MONO LAKE BASIN WATER RIGHT DECISION 1631

Decision and Order Amending Water Right Licenses to Establish Fishery Protection Flows in Streams Tributary to Mono Lake and to Protect Public Trust Resources at Mono Lake and in the Mono Lake Basin

(Water Right Licenses 10191 and 10192, Applications 8042 and 8043, City of Los Angeles, Licensee)

September 28, 1994

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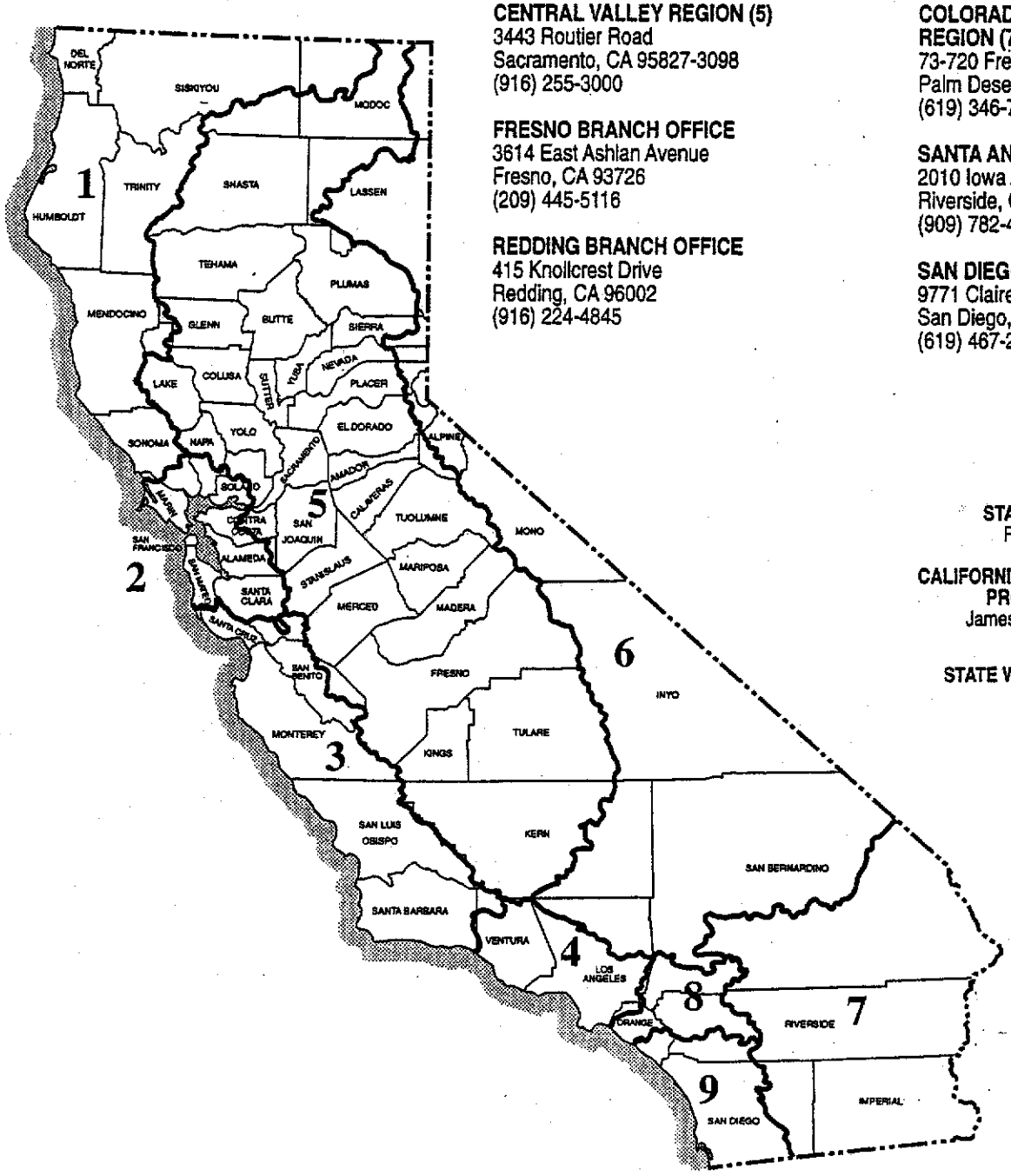

