	(940312)	109.19	(940211)	93.95	(941225)
8	709562.00	118171.00	156.21	(950606)	130.44	(950409)	120.72	(940312)	105.46	(940211)	92.23	(950421)
9	710028.00	119106.00	169.05	(950606)	135.59	(950409)	135.25*	(940312)	114.21	(940211)	99.61	(941225)
10	710902.00	119782.00	164.10	(950606)	132.64	(940312)	122.72	(950409)	107.58	(940211)	101.44	(941225)
11	711440.00	120492.00	149.48	(950606)	116.72	(940312)	114.99	(950409)	92.65	(941225)	92.08	(940211)
12	712152.00	121113.00	140.99	(950606)	98.94	(940312)	96.72	(950409)	82.38	(941013)	80.42	(940211)
13	712603.00	121825.00	146.68	(950606)	91.35	(940312)	87.08	(950409)	78.19	(941013)	77.00	(940211)
14	712960.00	122830.00	152.86	(950606)	73.33	(940211)	72.30	(940312)	69.65	(950409)	68.94	(950605)
15	712716.00	123925.00	147.02	(950606)	71.19	(940211)	62.62	(940312)	62.22	(950605)	59.29	(950409)
16	712878.00	124801.00	97.68	(950606)	54.12	(940211)	48.04	(950629)	47.93	(950601)	45.89	(940515)
17	712283.00	125747.00	80.19	(950606)	53.50	(940515)	53.19	(950303)	52.46	(950321)	49.86	(940211)
18	711772.00	126828.00	86.17	(950303)	76.30	(950413)	70.92	(950321)	66.50	(940515)	57.13	(941125)
19	711286.00	127742.00	109.42	(950303)	95.56	(950413)	84.60	(950321)	72.96	(950213)	69.32	(940515)
20	710581.00	128509.00	137.42	(950303)	111.05	(950413)	104.07	(951212)	103.84	(950321)	88.10	(950213)
21	709979.00	128975.00	145.78	(950303)	137.15	(951212)	119.01	(950413)	114.89	(950321)	99.08	(950213)
22	709469.00	129309.00	160.02	(951212)	145.28	(950303)	117.66	(950321)	114.68	(950413)	105.56	(940318)
23	708864.00	129423.00	189.00	(951212)	157.83*	(950303)	129.34	(950321)	120.51	(940318)	119.18*	(950413)
24	708446.00	129688.00	193.18	(951212)	152.55	(950303)	127.97	(950321)	122.00	(940318)	111.98	(950413)
25	708043.00	130099.00	198.74*	(951212)	146.13	(950303)	125.62	(950321)	123.46*	(940318)	105.32	(950413)
26	707718.00	130494.00	194.43	(951212)	136.20	(950303)	119.52	(940318)	118.92	(950321)	96.00	(950413)
27	707469.00	131074.00	173.08	(951212)	117.67	(950303)	107.38	(940318)	104.20	(950321)	85.18	(950615)
28	707370.00	131577.00	157.95	(951212)	106.20	(950303)	99.24	(940318)	94.80	(950321)	78.49	(950615)
29	707198.00	132553.00	140.69	(951212)	98.40	(950303)	89.28	(940318)	87.84	(950321)	71.94	(950615)
30	706312.00	133168.00	171.83	(951212)	107.80	(950303)	98.29	(940318)	95.79	(950321)	78.16	(950615)
31	705429.00	133701.00	160.66	(951212)	92.09	(950303)	88.19	(940318)	84.89	(950321)	80.82	(950310)

Run Date: 07/29/98

Keeler Modeling Region, 97.21% Controlled (Method 1), Vector Met
High 10 Tables

24-hr PM10 (ug/m3)

