SVMO SECTION 3005 MITIGATION PLAN

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Searles Valley Mineral Operations, Inc.

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Chapter 1 Introduction

Searles Valley Minerals Operations, Inc. (SVMO or Company) submits this mitigation plan under Section 3005 and Section 3800 of the California Fish & Game Code for its ongoing solution mining facilities located in Searles Valley, California. Sections 3005 and 3800 prohibit the taking of birds or mammals, except in connection with mining operations having an approved mitigation plan. These sections will be collectively referred to herein as "Section 3005."[1]

Over the past three years, the California Department of Fish & Game (CDFG or Department) and SVMO have been working together to address unavoidable and incidental take of birds at SVMO's mining facilities. This has included the development and implementation of measures to minimize and avoid impacts to birds.

In summary, birds are found at influent and effluent brine ponds. Influent ponds serve as feedstock reservoirs and concentration ponds for brine delivered to the chemical processing plants. Effluent ponds contain depleted brine flows (natural brine extracted from beneath Searles Lake with commercially valuable chemicals removed) that are being returned to Searles Dry Lakebed for percolation into the underground brine aquifer. These return flows are essential to SVMO's ongoing solution mining operation at Searles Dry Lakebed.

For the interim period during mitigation plan development, SVMO's bird hazing techniques have been evaluated and CDFG has determined the techniques are reasonable and practical methods of avoidance and minimization on an interim basis. This Section 3005 Plan does not seek authorization for the take of species that are endangered, threatened or fully protected. SVMO and CDFG have evaluated the site-specific hazing techniques for two years, and considered the use of alternative technologies, in finally arriving at the current combination of hazing techniques based upon this specific site. SVMO has also implemented a bird rescue program that was evaluated and approved on an interim basis by the CDFG. These measures will minimize the take of birds at Searles Lake. In addition, SVMO put into operation a bird rehydration pond in the vicinity of the facility. After implementing all reasonable measures and reducing the incidental take of birds to the extent feasible, it is estimated that there will be some level of "unavoidable" or residual take of birds as a result of SVMO's on-going solution mining operations on the surface of Searles Dry Lakebed. Therefore, SVMO is proposing offsite mitigation measures, with SVMO to contribute resources to restore bird habitat at Owens Lake, to further mitigate

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[1] Any use of the pronouns "we" or "our" throughout this document refers solely to SVMO, and not to the California Department of Fish & Game.

avian mortality at Searles Lake. Finally, SVMO has implemented a monthly monitoring protocol to aid in evaluating the effectiveness of onsite mitigation measures, as required by Section 3005(b)(3).

Most of the Plan, including the onsite avoidance and mitigation measures, has already been implemented by SVMO. As required by Section 3005, SVMO is submitting this Plan for approval by CDFG. Once the Plan is approved, SVMO will fulfill the commitments contained in it by integrating the plan requirements into its ongoing solution mining operations at Searles Lake.

SVMO has prepared this Mitigation Plan, hereafter termed "Section 3005 Plan," "Mitigation Plan" or "Plan", to address all of the mitigation plan requirements identified in Section 3005. This planning document is divided into six chapters in order to address both the general and highly specific criteria defined in Section 3005. The following is an annotated summary of the chapters contained in this Mitigation Plan.

Chapter 1: Introduction. This chapter includes a statement of content and objectives, with the objectives being based on criteria contained within Section 3005.

Chapter 2: Environmental Setting. The environmental setting and mining operations for SVMO's ongoing mining operations in Searles Valley are described. The Section 3005 Plan is site specific and this chapter establishes the foundation for defining the unique, or site specific, environment for ongoing mining operations that will be used to determine the appropriate avoidance and mitigation measures, as well as establishing a framework for considering offsite mitigation.

Chapter 3: Existing Conditions and Mitigation Efforts. This chapter includes a description and detailed discussion of the current conditions, and the onsite mitigation and avoidance measures implemented by SVMO to minimize impacts to birds.

Chapter 4: SVMO's Searles Lake 3005 Avoidance, Hazing and Bird Rescue Plan and Owens Lake Mitigation Program. In this chapter, a residual number of unavoidable bird deaths is estimated after implementation of SVMO's avoidance, hazing and bird rescue activities. SVMO's proposed offsite mitigation also is described, along with the scaling of aquatic bird "debit" at Searles Lake and the estimated "credit" associated with the offsite mitigation.

Chapter 5: Monitoring Plan. This chapter defines ongoing monitoring to comply with Section 3005 monitoring requirements.