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In the Matter of Amendment of the City of Los Angeles' Water Right Licenses for Diversion of Water From Streams Tributary to Mono Lake (Water Right Licenses 10191 and 10192, Applications 8042 and 8043)		DECISION 1631
		SOURCE: Lee Vining Creek Walker Creek Parker Creek Rush Creek
		COUNTY: Mono
CITY OF LOS ANGELES, Licensee		

DECISION AND ORDER AMENDING WATER RIGHT LICENSES TO ESTABLISH FISHERY PROTECTION FLOWS IN STREAMS TRIBUTARY TO MONO LAKE AND TO PROTECT PUBLIC TRUST RESOURCES AT MONO LAKE AND IN THE MONO LAKE BASIN

SUMMARY OF CONTENTS

TABLE OF CONTENTS

Draft EIR concludes that no state listed or federally listed or proposed threatened or endangered plants would be affected by any of the alternatives. In addition, no special-status plants in the Mono Basin or Long Valley occur in riparian zones affected by the project. Two plants listed in the California Native Plant Society inventory of rare and endangered plants could be affected by an increase in lake level above 6,400 feet. All special-status plants in the Mono Basin and Long Valley were probably more abundant in 1940 than today, but they have not been adversely affected by changes in streamflow or lake levels. (SWRCB 7, Vol. 1, pp. 3C-48 to 3C-49.)

In summary, the minimum streamflow and lake level criteria established in this decision will benefit Mono Lake brine shrimp and California gulls, may have some beneficial effect on ospreys and bald eagles, and are not expected to have a significant adverse impact on any special status species of animals or plants.

6.4 Mono Basin Air Quality

As noted earlier in this decision, the California Supreme Court ruled that the scenic views of Mono Lake and its shore, and the purity of the air in the Mono Basin are among the values protected by the public trust doctrine. (National Audubon Society v. Superior Court, 33 Cal.3d at 435, 189 Cal.Rptr. at 356.) The declining water level of Mono Lake attributable to LADWP diversions has led to severe periodic dust storms, a deterioration of air quality in the Mono Basin and violation of standards set pursuant to the federal Clean Air Act. As discussed below, the evidence in the record establishes that resolution of the air quality problem will require reduced water diversions from pre-1989 levels in order to allow the water level of Mono Lake to rise and cover much of the exposed lakebed area.

LADWP argues that the Legislature "has not granted the SWRCB authority to enforce state or federal statutes involving air quality." (LADWP Rebuttal Brief, p. 65.) The fact that the Legislature has charged other agencies with primary regulatory

authority over air quality, however, does not mean that the SWRCB should ignore existing or potential air quality impacts of water diversions. As noted above, the Audubon decision establishes that air quality is among the values protected by the public trust doctrine. Moreover, all water diversions in California are subject to the constitutional prohibition of unreasonable use or method of diversion of water. (California Constitution, Article X, Section 2.) It should be beyond dispute that, in a situation where diversion of water can lead to violation of a public health based air quality standard, the protection of air quality should be considered in determining the conditions under which the water appropriation is allowed. Statutory restrictions upon the Great Basin Air Pollution Control District's jurisdiction to regulate water diversions cannot logically be interpreted as limiting the SWRCB's established statutory authority over diversion and use of water. (Water Code Sections 174, 1200, et seq.)

6.4.1 *Effect of Reduced Lake Levels on Air Quality*

No ambient air quality monitoring was conducted in the Mono Basin before 1979. Therefore, no quantitative data exist to describe the pre-1941 conditions. The Draft EIR (SWRCB 7, Vol. 2, pp. 3H-8 to 3H-11 and Appendix N, p. N5-7) reviewed the historical accounts of the Mono Basin including an 1889 report titled "*Quaternary History of the Mono Valley, California*" by Israel C. Russell (reprinted from the Eighth Annual Report of the United States Geological Survey, 1889, pp. 267-394). Russell noted that on windy days Mono Lake was streaked with alkaline froth, but his report makes no mention of windblown dust, sand or salt. (SWRCB 7, Vol. 2, pp. 3H10-3H11.)

