MASTER RESPONSE NO. 1 - AIR QUALITY

This master response addresses two types of potential impacts to air quality in the Mojave Desert region that were mentioned as matters of concern by commentors on the project. First, potential impacts to air quality due to the operation and maintenance of project spreading basins. Second, potential impacts to air quality (increase in the frequency or magnitude of wind blown dust) as a result of lowering brine levels beneath Bristol or Cadiz dry lake due to project operations.

POTENTIAL IMPACTS TO AIR QUALITY DUE TO THE OPERATION AND MAINENANCE OF PROJECT SPREADING BASINS

The project spreading basins will be composed of individual earthen berm cells ranging in size from 10 to 15 acres encompassing a total area of 390 acres. The project spreading basins are described in Section 4.6.1 of the Final EIR/EIS, Volume 1, and their location is shown on Figure 4-15. Spreading basin operation and maintenance is described in Section 4.7.1. A Cadiz Project pilot spreading basin test was conducted at the proposed location of the project spreading basins. For information regarding the pilot spreading basin test, see the Cadiz Groundwater Storage and Dry-Year Supply Program Environmental Planning Technical Report – Groundwater Resources Report (Report No. 1163) Volume I.

Estimates of the potential impact to air quality from the maintenance of the spreading basins (removal of accumulated sediment) are included in the Final EIR/EIS, Volume 1, Section 5.6.4. Sediments are anticipated to accumulate in the spreading basins from three sources: 1) sediments deposited from Colorado River Aqueduct water delivered to the spreading basins, 2) sediments from the deposition of particulate matter from the atmosphere (wind blown dust) that will accumulate when spreading basins contain water, and 3) algae that will grow within the spreading basins when they contain water. These sediments will remain on the dry surface of the basins when they empty through percolation of the water. If not removed, these materials would reduce the percolation rate of the spreading basins. For this reason, the accumulated sediments will be removed prior to refilling the spreading basins. In this process, sediments will be removed by heavy equipment to a depth of approximately one-half inch just prior to refilling of a cell. The procedures described below will be implemented to minimize the amount of dust emissions during these operations. The sediment removal process will be conducted only as required prior to commencement of spreading operations within specific cells.

The removed material will be loaded into haul trucks by a front-end loader for transport and disposal at the Cadiz agricultural holdings. PM_{10} emissions during these operations include:

- Scraper exhaust
- Fugitive emissions from the scraper operation
- Front-end loader exhaust
- Fugitive emissions from dumping material into the haul trucks
- Haul truck exhaust, brake and tire wear
- Fugitive emissions from entrained unpaved road dust during haul truck travel
- Fugitive emissions when the material is unloaded from the haul trucks

Watering will be used to reduce PM_{10} emissions by an estimated 50 percent of uncontrolled emissions during sediment removal by the scraper. Additionally, the unpaved roads used by the haul trucks will be watered once each hour during truck travel to reduce fugitive PM_{10} emissions by an estimated 73 percent from uncontrolled emissions. The haul trucks will be covered when they transport material,

so emissions from loss of material are not anticipated to occur. Removed material will be disposed of at and integrated into the cultivated Cadiz agricultural landholdings. PM_{10} emissions from the sediment removal activities are estimated to be 4.8 tons per year, which is below the Mojave Desert Air Quality Management District's CEQA significance criterion of 15 tons per year, as described in Section 5.6.2 of the Final EIR/EIS, Volume 1.

A significant increase in PM_{10} emissions from current levels is not anticipated to occur through wind erosion of the spreading basins because of the formation of a crust on their surface when the basins dry out after emptying. Cadiz Project pilot spreading basin tests have shown that the sediment forms a crust on the surface because of the presence of algae and other materials. This crust reduces the susceptibility of the spreading basin surfaces to wind mobilization of dust to levels comparable to or lower than that of the surrounding desert land. For additional information, see the Cadiz Groundwater Storage and Dry-Year Supply Program Environmental Planning Technical Report – Groundwater Resources Report (Report No. 1163) Volume I, page 10. Should the spreading basin crust not form as anticipated and significant increases in PM_{10} emissions occur, the Final EIR/EIS includes Mitigation Measure AQ-9:

> "Based on periodic visual inspection, soil binders will be applied to the spreading basins following water spreading operations to control wind-blown dust emissions."

