

# **SUMMARY**



## Introduction

The Mono Basin Planning Area experiences severe episodes of air pollution attributable to windblown erosion of fine particulate matter, known as PM-10, from the exposed lake shore of Mono Lake--the water elevation of the lake having declined approximately 45 feet between 1941 and 1989, due to water diversions from tributary streams by the City of Los Angeles Department of Water and Power. These pollution episodes produce concentrations of PM-10 that violate federal, health-based air quality standards and adversely impact the public trust resources of the Mono Basin.

The federal Clean Air Act states that areas in violation of the National Ambient Air Quality Standard (Standard) for PM-10 are required to develop a State Implementation Plan or SIP that demonstrates how the area will decrease emissions and attain the federal Standard. The purpose of the *Mono Basin PM-10 State Implementation Plan* is to fulfill this requirement. In accordance with the time line established by the United States Environmental Protection Agency, this submittal is due by June 29, 1995.

The present document summarizes the air pollution problem and its projected resolution, including:

- a synopsis of the regulatory status,
- a description of the planning area,
- an inventory and analysis of the sources and severity of polluting emissions, and the impact on human health and natural resources,
- a presentation of modeling results that predict the distribution and concentration of emissions at varying lake levels, and
- a demonstration of attainment through implementation of the control measure--a gradual restoration of the lake level to an elevation of at least 6,391 feet.

## **Scope of the Problem**

PM-10, particulate matter less than 10 microns in diameter, can penetrate deep into the respiratory tract, and lead to a variety of respiratory problems and illnesses. Ambient air quality monitoring in the Mono Basin--conducted by Great Basin Unified Air Pollution Control District (District) during the period of 1988-1992--measured eight exceedances of the federal Standard for 24-hour PM-10 concentration of 150 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). These violations--some over three times the Standard--were the basis for the redesignation of the planning area as moderate nonattainment on November 29, 1993.

An analysis of the sampling data from the monitoring sites clearly shows that dust storms in the basin are dominated by PM-10 sized particles of eroded efflorescent salt deposits with some soils and sediments. Efflorescent salts, which were virtually nonexistent before 1941, now cover 4,975 acres of the exposed lake shore between the 6,376 and 6,390 foot elevations.

Peak day PM-10 emissions from lake shore windblown dust are estimated at 588 tons/day and annual average emissions are calculated at 5,665 tons. Other possible sources of PM-10 have been evaluated and their individual and cumulative contribution to the pollution problem is insignificant--lake shore windblown dust accounts for approximately 99% of total emissions for the peak day and 86% of the annual average.

## ***Mono Lake Basin Water Right Decision 1631***

Recognizing the duty to protect public trust resources, Decision 1631 of the California State Water Resources Control Board (SWRCB) amends the water right licenses of the City of Los Angeles. Air quality is a public trust resource and the SWRCB found that protecting air quality should be a determining factor in the water appropriation decision at Mono Lake.

The process of review of Mono Basin water rights involved extensive evidentiary hearings. For that portion on air quality, the SWRCB considered computer modeling results predicting future air quality conditions at different lake levels. It was resolved that the only feasible control measure to sufficiently reduce emissions to comply with the federal PM-10 Standard is a limitation on diversions to affect a gradual increase in the water elevation of Mono Lake to at least 6,391 feet and submerge much of the exposed emissive source area. As shown in Figure S-1, an estimated 26 years is required for Mono Lake to rise to 6,391 feet under normal runoff hydrology. Extremely wet runoff years could result in the lake reaching 6,391 feet in as little as nine years, whereas it may take as long as 38 years under drought conditions (Figure S-2).

## **Design Day Concentrations**

Dispersion modeling techniques are a method to assess the effectiveness of the planned control measure to remediate source conditions and bring the area into compliance with the PM-10 Standard. The Industrial Source Complex Model (ISC2) and an empirically-derived emission factor are applied to predict PM-10 concentrations downwind of exposed lake shore areas, and the modeling results are examined to correlate change in predictions to different lake levels or source elevations.

Windblown PM-10 emissions at Mono Lake vary with season due to crust formation, snow cover, and precipitation--conditions that inhibit the erodibility of the lake shore and are typically present on days outside of the "dust season." In order to obtain realistic predictions that account for actual source area conditions, only days within the dust season recording at least one hour of winds above 16 mph are selected from the monitoring data.

