3.5 Master Response on Potential for Generation of Dry Lake Dust

3.5.1 Introduction

Overview

This master response addresses the issues commenters raised about the potential for dust generation on Bristol and Cadiz Dry Lakes. The response includes an overview of the proposed Project's potential to change the existing dust generation conditions at the Dry Lakes and potentially impact air quality. A comparison of Owens Lake to the proposed Project is also discussed.

This master response is organized by the following subtopics:

3.5.2 Dry Lake Dust Generation Potential and Impacts to Air Quality
3.5.3 Dust Generation Comparison to Owens Lake

3.5.2 Dry Lake Dust Generation Potential and Impacts to Air Quality

Summary of Issues Raised by Commenters

Commenters request an expanded discussion of the relationship between groundwater drawdown at Bristol and Cadiz Dry Lakes and the potential to create additional dust and impact air quality. Commenters also request more information about how the reduction of evaporation could impact the production of airborne dust. In addition, commenters express concern that the area could be affected the way Owens Valley was when water was diverted from Owens Lake.

Response

As described in the Draft EIR, the natural salts at the Bristol and Cadiz Dry Lakes form crusts as they dry out that are resistant to wind erosion. This crusty soil does not rely on groundwater to maintain its integrity but, rather, the sodium chloride and calcium chloride that make up the soils tend to bind into a hard crusty surface material that is generally resistant to wind erosion. The chemistry at the Dry Lakes is so saline that it supports active salt production operations.

Bristol and Cadiz Dry Lakes are not and have never been perennial surface water lakes. These dry lakes do not collect standing water year-round. Instead the surface of the Dry Lakes is usually dry throughout the year and forms into a salt crust that is occasionally wetted by precipitation and runon. When there is standing water at the surface, it most frequently occurs after storms. In portions of the Dry Lakes where depth to groundwater is 8 to 12 feet below the surface, capillary action can bring moisture to the surface but the Dry Lakes are not an outlet for groundwater except by evaporation. No part of the proposed Project would collect or interfere with periodic surface water on the Dry Lakes. Neither would it interfere with surface water anywhere else in the Watersheds or change the current surface water conditions (see Draft EIR Vol. 1, Section 4.3.4 Air Quality, pp. 4.3-15 to 4.3-16; Section 4.9.1 Hydrology and Water Quality, pp. 4.9-15 to 4.9-18; and Final EIR Vol. 7, Appendix E2 Fugitive Dust and Effects from Changing Water Table at Bristol and Cadiz Playas).

Relationship of Surface Water and Groundwater to Potential Dust Generation

Commenters expressed concern about how potential changes to surface water and groundwater at the Dry Lakes might increase the generation of dust. Direct precipitation and surface water runon does temporarily collect on the Dry Lake surfaces for short periods of time after rain events. However, as mentioned above, the Bristol and Cadiz Dry Lakes have never been surface water lakes. Any standing water originates from storms and runon, not from the groundwater. In addition, the proposed Project does not include any elements that would collect or interfere with periodic surface water on the Dry Lakes or with surface water anywhere else in the Watersheds. The Project would only extract the groundwater flowing through the Fenner Gap before it migrates to the area beneath the Dry Lakes, becomes highly saline, and evaporates. The nature of the salt crust and the relationships of sources of water to the crust are summarized below.

As described in the Draft EIR, sampling conducted for the dust investigation revealed that the surface crust salts that bind the surface sediments have a unique chemistry and are predominantly composed of sodium, calcium, and chloride (see Draft EIR Vol. 1, Section 4.3.4 Air Quality, pp. 4.3-15 to 4.3-16; Draft EIR Vol. 1, Section 4.9.1 Hydrology and Water Quality, pp. 4.9-15 to 4.9-18; and Final EIR Vol. 7, Appendix E2 Fugitive Dust and Effects from Changing Water Table at Bristol and Cadiz Playas). The presence of calcium chloride mining operations on both Dry Lakes supports this finding. There are very low quantities of the sodium salts of carbonate, bicarbonate, and sulfate, surface sediments that are known to cause severe fugitive dust storms on the Owens Lake playa.

The dominance of chloride at the Bristol and Cadiz playas results in salts that produce salt efflorescence, which more efficiently retains water and maintains the surface crust. During the field investigation, crusty wind resistant soils were observed at the eastern portion of Bristol Dry Lake where groundwater is deep below the surface. While the groundwater comes within 8 to 12 feet below the surface at the center of the Dry Lakes, the depth to groundwater becomes greater moving further out from center. Based on field observations, the eastern portion of the Bristol Dry Lake retains a crusty, wind resistant surface where the depth to groundwater exceeds 65 feet (see Draft EIR Vol. 1, Section 4.3.4 Air Quality, p. 4.3-15). Accordingly, even where the depth of groundwater is too deep to provide water to the surface by capillary action, the salt crust is being maintained. This supports the conclusion that the salt crust is maintained solely by rewetting from annual rainfall and surface sheet flow from surrounding areas. The Project elements would not interfere with the conditions maintaining the crust and would create no more dust than already exists at the Dry Lakes.