No.	xrec(m)	yrec(m)	6-hi PM10	(yrmndy)	7-hi PM10	(yrmndy)	8-hi PM10	(yrmndy)	9-hi PM10	(yrmndy)	10-hi PM10	(yrmndy)
1	710511.00	128874.00	75.23	(940217)	73.70	(940318)	70.05	(940515)	69.08	(950615)	65.28	(950309)
2	710786.00	128693.00	70.75	(940217)	67.76	(940515)	65.03	(940318)	64.03	(950615)	62.43	(950810)
3	708305.00	115290.00	93.43	(941225)	89.59	(940311)	89.10	(941013)	88.25	(951216)	82.72	(941103)
4	708760.00	115706.00	92.00	(941225)	89.25	(940311)	88.46	(941013)	88.06	(951216)	82.00	(950402)
5	709092.00	116155.00	92.96	(941225)	90.05	(941013)	89.28	(951216)	87.19	(940311)	81.08	(950605)
6	710475.00	119485.00	98.72	(951216)	96.85	(950421)	94.80	(941013)	89.30	(940311)	86.95	(950402)
7	709262.00	117065.00	93.90	(950421)	91.88	(941013)	89.43	(951216)	87.33	(940311)	83.72	(950605)
8	709562.00	118171.00	92.16	(941225)	88.73	(951216)	88.47	(941013)	86.82	(940311)	82.76	(950402)
9	710028.00	119106.00	97.60	(950421)	97.04	(951216)	94.59	(941013)	91.36	(940311)	89.48	(950402)
10	710902.00	119782.00	100.36	(951216)	95.94	(950421)	95.35	(941013)	87.21	(951004)	84.65	(950605)
11	711440.00	120492.00	92.04	(951216)	91.91	(941013)	90.17	(950421)	82.88	(951022)	79.02	(950605)
12	712152.00	121113.00	77.43	(941225)	76.37	(950421)	76.08	(951216)	74.64	(950605)	73.33	(951022)
13	712603.00	121825.00	73.31	(950605)	71.49	(941225)	70.69	(950421)	69.74	(951216)	69.65	(951022)
14	712960.00	122830.00	66.98	(941013)	58.37	(951022)	58.23	(941225)	56.85	(950421)	56.43	(950629)
15	712716.00	123925.00	58.33	(941013)	56.65	(950629)	53.95	(950601)	52.51	(951126)	52.41	(941225)
16	712878.00	124801.00	44.60	(941117)	44.12	(950605)	42.46	(950321)	42.04	(951126)	41.23	(940322)
17	712283.00	125747.00	47.20	(940516)	46.77	(950413)	46.47	(950629)	46.30	(940322)	45.65	(950601)
18	711772.00	126828.00	56.12	(950213)	51.80	(940516)	49.10	(940322)	48.60	(941117)	47.98	(940217)
19	711286.00	127742.00	61.90	(940217)	59.27	(941125)	57.43	(950615)	57.08	(950810)	54.69	(950807)
20	710581.00	128509.00	78.70	(940217)	77.33	(940318)	76.04	(940515)	73.06	(950615)	67.73	(950309)
21	709979.00	128975.00	92.07	(940318)	86.28	(940217)	82.80	(950615)	80.88	(950309)	80.65	(940515)
22	709469.00	129309.00	100.26	(950213)	91.16	(940217)	90.55	(950309)	90.04	(950615)	82.36	(940515)
23	708864.00	129423.00	108.96*	(950213)	102.09*	(950309)	101.09*	(940217)	100.21*	(950615)	92.99	(940515)
24	708446.00	129688.00	104.50	(950213)	100.66	(950309)	100.30	(950615)	99.87	(940217)	95.42*	(940515)
25	708043.00	130099.00	100.27	(950213)	99.48	(950615)	99.13	(950309)	97.84	(940217)	94.72	(940515)
26	707718.00	130494.00	95.42	(950615)	93.99	(950309)	93.07	(940217)	93.02	(950213)	91.34	(940515)
27	707469.00	131074.00	82.79	(950309)	82.31	(940217)	82.27	(950413)	81.19	(950213)	80.78	(940515)
28	707370.00	131577.00	75.79	(940217)	75.62	(950309)	73.97	(940515)	73.75	(950213)	73.75	(950413)
29	707198.00	132553.00	69.91	(940217)	69.76	(950413)	69.26	(940515)	68.09	(950309)	67.59	(950213)
30	706312.00	133168.00	76.24	(950310)	75.04	(940515)	74.40	(940217)	73.48	(950309)	73.36	(950614)
31	705429.00	133701.00	74.47	(950614)	73.39	(950309)	71.89	(950615)	71.21	(940515)	67.16	(940217)