Aerial photographs from 1930 (lake elevation approximately 6,420) and 1940 (lake elevation approximately 6,417) show very narrow fringes of efflorescent salts along the edges of lagoons near the lakeshore; scattered small patches of salt among some sand dunes; and no efflorescent salt visible on the narrow strip of barren sand bordering the north or east shores of the lake. (SWRCB 7, Vol. 2, p. 3H-9.) The Draft EIR states that the best available evidence suggests that major dust storm events were probably rare

under pre-diversion conditions and that any dust storms that did occur would have been dominated by silt, clay, and sand particles with only small quantities of salt particles from interstitial salts and water spray from off the lake. (SWRCB 7, Vol. 2, p. 3H-11.)

As the surface elevation of Mono Lake has fallen from 6,417 feet at the start of LADWP diversions in 1941 to 6,375 feet in spring of 1994, increasingly greater areas of former lakebed and lakebed sediments have been exposed ("relicted") forming a white ring around Mono Lake known as the playa. Under present conditions with large areas of exposed playa, strong winds produce dust storms of varying size and duration that degrade the ambient air quality and scenic views of the Mono Basin. The three most frequent dust emission source areas are the landbridge (the exposed playa between the shoreline and Negit Island), the North Shore and the East Shore. (GBUAPCD A, p. 7.) An additional emission source area is the emerged western portion of Paoha Island. (SWRCB 7, Vol. 2, pp. 3H-20 and 21.)

The Draft EIR describes the term "dust storm" and "sand storm" as episodes of windblown particulate matter that significantly restrict visibility. Dust storms are dominated by particles with diameters smaller than 100 microns; sand storms are dominated by particles with diameters larger than 100 microns. (SWRCB 7, Appendix N, p. N-10.)

The major emission sources of suspended particulate matter in the Mono Basin are produced by wind erosion of efflorescent salt deposits and some exposed soils, and sediments. (RT VI, 201:4-201:12.) Efflorescent salts form as shallow saline ground water rises to the surface of permeable sediments through capillary action and evaporates at the soil surface leaving a highly erodible salt crust. (GBUAPCD 30, pp. 1, 2, 16, and 17, photographs). Efflorescent salt deposits are seldom found on soil-air interfaces where the ground water table is more than ten feet below the ground surface. (GBUAPCD 30, pp. 1 and 11;

SWRCB 7, Vol. 2, p. 3H-21.) The major emission sources at Mono Lake are considered "anthropogenic", a classification which includes emissions influenced directly or indirectly by human activity. (SWRCB 7, Vol. 2, p. 3H-6.)

6.4.2 *The PM-10 Standard and Human Health*

The term "ambient air quality" refers to the atmospheric concentration of a specific compound or material present at a location that may be some distance from the source of the pollutant emissions. (SWRCB 7, Vol. 2, pp. H-1 and H-2.) During the 1980s, air quality standards for particulate matter were revised to apply only to "inhalable" particles with a size distribution weighted toward particles having aerodynamic diameters of 10 microns or less ("PM-10"). (SWRCB 7, Appendix, p. N-3.) The PM-10 standard is set to control concentrations of inhalable sized fine particles less than 10 microns in size, or about one tenth the diameter of human hair. (GBUAPCD A, III, p. 17.) Health risk studies were used to establish the PM-10 standard based on potential impacts to human health. (RT XII, 9:8-9:22 and 52:6-52:13.)

PM-10 sized particles are small enough to be inhaled deep into the lower respiratory tract. When breathing through the nose, few particles with an aerodynamic diameter larger than 10 microns reach the lower respiratory tract. (SWRCB 7, Appendix, p. N-3.) People who live in or visit areas exposed to the dust events at Mono Lake are at risk.

Federal standards for suspended particulate matter (PM-10) have been set for two time periods: a 24-hour average and an annual average of 24-hour values. The federal "National Ambient Air Quality Standards" (NAAQS) for PM-10 are:

150 micrograms/cubic meter as a 24-hour average; and
50 micrograms/cubic meter as an annual arithmetic mean
(SWRCB 7, Vol. 2, p. 3H-4; RT XII, 9:23-10:3.)