Chapter 6: Conclusions. This chapter contains a summary of the basis for the Mitigation Plan and the requirements of Section 3005.

SVMO's objectives in preparing this Mitigation Plan, as outlined above, are to provide a clear statement of the issues; to identify measures that have been and can be implemented to minimize loss of birds, consistent with maintaining ongoing mining operations;

and to identify measures to mitigate or compensate for the unavoidable or residual take of birds from these ongoing mining operations. SVMO is a responsible company with a long history of providing both jobs and opportunities for the community in Searles Valley. Protecting the environment is part of SVMO's commitment to that community, including operating its business in a manner that protects health and safety and fulfills its stewardship responsibilities to protect native wildlife on Searles Dry Lakebed, particularly birds, in accordance with the requirements of Section 3005.

Chapter 2 Environmental Setting

Introduction

For roughly the past 110 years, solution mining operations have been conducted on Searles Dry Lakebed, located in Searles Valley in the central-southeastern portion of California. Figure 1 illustrates the location of Searles Valley and Searles Dry Lakebed. A number of companies have conducted solution mining, including such firms as American Potash, Kerr-McGee Chemical Corporation and North American Chemical Company. The solution mining operations on Searles Dry Lakebed currently are owned, operated and managed by SVMO.

The following description of the mining operations has been simplified to describe the major components of the solution mining system currently in operation on Searles Dry Lakebed. The solution mining operations currently being carried out in Searles Valley consist of the following activities: (1) extracting mineral laden brines from the horizontal saline bed deposits beneath the Lakebed surface (with total dissolved solids (TDS) concentrations on the order of 350,000 mg/L, or 35% salt); (2) adding brackish water extracted from the brackish groundwater aquifers located adjacent to and south and north of the Lakebed to the process mineral brine, which is then delivered to the chemical processing facilities; (3) processing large volumes of brine to produce chemicals for commercial markets throughout the world, such as soda ash, sodium sulfate, and borax; and (4) returning processed or depleted brine back to the lakebed where portions of it are injected into the subsurface layers through injection wells, and the remainder is placed in percolation ponds and allowed to naturally percolate back into the brine aquifer. Figure 2 illustrates this solution mining process in graphic form.

Approximately 24,455 acre-feet of brine (7,969,200,000 gallons) are pumped annually from Searles Dry Lakebed for processing. With the addition of brackish water from adjacent brackish water aquifers, approximately 33,580 acre-feet (10,942,782,000 gallons) of processed brine is returned to the lakebed annually. The processed brine is delivered to a number of injection wells in pipelines, and to a large percolation pond (about 1,200 to 1,400 acres in size which stores up to ~10,000 acre-feet of brine) in surface channels. Once there, the brine is allowed to percolate into the ground and dissolve additional salts that can then be extracted for additional processing from the brine aquifer by the extraction wells. The cover photo is a recent aerial photo of the Lakebed. (SVMO, January 21, 2003.) Figure 3 is a diagram depicting the same area covered by the aerial photo.

SVMO presently owns or leases more than one-half of the land on Searles Lake and conducts solution mining operations for evaporite minerals that occur below the lake surface (see Figure 4, land ownership map for Searles Dry Lakebed). Brines are pumped from permeable evaporite strata in the upper 400 to 500 feet of the saline deposits and then borax, salt cake, and soda ash are recovered through a series of fractional crystallization processing operations (Rykken, L.E. 1976. Lithium production from Searles Valley, in Vine, J.D., ed., Lithium resources and requirements by the year 2000, U.S. Geological Survey: Professional Paper 1005). Brine is defined as water with a total dissolved solids (TDS) concentration of more than 35,000 milligrams per liter (mg/L) (Winslow, A.G., and L.R. Kister, Jr. 1956. Saline-water resources of Texas. U.S. Geological Survey: Water-Supply Paper 1365). Brine-bearing units in the saline deposits units are recharged by infiltration of fluid from the lake surface, or by injection or drainage of fluid into wells. Principal sources of recharge fluid are concentrated brines from the saline deposits and return flows from plant operations.

Location

Searles Lake is located in the northwestern corner of San Bernardino County, about ten miles east of Kern County and a few miles south of the Inyo County boundary. Globally, it is located at about 35°45" North Latitude and 117°24" West Longitude (see Figure 1 and Figure 5 (the latter graphic illustrates Searles Valley and the surrounding topography)).