Run Date: 07/29/98

Olancha Modeling Region, 97.21% Controlled (Method 1), Vector Met
High 10 Tables
24-hr PM10 (ug/m3)

No.	xrec(m)	yrec(m)	1-hi PM10	(yrmndy)	2-hi PM10	(yrmndy)	3-hi PM10	(yrmndy)	4-hi PM10	(yrmndy)	5-hi PM10	(yrmndy)
1	699012.00	105667.00	38.94	(941014)	38.45	(940129)	38.43	(940128)	37.28	(950505)	36.01	(950504)
2	700340.00	105044.00	46.13	(940128)	44.03	(940129)	43.93	(941014)	41.01	(941102)	40.76	(951004)
3	699410.00	108634.00	37.25	(941014)	36.57	(950504)	36.51	(940129)	36.37	(940128)	36.02	(950505)
4	700647.00	108935.00	45.88	(940128)	45.49	(941014)	44.26	(940129)	40.55	(941102)	40.51	(951004)
5	701403.00	109325.00	54.35	(940128)	51.92	(941014)	51.84	(950409)	49.50	(940129)	49.05	(951004)
6	702159.00	109842.00	90.88	(950409)	75.03	(940312)	66.30	(940128)	64.85	(951004)	64.58	(951022)
7	702550.00	110452.00	125.98	(950409)	114.81	(940312)	99.35	(950606)	91.09	(941225)	84.62	(950421)
8	703182.00	110761.00	181.25	(950606)	138.64	(950409)	130.87	(940312)	104.43	(941225)	102.02	(940211)
9	703769.00	111102.00	174.61	(950606)	107.62	(950409)	100.70	(940312)	93.18	(940211)	82.58	(941225)
10	704278.00	111587.00	116.64	(950409)	107.82	(950606)	105.83	(940312)	85.31	(941225)	82.43	(940211)
11	704693.00	112603.00	171.40	(950606)	134.96	(950409)	125.00	(940312)	102.69	(940211)	99.87	(941225)
12	705641.00	113168.00	183.05	(950606)	152.03	(950409)	142.22	(940312)	113.08	(941225)	110.76	(940211)
13	706432.00	113579.00	184.89	(950606)	146.27	(950409)	138.24	(940312)	110.97	(941225)	107.91	(940211)
14	707552.00	114476.00	191.20*	(950606)	154.57*	(950409)	149.95*	(940312)	119.19*	(941225)	112.49*	(940211)
15	698585.00	120873.00	40.61	(940515)	38.24	(950109)	38.07	(940606)	34.65	(941004)	34.38	(940423)
16	698981.00	118897.00	41.82	(940515)	39.18	(940606)	38.79	(950109)	35.27	(940423)	34.14	(941004)
17	698612.00	117031.00	36.88	(940606)	36.25	(940515)	34.62	(950109)	33.83	(940423)	31.98	(941102)
18	698669.00	114997.00	32.40	(940515)	32.29	(940424)	31.70	(950929)	31.59	(940509)	31.49	(941102)
19	697590.00	113254.00	32.25	(950929)	32.10	(940912)	31.92	(940509)	31.32	(940424)	31.07	(950505)
20	697941.00	111270.00	34.49	(950929)	33.25	(950928)	31.88	(940912)	31.81	(940509)	31.21	(951012)
21	698248.00	109322.00	33.73	(950929)	32.70	(950928)	32.55	(950512)	32.42	(950504)	31.69	(940509)

Run Date: 07/29/98

Olancha Modeling Region, 97.21% Controlled (Method 1), Vector Met
High 10 Tables
24-hr PM10 (ug/m3)