Dr. M. Joseph Fedoruk, M.D., testified on behalf of LADWP that there was no evidence that, at the existing lake levels, the occasional dust storms will have a significant public health impact in the affected areas. (LADWP 47, Section 6, p. 87.) Dr. Fedoruk suggested it is likely that individuals in the affected area will limit their exposure to PM-10 by taking avertive action, such as going indoors during the occasional dust storms. (LADWP 47, Section 6, p. 88.) After hearing the description of dust problems experienced by a resident on the north shore of Mono Lake (NAS&MLC 1F), however, Dr. Fedoruk agreed that experiences of the type described would constitute a public health problem. (RT XXIII, 41:10-41:20.)

Mr. Duane Ono of the Great Basin Unified Air Pollution Control District (GBAPCD), testified that exposure to PM-10 levels above the federal standard may cause sensitive individuals to experience varying degrees of breathing difficulties, some of which may linger beyond the exposure period. In some cases, breathing difficulties due to PM-10 exposure may cause asthma attacks or even contribute to an individual's death. Other health effects such as eye and nasal irritation may also occur. The most sensitive population includes children, the elderly, and people with respiratory problems, heart disease or influenza. (GBUAPCD A, III, p. 16; RT XXIX, 27:20-27:24.) The U.S. Forest Service is concerned that exposure to dust events poses a potential health risk to visitors to the Mono Basin. (RT XXIX, 20:20-20:25.)

6.4.3 *Existing Air Quality Conditions*

Efflorescent salt deposits at Mono Lake are found along the northern and eastern shores of the lake, generally below the 6,390 foot contour. (SWRCB 7, Vol. 2, Figure 3H-20.) Efflorescent salts which were virtually nonexistent before 1941 cover 4,975 acres or approximately 65 percent of the relicted lands at lake elevation 6,376 feet. Some of the salts are noncrystalline powdery deposits highly susceptible to wind erosion. More often, the salts are crusted but subject to

disturbance by windblown sand. (SWRCB 7, Vol. 2, p. 3H-21; GBUAPCD 7, 17, 18, and 19 (photographs).)

Windblown emissions at Mono Lake vary with season due to snow cover, precipitation, and crust formation. Generally the dust episodes occur during the months of April, May, June, November and December when the surface crust of the playa is thin. (GBUAPCD 10, pp. 3 and 5; RT XXIX, 20:9-20:11.) U.S. Forest Service Exhibit 3 is a video of dust events as seen from the Mono Lake Visitor Center in the spring of 1993.

Documented dust events have caused short-term air quality degradation in the Scenic Area which has resulted in exceedences of the Federal standard for PM-10. However, sampling data suggest that in Lee Vining (which is normally upwind of the dust storms), PM-10 concentrations over a 5 year period were extremely low during all the dust storms. (RT XXIX, 103:1-103:12.) Dust events have occurred at a frequency and concentration in violation of the Federal Clean Air Act. (GBUAPCD A, p. 1.) Mr. Ono testified that GBUAPCD monitoring data at the Simis Ranch show a statistical average of about 3.2 exceedences per year for the period 1988 to 1992. (RT XXIX, 53:12-53:19.) The national ambient air quality standard for PM-10 allows one exceedence or less per year without regard to how much the level is above the measured numerical standard of 150 micrograms per cubic meter. (RT XXIX, 29:2-29:15.) While the air quality of the Mono Basin is normally within the standard, there are enough days over the standard during the three-year period to be in violation. (RT XII, 14:3-14:8.)

6.4.4 *Compliance with Federal Clean Air Act Requirements*
Designation as a Nonattainment Area: On July 16, 1993, the U.S. Environmental Protection Agency (U.S. EPA) published a notice of proposed rulemaking revising the PM-10 designation for the Mono Basin in the Federal Register. (Vol. 58, No. 135, pp. 38331-38333.) The U.S. EPA proposed to revise the PM-10 designation for the Mono Basin from "unclassifiable" to "nonattainment" based upon recorded violations of the PM-10 NAAQS which occurred on or

after January 1, 1989. (USEPA 1, p. 1.) The Mono Basin was designated as a nonattainment area for PM-10 on December 29, 1993. (RT XXIX, 28:11-28:19.)