In addition, the proposed offsite mitigation area is at Owens Lake. The proposed site is on a portion of the lakebed that is currently dry, adjacent to shoreline saltgrass meadows along the southwest shore of the lakebed playa. Owens Lake is located about 90 miles to the NE of Searles Lake, at the southern end of the Owens Valley. The proposed mitigation habitat will consist of 115 acres of shallow permanent ponds developed as waterfowl habitat. The site is located in Sections 4 and 5, T18S R37E. The site is about 3 miles to the NE of the town of Olancha, about one-half mile to the north of State Highway 190. Figure 6 shows the general Owens Lake area, including the project site and the surrounding vicinity.

Natural Environmental Setting

Much of the information summarized in the following text is derived from a detailed hydrology report of the Searles Valley (Errol L. Montgomery & Associates, Inc. 1989. Hydrogeologic Conditions Searles Lake Area Inyo and San Bernardino Counties California). Searles Valley is located in the southwest part of the Basin and Range geologic province. During the Pleistocene Epoch, Searles Lake was the third or fourth in a chain of lakes which were fed by the Owens River drainage system (see Figure 7). This system drained part of the east flank of the Sierra Nevada, and included Mono Lake, Owens Lake, China Lake, Searles Lake, Panamint Lake, and also Manly Lake, in Death Valley (Smith, G.I., 1979. Subsurface stratigraphy and geochemistry of late Quaternary evaporites, Searles Lake, California. U.S. Geological Survey: Professional Paper 1043). Inflow to, outflow from, and water levels in Searles Lake fluctuated in response to regional climatic changes associated with glacial events during the Pleistocene. Thick sequences

of soluble evaporites were deposited in Searles Lake as lake levels declined during dry cycles (Ibid.)

The climate of Searles Valley currently is hot and arid. Temperatures range from a recorded low of about 6°F to a recorded high of 114°F; average is about 66°F (Moulton, G.F., 1980. Compendium of Searles Lake Operations. Society of Mining Engineers of AIME Transactions, Volume 270). Table 1 provides a summary of temperature data. Most desert wildlife is well-adapted to that climate, and migrating birds pass through the deserts throughout the southwest. Average annual precipitation at the town of Trona for the 29-year period from 1951 to 1980 was 3.95 inches. Table 2 summarizes annual and monthly average precipitation for this period. Nearly all of the rainfall is lost to evaporation. The average annual evaporation rate for freshwater is about 84 inches and the average annual evaporation rate for brine is about 41.5 inches in the Searles Valley area (oral communications, Dr. William F. Ganus, Vice President, Hydrology, Kerr-McGee Chemical Company, 1989).

Table 1
SUMMARY OF TEMPERATURE NORMALS AT TRONA, CALIFORNIA*
1951 - 1980 (°F)

Month	Maximum	Minimum	Mean
January	58.9	31.7	45.3
February	65.4	36.7	51.1
March	71.3	41.5	56.4
April	78.7	48.6	63.7
May	88.2	56.9	72.6
June	98.4	65.2	81.8
July	105.6	72.3	89.0
August	103.4	70.7	87.1
September	96.6	63.0	79.8
October	85.1	51.6	68.4
November	69.6	39.1	54.3
December	59.2	31.1	45.2
Annual	81.7	50.7	66.2
24-hour extremes at China Lake**	114	6	

Source: * National Oceanic and Atmospheric Administration (NOAA), 1982a. Climatography of the United States No. 81 - Monthly Normals of Temperature, Precipitation, Heating and Cooling Degree Days 1951-1981: California.

** California Air Resources Board. 1975. Climate of the Southeast Desert Air Basin.

Table 2
SUMMARY OF PRECIPITATION NORMALS
AT TRONA, CALIFORNIA*
1951 - 1980 (inches)

January	0.87
February	0.71
March	0.51
April	0.19
May	0.10
June	0.09
August	0.18
September	0.22
October	0.15
November	0.40
December	0.35
Annual	3.95
24-hour extremes at China Lake**	1.0 (liquid) 5 (snow)

Source: * National Oceanic and Atmospheric Administration (NOAA), 1982a. Climatography of the United States No. 81 - Monthly Normals of Temperature, Precipitation, Heating and Cooling Degree Days 1951-1981: California.

** California Air Resources Board. 1975. Climate of the Southeast Desert Air Basin.

Geologic Conditions

The stratigraphy of the alluvial deposits unit is characteristic of closed basins (see Figure 8).