Existing Dust Generation Conditions

As discussed in the dust study conducted at the Dry Lakes (Draft EIR Vol. 3/Final EIR Vol. 7, Appendix E2 Fugitive Dust and Effects from Changing Water Table at Bristol and Cadiz Playas [reflecting non-substantive clerical changes]), the playa area around Bristol Dry Lake currently produces fugitive dust due to erosion by sand grains driven by high winds across the playa surface. The sand available on the playa margin is responsible for the magnitude of the dust release. Changes in groundwater levels would have no impact upon the existing conditions. Soils in these marginal areas exhibit higher salt content than soils that dominate the broad alluvial valleys of the Fenner Watershed, but the concentrations are not as high as the crusty soils on the Dry Lakes themselves. As a result, less crusting is observed in these marginal areas, and only a few salt-tolerant plants can survive to anchor soils in place (see below and see **Master Response 3.6** Vegetation). As described in the Draft EIR, and mentioned above, salt-tolerant vegetation is present generally only at the playa margins, consisting of four-wing saltbush, cattle saltbush, and creosote bush. See Draft EIR Vol. 1, Section 4.9.1 Hydrology and Water Quality, pp. 4.9-15 to 4.9-18, and Final EIR Vol. 7, Appendix E2 Fugitive Dust and Effects from Changing Water Table at Bristol and Cadiz Playas. Since depth to groundwater at the edge of the Dry Lakes is greater than 65 feet, increasing with distance from the center of the Dry Lakes, the existing dust generation that is observed from the margins of the Dry Lakes is unaffected by groundwater deep below the surface and would not be affected by changes in groundwater levels from Project operations.

Dust Generation from Potential Loss of Vegetation

Margins of Dry Lakes

Commenters expressed concern that the withdrawal of groundwater might adversely impact vegetation at the margins of the playas and that such loss would result in an increase in the generation of dust. As described in the Draft EIR, the depth to groundwater measured in wells at the margins of Bristol Playa was over 65 feet below ground surface in May of 2011. This depth is well below the reach of the vegetation at the margin, which consists of four-wing saltbush, cattle saltbush, and creosote bush. Of these, only the four-wing saltbush with average root lengths of 13 feet and maximum root length of 25 feet would have the potential to connect with relatively shallow groundwater (see Final EIR Vol. 7, Appendix F4 Vegetation, Groundwater Levels and Potential Impacts from Groundwater Pumping Near Bristol and Cadiz Playas, p. 1). However, given that the depth to groundwater level at the plant-supporting edges of the Dry Lakes is not shallower than 65 feet below the surface, there is at minimum a 40-foot gap between roots and water. Accordingly, the four-wing saltbush does not use and is not dependent upon groundwater at the Dry Lakes. The other plants are not phreatophytic (plants using groundwater) and therefore also do not depend upon the groundwater beneath the Dry Lakes. All of the vegetation at the Dry Lakes margin survives on surface water from precipitation and runon. See Draft EIR Vol. 1, Section 4.9.1 Hydrology and Water Quality, pp. 4.9-15 to 4.9-18; Draft EIR Vol. 1, Section 4.4.3 Biological Resources, pp. 4.4-49 to 4.4-50; Final EIR Vol. 7, Appendix E2: Fugitive Dust and Effects from Changing Water Table at Bristol and Cadiz Playas;

and Final EIR Vol. 7, Appendix F4 Vegetation, Groundwater Levels and Potential Impacts from Groundwater Pumping near Bristol and Cadiz Playas. See also **Master Response 3.6** Vegetation.

Dry Lake Surfaces and Center

Very little plant life is found on the Dry Lake surfaces, except for small linear patches of vegetation that exist due to leaking fresh water pipes supporting mining operations on Bristol Dry Lake. Field and area investigations have confirmed that no vegetation survives in areas where the water table approaches 15 feet below the surface due to the extreme salinity of the surface soils. As a result, the proposed Project would have no impact on the existing vegetation and would not result in any increase in dust resulting from vegetation loss. See **Master Response 3.6** Vegetation.