No.	xrec(m)	yrec(m)	6-hi PM10	(yrmndy)	7-hi PM10	(yrmndy)	8-hi PM10	(yrmndy)	9-hi PM10	(yrmndy)	10-hi PM10	(yrmndy)
1	699012.00	105667.00	34.98	(940509)	34.87	(941102)	34.78	(950512)	34.70	(941003)	34.16	(950327)
2	700340.00	105044.00	38.93	(941119)	38.74	(950505)	38.54	(950327)	37.90	(950409)	37.66	(941113)
3	699410.00	108634.00	35.06	(950512)	34.19	(940509)	34.08	(941003)	33.61	(950929)	33.37	(941102)
4	700647.00	108935.00	40.50	(950505)	39.35	(941003)	39.03	(950409)	38.82	(950504)	38.72	(950512)
5	701403.00	109325.00	45.81	(941102)	44.75	(951022)	44.69	(941119)	44.30	(940228)	43.46	(950505)
6	702159.00	109842.00	64.50	(941225)	61.03	(950402)	59.80	(940228)	59.29	(951216)	58.69	(941014)
7	702550.00	110452.00	81.94	(951022)	81.31	(951216)	78.18	(941013)	75.76	(940128)	75.00	(940211)
8	703182.00	110761.00	97.38	(950421)	97.03	(941013)	93.51	(951216)	89.00	(951022)	80.28	(950402)
9	703769.00	111102.00	81.55	(941013)	78.98	(950605)	77.99	(951216)	77.98	(950421)	73.91	(951022)
10	704278.00	111587.00	78.86	(951216)	78.65	(950421)	78.34	(951004)	77.87	(951022)	73.69	(941013)
11	704693.00	112603.00	92.82	(950421)	91.79	(941013)	91.64	(951216)	87.82	(951022)	87.78	(951004)
12	705641.00	113168.00	101.49	(951216)	101.48	(950421)	99.66	(941013)	96.71*	(951022)	96.59*	(951004)
13	706432.00	113579.00	98.06	(951216)	97.09	(950421)	96.85	(941013)	92.81	(951022)	92.43	(951004)
14	707552.00	114476.00	104.24*	(950421)	102.77*	(941013)	102.28*	(951216)	95.14	(951022)	92.84	(951004)
15	698585.00	120873.00	33.41	(940421)	32.95	(950108)	32.78	(950213)	32.70	(950614)	32.56	(950322)
16	698981.00	118897.00	33.77	(940421)	32.86	(950213)	32.84	(950108)	32.67	(950322)	32.31	(940516)
17	698612.00	117031.00	31.82	(940516)	31.13	(940424)	31.01	(950108)	30.93	(950929)	30.74	(941014)
18	698669.00	114997.00	31.28	(950505)	31.17	(940423)	31.16	(950428)	31.12	(940606)	30.95	(950109)
19	697590.00	113254.00	31.01	(950428)	30.66	(950109)	30.64	(941016)	30.63	(941119)	30.59	(950523)
20	697941.00	111270.00	30.99	(940404)	30.95	(950505)	30.71	(940128)	30.65	(940129)	30.65	(950523)
21	698248.00	109322.00	31.66	(941014)	31.39	(940404)	31.35	(951012)	31.20	(940129)	31.19	(950505)

Run Date: 07/29/98

Lone Pine Modeling Region, 97.21% Controlled (Method 1), Vector Met
High 10 Tables

24-hr PM10 (ug/m3)