Hydrologic Conditions

Groundwater withdrawals from the alluvial deposits aquifer occur chiefly from four well fields currently operated by SVMO. The saline deposit unit daylights in the center of Searles Valley and is comprised of interbedded mud and evaporite strata of quarternary age (see Figure 8). The evaporite minerals chiefly consist of sodium and potassium carbonates, bicarbonates, sulfates, chlorides, and borates and also include halite, trona, hanksite, burkeite, and borax (Smith, G.I., 1979. Subsurface stratigraphy and geochemistry of late Quaternary evaporities, Searles Lake, California. U.S. Geological Survey: Professional Paper 1043). The principal brine-bearing units in the saline deposits are the Upper Salt, the Lower Salt, and the upper part of the Mixed Layer (see Figures 4 and 5). Brine occurs under unconfined conditions in the Upper and Lower Salt, and under confined conditions in the Mixed Layer (Harshbarger and Associates. 1974. Hydrogeological

conditions and analyses of mixed layer brine aquifer in Searles Lake brine field. Preliminary report PR-C303-74-1 for Kerr-McGee Chemical Corporation, Trona, California, July 12, 1974; 1975a. Results of 90-day pump test and well field design for long-term brine production from the Mixed Layer, Searles Lake, California. Report R-C303-75-1, prepared for Kerr-McGee Chemical Corporation, Trona, California, March 15, 1975; 1975b. Conceptual resume of the hydrologic systems in Searles Valley, California. Memorandum report MR-C303-75-2, prepared for Kerr-McGee Chemical Corporation, Trona, California, September 17, 1975). Fluid levels in the Upper Salt and the Lower Salt are partially dependent upon the brine withdrawal and recharge operations of SVMO. However, depth to fluid levels within the Upper Salt layer generally ranges from near land surface to less than 10 feet below land surface. The Upper and Lower Salt are recharged by infiltration of return flows from plant operations onto the lake surface, and by concentrated brines injected into wells.

Traditional fresh surface water does not exist on Searles Dry Lakebed as a natural condition, with the exception of rare runoff events that deliver surface flows from the surrounding mountains and alluvial fans. The Upper Salt brine aquifer does rise to the surface at various locations on the lakebed during wet years, and then retreats during the summer to about 10 feet below the lakebed surface. When the rare surface runoff events occur, any ponded water either percolates into the brine aquifers, or it ponds on the surface and dissolves salt crystals, and eventually evaporates.

The surface brine bodies that presently occur on the lakebed consist primarily of natural and processed brines, which occur in the influent and effluent ponds and connecting channels. The influent brine ponds receive natural brines pumped to the surface for conditioning. Effluent or percolation ponds that are replenished by processed brine flows from SVMO's three chemical processing plants: Westend, Trona and Argus.

The following physical factors define the surface water on the lakebed, which consists of natural and processed brine from chemical processing operations. SVMO wells extract brine from the three brine aquifers identified above, and brackish water from areas to the south, west and north of the dry lakebed. These fluids are delivered to one of the three chemical processing plants operated by SVMO where chemicals are extracted. The processed brine exits the chemical processing plants and is returned to the dry lakebed in one of two ways. Portions of the processed brine from the Argus Plant are delivered in pipelines to injection wells and are then injected back into the various salt layers in support of solution mining operations. All of the Trona Plant partially depleted brine is percolated into the aquifer on the lakebed. Annually, the volume of brine extracted from the lake is about 200,000 acre-feet per year. The process brine and brackish water return flows are about 240,000 acre feet per year, with processing losses made up by groundwater pumped from the well fields described above. The process brine injection constitutes about 30 percent of the total process brine return flows.

The remainder of the process brine is delivered to several percolation ponds through man-made channels that have the appearance of shallow, slow-moving streams. SVMO operates and maintains two channels that transport process brine out to the percolation

ponds located on the dry lakebed. The Westend channel carries about 2,000 gallons per minute from the Westend Plant to the percolation ponds. This man-made channel is a maximum of 10 feet deep, 20 feet wide and is about two miles long.

The second channel is the Argus/Trona effluent line, which transports those depleted process brine flows from the Trona and Argus Plants that are not being directly injected back into the salt layers. This channel handles 10,000 to 12,000 gpm of flow. This artificial channel is approximately 10 feet deep, 40 feet wide and is about one mile long.

The man-made percolation ponds encompass several square miles of the dry lakebed. During the summer, they encompass about 2.25 square miles and in winter about 4.6 square miles. Collectively, the percolation ponds hold approximately 3,000 acre-feet (at any one time) of process brine that gradually percolates back into the underlying brine aquifers. The ponds and channels were excavated, and the material excavated was used to create the berms that form the boundaries of the ponds. The majority of the material contained in the berms consists of the dry lakebed clays described above, but maintenance operations also utilize excavated materials from other locations in Searles Valley to protect and maintain the berms from eroding, or otherwise failing.