Federal regulations focus on the sixth highest or design day concentration over a five year period at the worst air impact site for determining attainment of the 150  $\mu\text{g}/\text{m}^3$  PM-10 Standard. For a simulated lake level of 6,391 feet, the modeling predictions indicate a design day concentration at the worst site of 387  $\mu\text{g}/\text{m}^3$ .

## **Demonstration of Attainment**

The dispersion modeling study assumed that all source areas are homogeneous. In fact, higher lake shore areas closer to the prediversion water line have different surface characteristics--and less susceptibility to erosion--than lower areas of the relicted lake bed. Analysis indicates that the exposed lake shore area above 6,390 feet is a net deposition area, while the zone below that elevation is a net deflation area. This means that as the water elevation increases over time, submerging source areas below the 6,390 foot contour, the supply of suspended or entrained particulate matter being deposited above the 6,390 foot contour will decrease. There is also evidence of expansion of surface-stabilizing natural vegetation above the 6,390 foot elevation.

The change in modeled air quality impact due to decreasing deposition from lower-to-higher exposed lake shore areas can be calculated. Modeled PM-10 emissions decrease proportionally with the decrease in size of net deflation source areas, a result of the increase in lake level. Figure S-3 depicts adjusted design day PM-10 concentrations at the worst air impact site as a function of increasing lake levels.

The combined effects of (1) increasing the water elevation of Mono Lake to 6,391 feet, and (2) eliminating deposition of particulate matter in the area between the 6,391 to 6,400 foot elevations, accomplishes attainment of the PM-10 Standard of 150  $\mu\text{g}/\text{m}^3$  by 2021.

## **Conclusion**

This submittal has been prepared to satisfy all PM-10 SIP requirements of the federal Clean Air Act Amendments of 1990 in a single, consolidated document.

Modeling predictions demonstrate that full implementation of the control measure will bring the area into attainment. Calculations of adjusted PM-10 concentrations at different lake levels provide quantitative milestones for “reasonable further progress” (RFP), which the District commits to submit every three years to track progress toward attainment.

Decision 1631 provides an enforceable assurance that the control measure will be implemented. As a contingency measure, if the lake level does not reach an elevation of 6,391 feet by September 28, 2014, the SWRCB will hold a hearing to consider appropriate revisions to the water right licenses and to determine if they will further limit water diversion activities by the Licensee.

It is not possible to comply with the serious attainment date of December 31, 2003, and additional time will be required. An Extension of Attainment Date--to set said date to be coterminous with the SWRCB schedule for restoring the lake level--is considered reasonable and is herewith requested.