Cost Analysis for Potential Dust Mitigation

Commenters expressed concern regarding the lack of a cost analysis for dust mitigation. As discussed above, the proposed Project will not change the existing levels of dust in the Cadiz Valley, and there will be no impact to air quality relative to changes in dust generation. Consequently, there is no need to prepare a cost analysis for the mitigation of dust. Further, though the analysis presented in the EIR demonstrates that the Project will not result in any significant air quality impacts related to dust, the Project will be subject to a Groundwater Management Monitoring and Mitigation Plan (GMMMP) to be reviewed by the County in its capacity as a responsible agency. The provisions of the GMMMP concerning Dry Lake dust are not required to mitigate significant impacts under CEQA, but rather intended to satisfy the procedural framework of the Memorandum of Understanding (MOU) entered into by and between Santa Margarita Water District (SMWD), Cadiz Inc., Fenner Valley Mutual Water Company (FVMWC), and the County on May of 2012. The Draft GMMMP has been updated in the Final EIR Vol. 7, Appendix B1 Updated GMMMP. Dust monitoring is included in the Updated GMMMP through the installation of four (4) nephelometers as well as soil sampling. An air quality monitoring plan will be developed for the Project consistent with the conditions set forth in the Updated GMMMP, Chapter 6, Section 6.8 to be reviewed and approved by the County before the Project commences construction. If specified changes in particulate matter or soil composition occur, action criteria would trigger corrective measures to mitigate any potential adverse changes to air quality, including modifications to Project operations. See Final EIR Vol. 7, Appendix B1 Updated GMMMP Chapter 6, Section 6.8. The costs of monitoring and corrective measures would be borne by the Project proponents. In addition, to reinforce implementation of the Updated GMMMP, the monitoring and corrective actions for Dry Lake dust are also included as Mitigation Measure **AQ-5**. See Final EIR Vol. 7, Appendix B1 Updated GMMMP.

3.5.3 Dust Generation Comparison to Owens Lake

Summary of Issues Raised by Commenters

Commenters requested an expanded discussion of the proposed Project's potential to create dust impacts like those experienced on the Owens Lake lakebed.

Response

Commenters expressed concern that the Project activities might cause an increase in dust generation with impacts similar to those at Owens Lake. As discussed in the Final EIR, Vol. 7,Appendix E2 Fugitive Dust and Effects from Changing Water Table at Bristol and Cadiz Playas, Owens Lake is located about 200 miles north-northwest of the Project site. Prior to 1926, it was a perennial surface water lake at the terminus of the Owens River that previously held standing water and even occasionally overflowed to the south. During the late 1800's and early 1900's, the lake depth fluctuated between 7 and 15 meters and covered an area of about 280 square kilometers, depending on drought conditions and the volume of irrigation. Water was first diverted from the Owens River to the Los Angeles Department of Water and Power (LADWP) in 1913, and eventually Owens Lake was dry.

The resultant dry bed of Owens Lake produced enormous amounts of windblown dust due to the desiccation of the lakebed. The lakebed was likely the largest single source of PM10 dust (aerosol particles smaller than 10 microns in aerodynamic diameter) in the United States generating levels that consistently exceeded federal health standards. In addition, the dust contained trace metals, such as arsenic. Unlike the Bristol and Cadiz Dry Lake Playas, the soils on the exposed Owens Lake lakebed are dominated by carbonates, bicarbonates, and sulfates, which are extremely vulnerable to wind erosion.

As described in the Draft EIR, the chemistry of soils and water at the Bristol and Cadiz Dry Lakes is very different than soils and water found at Owens Lake. For millions of years, evaporation of water from the Dry Lakes has resulted in thick deposits of natural salts that are currently harvested by salt production companies. The natural salts at the Bristol and Cadiz Dry Lakes form crusts as they dry out that are resistant to wind erosion. This crusty soil does not rely on groundwater to maintain its integrity, rather the sodium chloride and calcium chloride that make up the soils and water tend to bind into a hard crusty surface material that is generally resistant to wind erosion. By comparison, salt species at Owens Lake are compromised mostly of carbonates, bicarbonates, and sulfates that tend to break apart when dried out, forming loose, fluffy soils that are easily lofted into the air (see Draft EIR Vol. 1, Section 4.3.4 Air Quality, pp. 4.3-15 to 4.3-16; Draft EIR Vol. 1, Section 4.9.1 Hydrology and Water Quality, pp. 4.9-15 to 4.9-18; and Final EIR Vol. 7, Appendix E2 Fugitive Dust and Effects from Changing Water Table at Bristol and Cadiz Playas).

This difference in soil composition is the result of two very different hydrological systems. Bristol and Cadiz Dry Lakes are not and have never been perennial surface water lakes as Owens Lake once was. There are no historic records of year-round standing water at Bristol and Cadiz

Dry Lakes, and the salt crust is not dependent upon depth to groundwater. The salt crust exists where depth to groundwater is in excess of 65 feet. Given this depth, the salt crust surfaces of the Dry Lakes depend solely on surface run on and direct rain for moisture. This is not the case with Owens Lake where, within the last hundred years, human activities emptied the lake and significantly altered historic conditions.