Chemical Factors and Characteristics

Surface Water

As previously noted, within the area on Searles Dry Lakebed, the process brine return flows represent a portion of the surface fluids on the lakebed. Periodically, the rising Upper Salt brine aquifer creates ponds on the lakebed. In addition to these surface brines, other fluids surface at isolated discharges on the lakebed edge from septic leach fields and community storm drains, or from ephemeral ponds that result when local precipitation is sufficient to cause surface runoff from the surrounding mountains to reach the lakebed. These waters along portions of the periphery of Searles Dry Lakebed support small populations of birds such as snowy plovers and other small shorebirds. The water quality of the surface brine ponds resembles that of the natural brines, although there are other constituents such as oil, ammonia and other chemicals introduced in connection with the processing. The Waste Discharge Requirements (WDRs) imposed on the Company by the Lahontan Regional Water Quality Control Board are included as Appendix 1 to this document.

The following information regarding process brine return flows is abstracted from Ecological Research Associates (Ecological Research Associates, 1994. Bioenvironmental Monitoring Program for Searles Dry Lake Percolation Pond, December 1992 - February 1994). Based on data provided from monitoring of the depleted brine return flows to the percolation ponds from chemical processing operations at the Westend, Trona and Argus Plants, the concentration of total dissolved solids (TDS) ranges from 200,000 to 300,000 milligrams per liter (mg/L). Salinity measured in the percolation pond over a one-year period showed TDS concentrations ranging from 246,000 to 302,000 mg/L.

Concentrations of dissolved oxygen measured in the pond were always so low as to be below the limit of detection (0.3-0.4 mg/L).

Groundwater

Results of laboratory chemical analyses indicate that most groundwater in Searles Valley contains sodium chloride and little or no calcium or magnesium. The average TDS concentration is about 35,000 mg/L in groundwater from the brackish alluvial deposits aquifer, about 420,000 mg/L in brine from the Upper and Lower Salt, and about 350,000 mg/L in brine from the Mixed Layer.

Biological Factors

Plant life is virtually absent from the lakebed terrain surrounding the ponds. This area, as well as the surrounding region, is part of the Searles Dry Lakebed, and it lacks the typical desert vegetation that is found off the historic lake bottom. There was very little evidence of terrestrial animals in the vicinity of the percolation pond, other than coyote. Ecological Research Associates (ERA) made no direct observations of coyote on the lakebed during its surveys. However, coyote are occasionally seen on the Lakebed by SVMO field personnel and CDFG staff and infrequently remains of small mammals such as kangaroo rats and ground squirrels have been reported.

All of ERA's observations of wildlife in the area were related to birds. While birds were seen in the area and were observed to occasionally land on the percolation pond, they only rested on the water surface for a few minutes, and circled overhead for more than 30 minutes before departing. (ERA 1994. Bioenvironmental Monitoring Program for Searles Dry Lake Percolation Pond, December 1992-February 1994).

Eremico conducted an extensive bird survey at Searles lake from September 2000 through September 2001. Professional biologists conducted weekly or semiweekly, depending upon the time of year, surveys to document birds observed in Searles Valley. In total, 7,459 birds were tallied during the surveys, representing 86 species in 12 major groups. (Eremico Biological Services October 31, 2001. Bird Surveys at Searles Lake, San Bernardino County, California, Final Report.)

In addition to the total bird survey above, SVMO contracted with Eremico to conduct a Snowy Plover survey on Searles lakebed. This survey conducted from April to July, 2001 observed use of portions of the lakebed by Snowy Plovers for breeding and hatching. The survey confirmed that areas of the lakebed near brackish water flows do support Snowy Plover nesting and breeding. These areas are delineated in the final report issued in August, 2001. (Eremico Biological Services, August 20, 2001. Snowy Plover Surveys at Searles Lake, San Bernardino County, California.)

Very little evidence of non-bird wildlife was observed in the vicinity of the brine ponds on the lakebed during the biological surveys. Accordingly, for purposes of Section 3005, the affected wildlife are birds that have been observed in the vicinity of the SVMO facility, and

that appear to temporarily land on the percolation pond or surrounding access waterways. SVMO acknowledges that some birds remain for longer periods due to various physical impairments. (Fry, 3-2002) This is examined further in Chapter 3.