The Regulatory Framework: The federal Clean Air Act amendments of 1990 require each state to develop, adopt, and implement a State Implementation Plan (SIP) to achieve, maintain, and enforce federal air quality standards throughout the state. These plans must be submitted to and approved by the U.S. EPA. The NAAQS for PM-10 sets forth regulations for implementing the regulatory standards by requiring the development of a SIP to develop strategies necessary to assure attainment and maintenance of the PM-10 standard. (USEPA 1, p. 1.) Designation as a nonattainment area sets up a series of planning and regulatory deadline requirements for the state and local air pollution control agencies. By operation of law, the Mono Basin is initially classified as a moderate nonattainment area. The State must submit a SIP to U.S. EPA within 18 months that either demonstrates attainment will occur no later than the end of the sixth calendar year following the effective date of redesignation or shows that a demonstration of attainment within that period is impracticable. (RT XII, 5:11-5:22; USEPA 1, p. 3.) Demonstration of practicable attainment may include the use of air quality models. (USEPA 1, p. 3.)

If the State does not demonstrate attainment or demonstrates that attainment is impracticable within six years from the designation date (December 29, 1993), the Mono Basin will be upgraded to the serious nonattainment classification by U.S. EPA. This redesignation provides additional time to attain the standard, while also triggering additional legal and planning requirements. A new SIP is required within 18 months that demonstrates attainment as expeditiously as practicable, but in no case later than ten years after the designation to serious nonattainment area. In a December 16, 1993 letter to GBUAPCD (NAS&MLC 246), U.S. EPA outlined its understanding of the general timelines for the longest period possible for compliance with planning deadlines and attainment deadlines. The letter states that if

the Mono Basin fails to attain PM-10 standards by December 31, 2008, a new SIP would be required that provides for a 5 percent reduction of PM-10 emissions per year until the NAAQS is attained. (NAS&MLC 246, p. 2.) If the State fails to provide an adequate SIP, U.S. EPA is required to promulgate its own federal implementation plan to achieve the attainment of the PM-10 standard in the Mono Basin. (RT XII, 6:10-7:7.)

The State has designated the GBUAPCD as the lead agency to develop the SIP for the Mono Basin. Once the plan is completed and approved by the GBUAPCD, it will be forwarded to the California Air Resources Board (ARB) for adoption. Once adopted by ARB, the plan is considered as a SIP which is then forwarded to the U.S. EPA in accordance with Clean Air Act requirements. (RT XXIX, 71:11-71:22.)

The GBUAPCD is currently in the process of developing a SIP to bring the Mono Basin into compliance with the Federal Clean Air Act. (GBUAPCD A, p. 1.) Mr. Ono testified that the SIP being developed by his agency must provide reasonable assurance that the standard would be met with the strategy that is included in the plan. (RT XXIX, 30:1-30:5.)

Air Quality Modeling: In 1991, the GBAPCD contracted with TRC Environmental Corporation (TRC) to perform an air quality model evaluation to assess dispersion modeling techniques for prediction of PM-10 emissions in the Mono Basin. (GBUAPCD 3, p. 1.) TRC evaluated the Industrial Source Complex Short Term (ISCST) model and the Fugitive Dust Model (FDM). The results of the evaluation were that the FDM outperformed the ISCST overall and was found to be technically superior for the prediction of PM-10 concentrations downwind of eroding source areas. In most instances, however, the predictions of the two models were similar. (GBUAPCD 3, p. 18; RT XXIX, 34:5-34:25.) Under GBUAPCD direction, TRC used the Industrial Source Complex-2 model (ISC-2), which was the U.S. EPA approved dispersion model, to model PM-10 emissions. The ISC-2 model is routinely used for regulatory purposes. (GBUAPCD A, II, p. 5) A Mono Lake Air

Quality Modeling Study was conducted to assess the impacts of windblown PM-10 emissions from the Mono Lake playa at different levels of the lake. (GBUAPCD 10, p. 1.)

As part of their work on the Draft EIR, Jones and Stokes Associates also evaluated air quality impacts in the Mono Basin using a computer model as the most practical method for developing quantitative air quality assessments of future conditions. Jones and Stokes Associates selected the Fugitive Dust Model (FDM). Modeling procedures and results are presented in Mono Basin EIR Auxiliary Report No. 28. (SWRCB 13z.)

Based on the investigations done by the GBUAPCD and Jones and Stokes Associates, Mr. Ono testified that an average Mono Lake elevation of 6,392 feet would provide an appropriate level of protection of air quality. Mr. Ono also testified that he believes the 6,390 feet alternative identified in the Draft EIR, will provide the necessary level of assurance to protect air quality. (RT XXIX, 26:2-26:13.) The 6,390 alternative had a projected median lake elevation of 6,391.6 feet. Mr. Ono stated that the lake elevation alternatives 6,383.5 feet and lower (as identified in the Draft EIR) would not satisfy the NAAQS for PM-10 and would not bring the Mono Basin into attainment. (RT XXIX, 26:21-26:25.)