In conclusion, the spreading basins will be operated and maintained in a manner that minimizes the mobilization of dust to below a level of significance.

POTENTIAL IMPACTS TO AIR QUALITY DUE TO INCREASED MOBILIZATION OF WIND BLOWN DUST ON BRISTOL OR CADIZ DRY LAKE

BACKGROUND INFORMATION

The Cadiz Project is located in the Mojave Desert Air Basin and is within the jurisdiction of the Mojave Desert Air Quality Management District. With respect to the federal ambient air quality standards, the Cadiz Project area is in a moderate non-attainment area for particulate matter (PM_{10}). Wind mobilized dust occurs as a natural condition in the East Mojave Desert and on Bristol and Cadiz dry lakes. Natural, active sand dunes occur at the margins of both dry lakes. In addition to natural conditions, four entities operate sodium chloride and calcium chloride mining and production facilities on Bristol and Cadiz dry lakes that contribute wind mobilized dust in the region. Lee Chemical operates a facility on Cadiz Dry Lake; Hills Brothers, National Chloride and TETRA Technologies, Inc operate production facilities on Bristol Dry Lake. For additional information, see Section 5.9 of the Final EIR/EIS, Volume I.

Potential impacts to air quality in the Mojave Desert region due to mobilization of wind-blown dust on Bristol and Cadiz dry lakes is addressed in Section 5.6 of the Final EIR/EIS, Volume I, and Section 2.4 of the Management Plan, Final EIR/EIS, Volume IV. It is believed that the groundwater beneath the lakebeds (brine) is sufficiently near the surface to moisten the surface soils through the capillary rise of moisture from the water table. It is also believed that brine beneath the lakebeds is hydraulically connected to the freshwater aquifer outside the dry lakes. If so, lowering of the freshwater aquifer to an extent that results in the lowering of brine levels could cause an increase in the frequency and severity of wind blown dust on the dry lakes by reducing or eliminating the capillary rise of moisture to the surface.

The potential for the Cadiz Project to increase the frequency and severity of wind mobilized dust on Bristol and Cadiz dry lakes requires: 1) project operations that result in an excessive lowering of the

groundwater levels beneath the dry lakes; 2) lowering of groundwater levels that result in the drying-out of lakebed surface soils; and 3) drying-out of dry lakebed surface soils that causes an increase in the mobilization of wind blown dust. Provisions of the Management Plan, described below, will be implemented to avoid lowering of groundwater levels beneath the dry lakes. Furthermore, monitoring of wind-blown dust at the dry lakes will be performed to identify any changes in wind-blown dust conditions. With these measures, it is not anticipated that the Cadiz Project will result in an increase in the mobilization of wind-blown dust on Bristol or Cadiz dry lake.

Some commentors have compared the Cadiz Project to the air quality problems at Owens Lake. The comparison is not appropriate. Bristol and Cadiz dry lakes have been intermittent dry lakes for thousands of years, while Owens Lake was a surface body of water that was drained (over a short period of years) by removal of surface water recharge. Dust mobilization from the surfaces of Bristol and Cadiz dry lakes already exists. The intent of the Management Plan is to prevent any increase in dust mobilization due to the operation of the Cadiz Project.

GROUNDWATER MONITORING AND MANAGEMENT PLAN

To ensure that the operation of the Cadiz Project will not cause adverse impacts to air quality or any other critical resource, the Management Plan has been incorporated into the Cadiz Project. It establishes an extensive monitoring network and the use of predictive water resources models that will provide guidance for operating the project in a manner that avoids adverse impacts to critical resources. Information collected from the monitoring network will be evaluated in conjunction with the results of water resources models to provide an early warning of the potential for adverse impacts. The provisions and requirements of the Management Plan are more fully described in the Master Response "Groundwater Monitoring and Management Plan." The particular provisions relating to the potential for air quality impacts at Bristol and Cadiz dry lakes are set forth below.