Chapter 3 Existing Conditions

Beginning in late 1999 and early 2000, SVMO, along with regulatory agencies having authority over water and biological resources, notably CDFG, identified as an issue of concern that bird deaths were occurring on the man-made surface channels and ponds. These structures are essential components of the system bringing brine for processing and returning SVMO's processed or depleted brine back to the natural brine aquifer as part of ongoing mining operations in Searles Valley. The cause of these deaths and the number of individuals associated with the bird deaths have been examined in great depth by SVMO staff and consultants and CDFG staff. SVMO and CDFG carried out a cooperative effort that included a year-long bird Survey by Eremico, a ground survey by Tom Dodson & Associates, and bird carcass necropsies to quantify and characterize these bird losses. Based on this cooperative investigation, the annual bird mortality related to SVMO's solution mining activities has been established for purposes of the Section 3005 plan at 486 aquatic birds (waterfowl, shorebirds, and other birds whose mortality is associated with the brines). SVMO believes that a lower number is more accurate, but has stipulated with the CDFG to use the 486 number for purposes of this Section 3005 Plan.

During the period from June 18, 2000 to September 30, 2001, CDFG and SVMO worked together to collect and obtain a variety of pertinent data on the Searles Dry Lakebed, including the number of birds sighted; type of birds sighted; the number of birds rescued and the number of rescued birds to survive. Data collected during this time were used as the bases for developing this 3005 Plan. Tables summarizing the bird data are attached as Appendix 2.

Not all bird species exhibit the same behavior, or are exposed to the process brines in the same manner. For example, the data indicate that puddle ducks and diving ducks may be at greater risk than other bird species. Although the International Bird Rescue Research Center (IBRRC) reported an incident in a previous winter in which 600 pelicans became salt encrusted shortly after landing, IBRRC quickly hazed the birds away and captured and cleaned some portion of them. Generally, however, although these birds may land on the surface brines, they have been observed to quickly leave, apparently finding the brines an unsuitable environment. Similarly, wading birds appear to be at low risk. Avocets, stilts, plovers, and killdeer are commonly observed in the vicinity of the surface brines, but only a few deaths have been recorded for these species.

In addition, where surface water occurs in the California desert, it assists migrating birds flying the inland route of the Pacific Flyway by providing rest stops. This observation applies particularly to those juvenile birds that are joining the migration patterns for the first time. Before mining began in Searles Valley, there were naturally occurring brine pools or ponds on the surface of the lakebed. Dr. Michael Fry, formerly of the University of California at Davis, has provided his expert opinion that the currently observed adverse

desert conditions for birds, including heat, exhaustion, dehydration, predation on weakened individuals and salt toxicity, are likely similar to natural conditions on Searles Dry Lakebed.

There is no available historic data to establish the natural mortality condition as a component of the current "background/baseline mortality" condition at Searles Dry Lakebed. However, Dr. Fry opines that the natural brines that occurred on Searles Dry Lakebed created a "natural mortality condition", defined as the non-quantifiable loss of birds under natural conditions at Searles Dry Lakebed prior to initiation of mining activities.

Since conditions on the lakebed following the initiation of mining activities preclude defining the number of birds lost due to natural mortality, for the purposes of this Mitigation Plan it will be assumed that any individual bird found dead on Searles Dry Lakebed may have been affected by the presence of process brines on the surface of the lakebed. Thus, to be conservative, this Plan does not attempt to take natural mortality into account when compiling bird mortality statistics, even though this assumption does not reflect what would occur naturally.

Development of Measures to Avoid or Reduce Exposure to Risk of Take

One of the regulatory requirements designed to conserve bird populations is a prohibition against the unlawful take of wildlife as specified in California law. This prohibition is codified in Sections 3005 and 3800 of the Fish and Game Code (see Appendix 3). However, just as hunting is authorized by state law as a lawful take of birds, the State has created other exceptions to the unlawful take of birds and mammals, including one for ongoing mining operations. The creation of this mining exception recognizes the unique role and locational characteristics of mining in providing essential commodities for American society. Consequently, the State Legislature enacted legislation that provides for the lawful take of birds and mammals in conjunction with ongoing mining operations. Sections 3005 and 3800 of the California Fish & Game Code address the unavoidable and incidental take of birds or mammals as part of ongoing mining operations, in accordance with a mitigation plan approved by the CDFG.