**PROJECTED APRIL 1 MONO LAKE  
SURFACE ELEVATION\*  
USING D-1631 OPERATIONAL RULES**

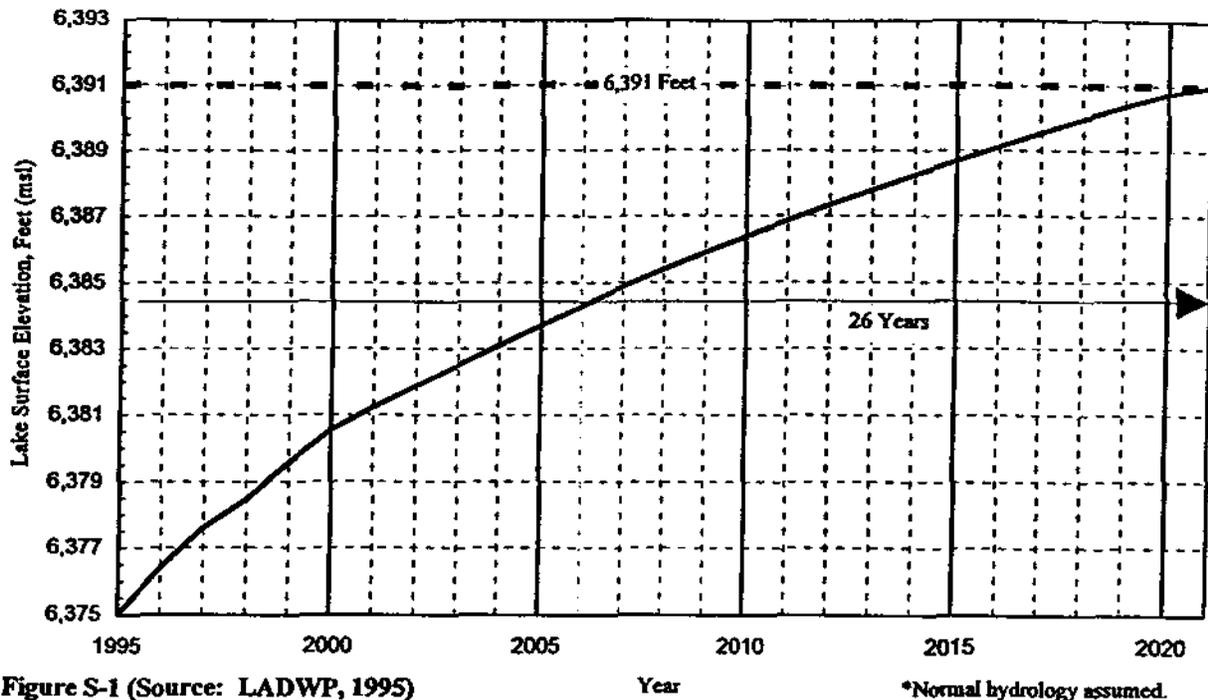


Figure S-1 (Source: LADWP, 1995)