WATER RESOURCES MONITORING AND MODELING

A series of water resources models are described in Section 3 of the Management Plan. These models will be calibrated to interpret groundwater level data gathered from monitoring wells at locations between the project area and the dry lake margins and beneath the dry lakebeds. The location of the monitoring wells is described in Section 4 of the Management Plan. Well clusters on Bristol and Cadiz dry lakes will be monitored in coordination with well clusters at the dry lake margins and observation wells located closer to the project wellfield. This configuration of well clusters and monitoring wells will provide a series of early warning monitoring locations. The data collected will be used in the models to evaluate the future effect of project operations on groundwater levels beneath the dry lakes. If and when necessary, modifications to project operations will be implemented so that the project does not cause groundwater level declines beneath the surface of the dry lakes that could contribute to or cause an increase in the mobilization of dust from the surface of the dry lakebeds.

Additionally, evapotranspiration (ET) monitoring stations and surface water monitoring stations will be located on Bristol and Cadiz dry lakes. ET stations will record ambient air temperature, vertical and horizontal wind speed and direction, humidity, water vapor density, solar radiation, net radiation, soil temperature, soil heat flux and soil water content or soil suction on an hourly basis. Soil moisture data collected from the evapotranspiration stations during the pre-operational phase of the project, in conjunction with soil moisture analyses from continuous core samples collected during drilling, will provide a baseline soil moisture condition with which to compare data collected during the operational phase of the project. Soil moisture data will be evaluated in the context of measured

groundwater levels to establish a relationship between changes in groundwater levels, soil moisture content, and potential for dust mobilization.

A staff gage will be established at the location of the evapotranspiration monitoring station on each of the dry lakes. These staff gages will be established to measure surface water accumulation on the dry lakes from storm runoff. A staff gage will consist of a calibrated measuring rod vertically mounted into the lakebed surface. Surface water effects on soil moisture and shallow groundwater levels will be evaluated to distinguish natural conditions from those attributable to project operations.

METEOROLOGICAL MONITORING AND ANALYSIS

Open-air nephelometers will be installed at Bristol and Cadiz dry lakes to obtain continuous information on dust mobilization and wind speed and direction. The open-air nephelometers measure increases in light-scattering associated with dust storms. These devices will be located based on measured wind direction to match prevailing wind patterns at each dry lake. An automated digital camera will be located at each lakebed to provide periodic photographs as further documentation of the occurrence of dust mobilization from the lake. Analysis of dust mobilization and wind data will indicate whether there is any changing relationship between these two factors (reduced wind speed required for dust mobilization). This dust/wind speed relationship will also be compared with any changes in surface soil moisture of the dry lakebeds and groundwater levels beneath the dry lakebeds.

Three meteorological towers will be installed in the region for a period of at least five years to establish patterns of regional wind speed and direction. Data collection from any or all of the meteorological towers may be extended if warranted. This baseline information will be used in conjunction with lakebed data for wind speed and direction and groundwater levels and soil moisture to determine whether (a) the project could contribute to lakebed dust mobilization and (b) if any project-mobilized lakebed dust could be transported throughout the Mojave Desert region. This review will consider whether existing dust storms on the dry lakebeds occur simultaneously with regional winds that are capable of transporting lakebed dust beyond the localized lakebed areas.

Groundwater, evapotranspiration, air and meteorological monitoring information, together with the results of water resources modeling and statistical analysis of air quality and meteorological data will be used to evaluate, and as appropriate, guide the management of project operations.

ACTION CRITERIA, DECISION MAKING PROCESS AND CORRECTIVE MEASURES

The Management Plan identifies specific quantitative criteria (action criteria) that will "trigger" review to determine whether a measured change is attributable to project operations. It is the intent of the Management Plan to identify changes from natural conditions at monitoring features as early as possible in order to identify and prevent the occurrence of adverse impacts to critical resources as a result of project operations. The action criteria presented in the Management Plan are considered conservative and may be refined as data is collected during project operations.