Since February 2000, SVMO, with guidance from regulatory agencies, primarily CDFG, has implemented a number of measures or actions to avoid or reduce the number of bird deaths on Searles Dry Lakebed. Substantial success has been achieved in reducing the amount of take relative to the number of birds at risk. These measures are summarized in the following discussion. Figure 10 shows the locations on the lakebed where the specific measures have been installed, and/or implemented.

1. <u>The following measures have been taken to reduce the risk due to the permitted release of hydrocarbons as a component of process brines</u>:

    a. WEMCO units have been modified in the chemical plants to reduce the total amount of hydrocarbons being discharged in the process brine.

b. The total length of the process brine return flow channel from Trona and Argus has been reduced by reconfiguring the channel.

c. Deflection booms have been installed in the channel at several locations and vacuum trucks remove any surface hydrocarbons at least once per day. Figure 11 contains a photo that illustrates the deflection booms on the pond.

d. Netting has been installed over the process brine return channel where it flows on the surface (as opposed to pipes) towards the dredge and percolation ponds. Figure 11 also contains a photo that shows the netting installed over the channel.

e. A new oil water separation system has been installed to control hydrocarbons that may occur within the Argus processed brine return flows.

2. Under CDFG guidance, the following hazing (bird frightening) activities have been implemented on the lakebed, particularly in areas adjacent to the dredge and percolation ponds:

a. Twenty-two (22) propane (non-projectile) cannons have been installed around the dredge and percolation ponds. These cannons are activated every few minutes. Figure 12 contains a photo of a cannon on the lakebed.

b. Eight stations, adjacent to the dredge, percolation and conditioning ponds, have been established with continual tape-loops of bird of prey calls to deter migratory bird species. Figure 12 contains a photo of a prey call station on a power pole adjacent to the percolation pond.

c. Mylar strips with bright, reflectant colors/patterns have been installed over approximately 200 acres as a method of hazing birds over the entire dredge pond and on the perimeter and over portions of the percolation pond. Figure 13 contains a photo showing mylar hazing lines across a portion of the percolation pond.

d. Hazing personnel are on standby during the daylight hours to chase and haze any birds that enter the pond areas with the goal of causing them to leave the pond area.

3. The following rescue operations have been implemented on the lakebed:

a. SVMO personnel collect live aquatic birds on the percolation ponds for removal and rehabilitation purposes and collect any dead bird carcasses discovered each day as part of ongoing monitoring and data collection. Figure 13 contains a photo of a crew and hazing boat on the pond.

b. Live aquatic birds collected on the ponds are delivered to a field facility where they are treated and rehabilitated in accordance with, and employing methods developed by, the IBRRC and approved by CDFG. An SVMO field lab used by IBRRC for bird rescue is shown in Figure 14. The SVMO Bird Rescue Modular Building is described in more detail in Appendix 4.

c. At present, SVMO utilizes the IBRRC staff to rehabilitate the birds delivered by SVMO staff. IBRRC treats the birds by rehydrating them, washing the salt from their feathers if required, and caring for the birds until they can be shipped to a final rehabilitation location where they are released. SVMO believes that there is no other manufacturing facility in the United States or in the world that utilizes this extensive process to this intensity. This process was implemented by SVMO as an interim measure to respond to the then unknown causes of bird mortality until additional information could be obtained and this Section 3005 Plan developed.

d. Based on the most recent rehabilitation efforts, approximately 75% of the rescued birds are being saved and released due to the treatment for salt toxicity. SVMO's efforts to control exposure to hydrocarbons appear to have been successful, as none of the birds presently being rescued exhibit exposure to hydrocarbons and rescue operations are totally focused on salt toxicity issues. Based on the success of the rehabilitation effort, SVMO infers that salt toxicity is the contributing cause of the current loss of birds for purposes of this Section 3005 Plan, and this focused rehabilitation approach is the basis for current bird rescue efforts. Numerous bird autopsies have confirmed that salt toxicity and encrustation are significant causes of bird mortality. SVMO believes other natural causes such as heat, exhaustion, dehydration, etc. contribute to Searles Valley bird mortality. CDFG concurs that oil (hydrocarbon materials used as part of the solution mining and processing operations) is not presently a significant cause of bird injury at Searles Lake.

e. Finally, a lined artificial surface pond of brackish water has been installed to provide birds with an alternative location to land and to rest, clean plumage and rehydrate. This pond was completed in May 2001 and was immediately occupied by wading birds, particularly avocets, as well as some ducks. It has proven to be suitable for nesting by avocet, as several pairs have established territories, laid eggs and successfully fledged young. Figure 15 contains a photo of the surface pond.