Mr. John Pinsonnault, an air quality consultant to LADWP, acknowledged that during some windstorms there will be exceedence of the Federal standards at Simis Ranch and Warm Springs, as well as other areas to the north and northeast of the lake. (RT XII, 257:2-257:10.) Mr. Pinsonnault also testified that the GBUAPCD monitoring data provide an excellent picture of the air quality at the suggested lake elevations of the LADWP plan. (RT XII, 257:14-257:20.) Mr. Pinsonnault discussed his general concern with the models used by GBUAPCD and JSA (RT XII, 258:1-261:25), but acknowledged that use of models is necessary to estimate concentrations of dust that could exist under certain conditions. (RT XII, 257:21-257:25.) Mr. Pinsonnault provided no data or studies to refute the findings of the GBUAPCD or the Draft EIR.

Mr. Pinsonnault also proposed a theory that as the lake elevation rises there could be increases in the ground water level that could cause even greater quantities of efflorescent salt crust to form at elevations that at the present time do not have salt crust. (RT XII, 264:23-265:7.) Although he was a member of the Technical Advisory Group on air quality issues and modeling for the Draft EIR, Mr. Pinsonnault testified that he had not provided the EIR contractor with any data or examples from the literature relating to issues he raised at the hearing. (RT XXIII, 21:7-21:13 and 22:16-22:19.) Mr. Ono testified that there was no foundation or data to support Mr. Pinsonnault's theory about increased efflorescent salt problems at higher water levels. (RT XXIX, 112:2-112:9.)

Other Potential Air Quality Mitigation Measures: GBUAPCD Exhibit 23 is a memo dated July 8, 1993 titled "Potential Mitigations For Mono Lake And Their Engineering Implications." The memo evaluates various alternatives to reduce or eliminate emission source areas found on the relicted playa at Mono Lake. The options evaluated were vegetation plantings, sand fences, volcanic cinders or other coverings, and chemical applications.

Dr. David P. Groeneveld, a plant ecologist and principal investigator for testing vegetation establishment on the saline Owens Drylake playa, conducted several investigations at Mono Lake for the GBUAPCD including a study titled, "Mono Lakeshore Environments: Vegetation Establishment to Control Airborne Dust." The conclusions of Dr. Groeneveld's vegetation study were:

1. Zones of poor or absent vegetation establishment on the eastern shore are constrained by poor ground water quality and quantity. Without artificial leaching, there will be no way to establish a vegetation cover that is meaningful for dust suppression on these zones;

2. Where vegetation is becoming established naturally due to proximity to seepage zones and springs (e.g., Simon Springs),

artificial planting is not a viable means of accelerating the process; and

3. Artificial plant establishment was successful in an extended fetch zone to the east of Simon Springs and has the potential to significantly reduce blowing dust in this limited area. This zone lies above the 6,393 foot contour. (GBUAPCD 26, pp. 1-2.)

Another study by Dr. Groeneveld, "Seeps and Springs Around Mono Lake That Influence Plant Establishment and Growth," reports that zones which lacked vegetation establishment around the lake (particularly the northeast area) coincided with waters of low calcium content, high salinity and potentially phytotoxic concentrations of boron and arsenic. (GBUAPCD 27, Abstract.) Dr. Groeneveld testified that, without extensive irrigation using pumped freshwater to leach those unvegetated saline zones, there would be no way to enhance vegetation growth to reduce blowing dust. He believes that condition will probably last tens to hundreds of years. (RT XXIX, 41:3-41:7.) There was no evidence provided as to the potential impact to ground water resources of such an intensive irrigation program.

Mr. Theodore Schade, GBUAPCD Project Manager for fugitive dust mitigation studies at Owens and Mono Lake, testified that the GBUAPCD has tested a number of fugitive dust mitigation measures at Owens Lake. The measures tested at Owens Lake included sprinkler irrigation, gravel blankets, artificial sand dunes and chemical sprays. With the exception of the gravel blanket, none of the measures reduced fugitive dust levels enough to be considered successful and appropriate for large scale implementation. (RT XXIX, 42:1-42:25.)