The action criteria for potential air quality impacts at the dry lakes, is a change of six inches from the pre-operational static groundwater levels in the observation wells on the dry lakebeds. (Section 7.4, Final EIR/EIS, Volume IV) Exceeding the action criteria does not necessarily constitute an impact to a critical resource or a predictor of a potential impact. The water resources models and air quality analysis that have been calibrated with data collected during the pre-operational and operational phases of the project will be used to evaluate whether the change in groundwater level is caused by the project. If so, a further assessment will be made of whether the groundwater change is accompanied by decreases in soil moisture and an adverse change in air quality.

The assessment will consider the groundwater level, soil moisture at the lakebed surface, wind velocity data obtained from weather stations on the dry lakebeds, and dust mobilization data obtained from the instrumentation installed upwind and downwind of the dry lakebeds. Statistical analyses will be performed as described in Sections 6.4.1 and 6.4.2 of the Management Plan to identify any adverse change in air quality. The changes in airborne particulate matter that can be detected by the instrumentation depend on the level in the atmosphere. In very clean air, changes of about 20% to 30% can be detected reliably. Changes as small as 10% can be detected in air with higher particle concentrations. The differences between the downwind and upwind readings from the open-air nephelometers that can be reliably attributed to particulate matter emissions from the dry lakebed surfaces will be established during analyses of the baseline monitoring. An adverse change in air quality is defined as a measurable increase in seasonal dust mobilization, attributable to project operations, based on the analyses of baseline monitoring.

If the assessment determines that the project is causing groundwater level changes that create a potential adverse impact to air quality at a dry lakebed, then corrective measures will be implemented. Such measures include modification of project storage and extraction operations to re-establish the natural hydraulic gradient in and at the margins of the dry lakes. This may be accomplished through: (a) reduction in pumping from project wells, (b) revision of pumping locations within the project wellfield, (c) stoppage of groundwater extraction for a duration necessary to correct the predicted impact, or (d) delivery of Colorado River water, if available, to the project spreading basins.

Metropolitan will inform the Bureau of Land Management of its assessment and any corrective measures that are implemented. BLM will review Metropolitan's assessment with appropriate technical assistance from the Technical Review Panel, as necessary. The BLM will retain the authority to enforce the Management Plan through the terms and conditions of the right-of-way grant(s) for the project.

CLOSURE PLAN

Section 8 of the Management Plan requires preparation and implementation of a Closure Plan. The Closure Plan will be developed no later than halfway through the project term to ensure that no residual effects of project operations will result in adverse impacts to critical resources during or after the post-operational phase. Metropolitan will utilize the groundwater modeling and monitoring data to identify actions to be taken during the operational-phase of the project to ensure that declines in groundwater levels due to project operations will not result in adverse impacts to critical resources, including adverse impacts to air quality in the Mojave Desert region.

Metropolitan will continue monitoring groundwater levels and air quality at the dry lakebeds during the post-operational phase (a minimum period of 10 years). The term of the post-operational phase will be extended if necessary to protect critical resources, including air quality. The other provisions of Management Plan will remain in effect and run concurrently with the term of the post-operational phase.

CONCLUSION

The Cadiz Project has the potential to cause indirect effects to air quality through an increase in the frequency and severity of wind mobilized dust on Bristol and Cadiz dry lakes. This potential is related solely to the lowering of groundwater levels, and would only occur if there is a connection between groundwater levels, surface soil moisture, and wind-mobilized dust. For the protection of air quality against this potential impact, the Management Plan requires the monitoring of groundwater

levels, surface soil moisture, and wind-mobilized dust. Any potential changes in air quality due to project effects on groundwater levels at the dry lakebeds will be identified and avoided through modifications of project operations. For these reasons, it is not anticipated that the Cadiz Project will result in an increase in the mobilization of wind blown dust on Bristol or Cadiz dry lake.