No.	xrec(m)	yrec(m)	1-hi PM10	(yrmndy)	2-hi PM10	(yrmndy)	3-hi PM10	(yrmndy)	4-hi PM10	(yrmndy)	5-hi PM10	(yrmndy)
1	694780.00	141778.00	46.71	(940318)	38.47	(940515)	38.31	(941004)	38.03	(950303)	37.70	(950310)
2	704526.00	134694.00	131.88*	(950303)	104.23*	(951212)	85.90*	(950213)	77.11*	(950413)	77.02*	(940318)
3	703399.00	134971.00	101.03	(950303)	81.70	(940318)	79.71	(951212)	72.86	(950213)	65.99	(950310)
4	702337.00	135174.00	73.64	(940318)	72.29	(950303)	61.59	(951212)	59.07	(950213)	58.48	(940515)
5	700958.00	135392.00	73.31	(950303)	63.46	(951212)	57.11	(940318)	54.93	(950213)	50.63	(950413)
6	700136.00	134574.00	76.56	(950303)	64.26	(951212)	56.44	(950213)	56.32	(940318)	50.83	(950413)
7	699141.00	134273.00	68.80	(950303)	59.34	(940318)	56.56	(951212)	53.59	(950213)	50.60	(950310)
8	697787.00	133698.00	49.06	(940318)	44.76	(950303)	44.09	(950110)	40.91	(950109)	40.65	(941004)
9	696274.00	133058.00	42.15	(940318)	37.03	(950310)	36.71	(950303)	36.29	(950213)	35.97	(940515)
10	696382.00	131807.00	42.35	(940318)	38.27	(950109)	36.91	(950310)	36.20	(950213)	36.16	(940423)
11	696970.00	129895.00	43.10	(940318)	40.99	(950109)	37.57	(950310)	36.81	(950213)	36.79	(950303)
12	697697.00	128594.00	44.06	(940318)	40.31	(950109)	39.63	(950303)	38.88	(950310)	38.03	(950213)
13	697069.00	128214.00	43.35	(940318)	39.70	(950109)	36.97	(950310)	36.48	(940515)	36.47	(950213)
14	696310.00	126530.00	41.49	(940318)	38.59	(950109)	35.84	(950110)	35.22	(940515)	34.46	(950108)
15	696968.00	124557.00	42.17	(940318)	38.88	(950109)	36.65	(950110)	35.61	(940515)	34.56	(941004)
16	697844.00	122654.00	44.02	(940318)	40.12	(950109)	37.53	(950110)	36.64	(940515)	35.36	(941004)

Run Date: 07/29/98

Lone Pine Modeling Region, 97.21% Controlled (Method 1), Vector Met
High 10 Tables

24-hr PM10 (ug/m3)

No.	xrec(m)	yrec(m)	6-hi PM10	(yrmndy)	7-hi PM10	(yrmndy)	8-hi PM10	(yrmndy)	9-hi PM10	(yrmndy)	10-hi PM10	(yrmndy)
1	694780.00	141778.00	37.44	(950213)	36.92	(940423)	36.39	(950321)	35.71	(950110)	35.49	(950322)
2	704526.00	134694.00	72.98*	(950310)	71.44*	(950321)	70.69*	(950615)	69.95*	(950309)	68.49*	(940423)
3	703399.00	134971.00	63.08	(940515)	63.01	(940423)	62.62	(950321)	60.52	(950615)	59.81	(950413)
4	702337.00	135174.00	54.08	(950321)	53.04	(950310)	52.94	(941004)	51.97	(940423)	50.55	(950615)
5	700958.00	135392.00	49.22	(940515)	48.92	(941004)	47.94	(950310)	46.09	(940217)	45.55	(950309)
6	700136.00	134574.00	49.64	(950310)	48.90	(950321)	47.87	(940515)	47.66	(950615)	47.62	(940423)
7	699141.00	134273.00	48.21	(940423)	47.06	(941004)	46.34	(950321)	46.01	(940515)	44.75	(950615)
8	697787.00	133698.00	40.39	(950213)	40.24	(940515)	39.92	(950310)	38.59	(951212)	38.48	(940423)
9	696274.00	133058.00	35.95	(940423)	35.86	(950109)	35.85	(941004)	35.52	(950110)	35.39	(950321)
10	696382.00	131807.00	36.05	(940515)	35.99	(950303)	35.85	(941004)	35.28	(950321)	34.91	(950110)
11	696970.00	129895.00	36.49	(940515)	36.44	(940423)	36.41	(941004)	35.74	(950321)	35.15	(950110)
12	697697.00	128594.00	37.39	(941004)	37.38	(940423)	37.15	(940515)	36.39	(950321)	35.53	(950110)
13	697069.00	128214.00	36.25	(941004)	36.01	(940423)	35.66	(950321)	35.44	(950110)	35.31	(950303)
14	696310.00	126530.00	34.33	(941004)	33.81	(950321)	33.77	(940606)	33.23	(940123)	33.07	(950322)
15	696968.00	124557.00	34.34	(950108)	34.08	(950321)	34.06	(940606)	33.50	(940123)	33.41	(940911)
16	697844.00	122654.00	35.17	(950108)	35.12	(950321)	34.68	(940606)	34.10	(940123)	34.04	(950322)