GBUAPCD Exhibit 23 addresses the quantity of material that would be needed to implement a volcanic cinder or gravel cover program on the Mono Lake playa. (GBUAPCD 23, pp. 1-2.) The area between lake elevation 6,383.5 feet and 6,390 feet encompasses a noncontinuous strip approximately 75,000 feet long between 675

and 2,000 feet wide, covering approximately 1,600 acres or 2.5 square miles. An estimated six inches of material (1.3 million cubic yards) would have to be laid over the mitigation area. This equates to approximately 162,000 dump truck loads (200 per day for three years) which would be required to move the material to the site.

Mr. Schade testified that if a successful engineering mitigation measure were identified, there would need to be a significant amount of land disturbance in the construction of the supporting infrastructure. This infrastructure would likely include new roads, pipelines, wells, powerlines, fences, sand fences and barrow sites. The GBUAPCD has not specifically identified any engineering measures that have a reasonable chance of succeeding at Mono Lake. (RT XXIX, 44:2-44:18.)

6.4.5 *Compliance with the Mono Basin National Forest Scenic Area Comprehensive Management Plan (CMP)*

Section 304 of the 1984 California Wilderness Act (PL 98-425) established the Mono Basin National Forest Scenic Area (Scenic Area). The Act required preparation of the Comprehensive Management Plan for the Scenic Area which was approved on March 16, 1990. (USFS 2, p. 1; RT XXVIII, 15:1-25:4.) The plan recommends a lake elevation range of 6,377 feet to 6,390 feet with management near the midpoint of 6,383.5 feet. The plan is intended to provide management direction for a 10 to 15 year period, but recognizes there may be a need for modification based on new information. (RT XXVIII, 15:8-25:25.) Forest Supervisor Dennis Martin testified that the management direction in the CMP needs to be reevaluated due to reclassification of the Mono Basin as a nonattainment area pursuant to the Clean Air Act. (RT XXVIII, 16:5-16:15.) Mr. Martin further testified that the USFS was not aware of any proven or feasible methods of physical mitigation that could be applied to the relicted lands that would be consistent with the intent of the federal legislation which is to preserve the natural scenic beauty of the area. The USFS recommended that the SWRCB should adopt the 6,390 feet

alternative to bring the Mono Basin into compliance with the Clean Air Act. (RT XXVIII, 17:9-17:19.)

6.4.6 *Conclusions Regarding Mono Basin Air Quality*

The evidence establishes that the Mono Basin is in violation of the national ambient air quality standard for PM-10 that was established for protection of human health. The major source areas of PM-10 emissions are relicted lakebed sediments encrusted with efflorescent salts. Most of the major source areas were exposed due to the declining water level in Mono Lake caused by LADWP's diversion of water from the tributary streams. The only feasible method of reducing the PM-10 emissions sufficiently to come into compliance with the national ambient air quality standards is to increase the water elevation of Mono Lake and submerge much of the exposed emission source area. The SWRCB recognizes that there is a degree of uncertainty inherent in predicting future air quality conditions based on the type of computer modeling results presented at the hearing. Nonetheless, the computer modeling results presented are the best evidence currently available of what is needed to come into compliance with applicable air quality standards. Increasing the water elevation of Mono Lake to an average level of 6,392 feet would provide a reasonable assurance of establishing compliance with the national ambient air quality standard for PM-10. Improving air quality at Mono Lake by reducing the severity of periodic dust storms in the Mono Basin would also protect the views and scenic resources for which the Mono Basin is widely known.

6.5 Visual and Recreational Resources

6.5.1 *Visual Characteristics of the Mono Basin*

Historical Overview: Many early visitors to the Mono Basin have described their impressions of the lake and the landscape. (SWRCB 13x, pp. 3-5; SWRCB 7, Vol. 2, pp. 3I-1 to 3I-6.) John Muir described the Mono Basin as "A country of wonderful contrasts, hot deserts bordered by snow-laden mountains, cinders and ashes scattered on glacier-polished pavement, frost and fire working together in the making of beauty." (SWRCB 13x, pp. 2-3.) In contrast, Mark Twain wrote in Roughing It: "Mono Lake lies in