**TRANSITION PERIOD SCENARIOS FOR  
MONO LAKE ELEVATION TO REACH 6,391 FEET  
USING D-1631 OPERATIONAL RULES**

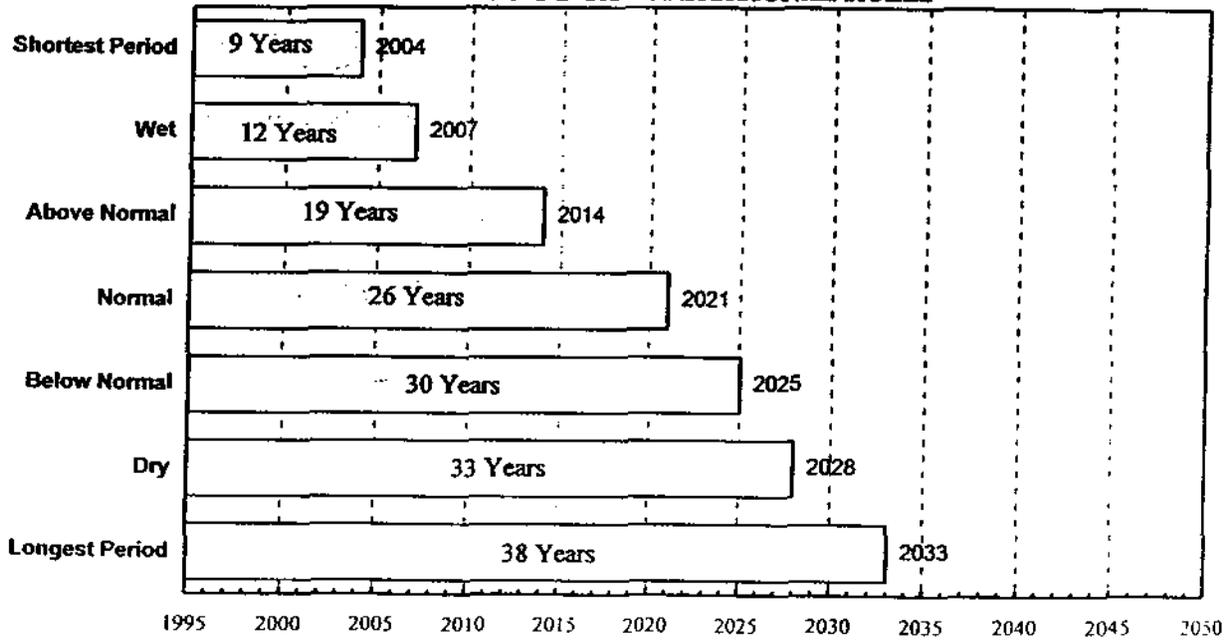
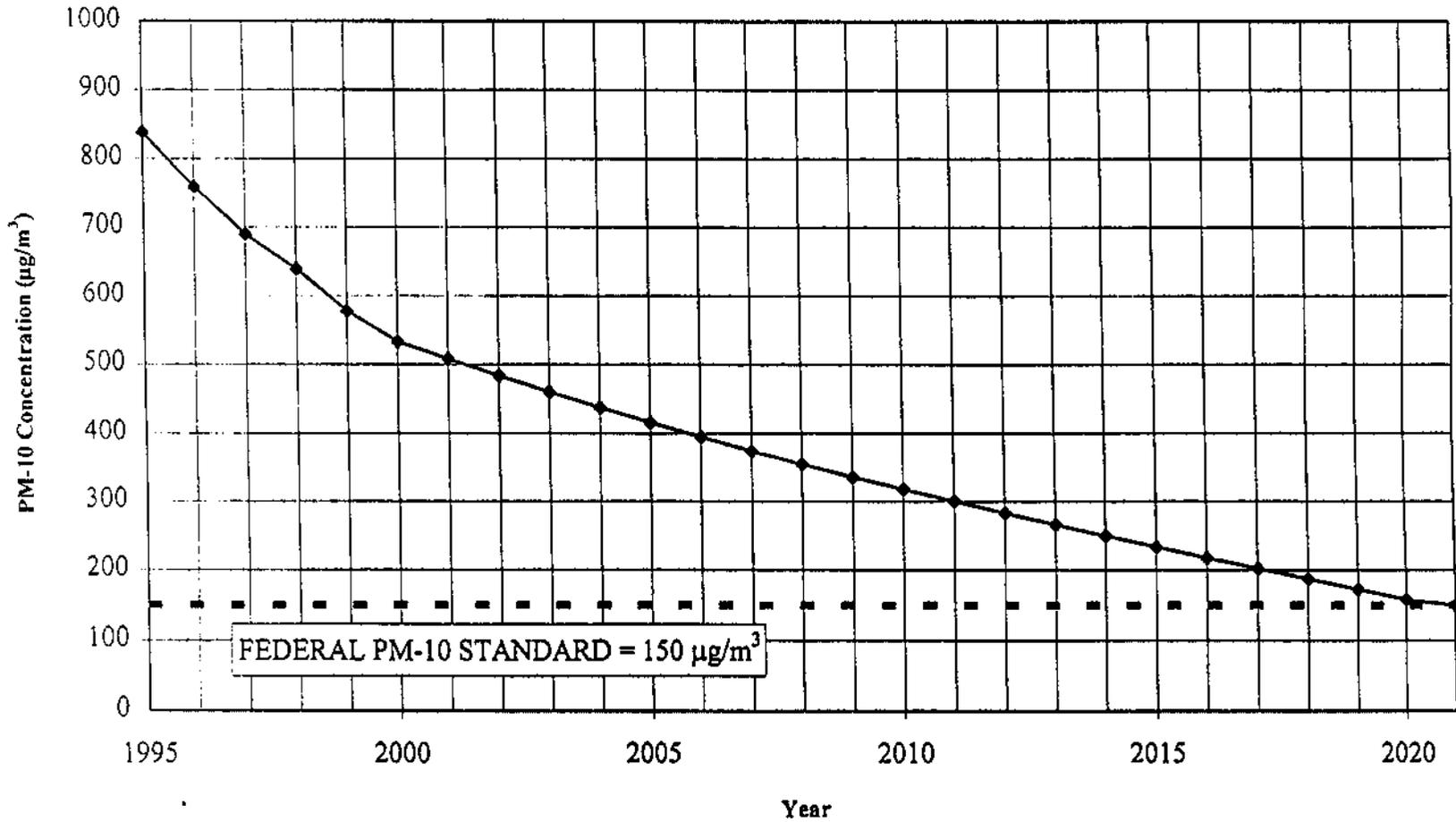


Figure S-2 (Source: LADWP, 1995)

Figure S-3

### ADJUSTED PM-10 CONCENTRATIONS AT RECEPTOR SITE 45 for Increasing Mono Lake Surface Elevations



\* Normal hydrology assumed