Effectiveness of Current Avoidance and Minimization Measures

The total combination of current avoidance and minimization measures has been installed incrementally over the past four years in a site-specific test of the effectiveness of various methods, and with the cooperation of the CDFG. Mitigation efforts began by installation of equipment and implementing design and construction activities to reduce hydrocarbons.

It progressed with the installation of propane cannons and mylar strips to haze birds on the dredge and percolation ponds and the installation of netting over the Argus and Trona Channels. The most recent measures to reduce bird mortality include personnel hazing birds on the dredge and percolation ponds, rescue and treatment of captured birds until those that can be are returned to health, and the installation of the rehydration pond that is filled with brackish water (about 25,000 mg/l TDS) from SVMO operating wells located in the South Brackish Well Field.

SVMO believes, based upon real-world testing onsite, that these measures represent the consideration and use of Best Available Technology (BAT) to reduce and/or avoid bird mortality on a site-specific basis as required by Section 3005(b)(1). These measures, based upon over four years of implementation, field testing, and monitoring, avoid impacts to birds and reduce avian injury and mortality.

SVMO also believes that the data presented in this Mitigation Plan demonstrate an overall reduction in take of avian species required by Section 3005(b)(3). It is difficult to establish a baseline from which take can be measured, however, as no site-specific data were kept prior to the initiation of the avoidance measures described herein. Moreover, since other conditions, including seasonal, environmental and ecological conditions, impact the level of take, such data would have to have been collected for a number of years in order to determine how many birds would have been taken but for the hazing and other mitigation measures that are now being implemented. As noted elsewhere in the Plan, however, such data will be maintained in future years. These measures have been proven safe and effective to reduce the level of take, as demonstrated from their historical use at other sites, observation of their use at the present site, and references in the literature. For example, some birds have been observed landing on the rehydration pond and flying away which suggests that an overall reduction in take is being achieved.

The following measures were also considered by SVMO as possible options to further avoid take of birds at Searles Lake. SVMO consulted with biology experts at CDFG and the University of California at Davis, studied the avoidance measures used at other facilities in Wyoming, and obtained the assistance of these experts in evaluating a wide range of potential measures. Those measures discussed below were not ultimately selected based upon the lack of proven effectiveness or some deficiency that made the measure inappropriate on a site-specific basis.

1. Strobe lights or laser sweeps at night over the dredge and percolation ponds to prevent birds from landing. In fact, night lighting could attract migrating birds, bats and other wildlife that may become exposed to brine areas.

2. Installation of buoys on the ponds with light and sounds to create more hazing of birds across the whole area of the ponds. SVMO evaluated such techniques, but because of the large surface areas of the ponds, could not reasonably project any additional effectiveness from such techniques as applied to this particular site. Buoys also pose unusual operational and maintenance costs because of the

corrosive effect of the brine and the degradation that could be expected after long periods of use.

3. Constructing small islands to be used to extend mylar over more of the pond area for hazing purposes. Because of the large surface areas of the ponds, SVMO could not reasonably project any additional effectiveness from such techniques as applied to this particular site. However, SVMO used the knowledge it obtained from its earlier testing to implement the extensive use of mylar at the ponds and the channels where effective as a hazing technique. Island and dike creation in the ponds also poses major conflicts with ongoing mining operations and, equally important, could create access (water edge habitat) for wading birds and thereby an increased potential wading bird loss.

4. Renting raptors to hunt the area during major use periods (falconry). SVMO considered and rejected this method because of the unpredictable and potentially adverse impacts from introducing a new predator into the subject area. Released raptors may prey on species that are not at risk or may harm themselves by stooping birds in the brine.

5. Putting in dikes in the ponds and stringing netting over the whole pond area. SVMO evaluated such techniques, but the cost benefit analysis was strongly negative. The cost to fill and net the ponds would be approximately $25,000 per acre based on the approximate $250,000 cost to net about 10 acres of channel. The estimated cost to net up to 1,400 acres of pond area would be greater than $35,000,000, without considering the installation of islands or pilings with which to anchor the netting, and excluding the future operation and maintenance costs. Moreover, the effectiveness of such techniques is outweighed by projected regular system failures, including tears or collapses in the netting system, and the adverse impacts of birds becoming entangled or otherwise injured by the netting system.

6. Injection of greater volumes of process brine in comparison to the present condition. SVMO considered and rejected this alternative as technically infeasible. Reinjection of brine is limited by the carrying capacity of the underground structures that support the topography and geologic formations that make solution mining feasible, and safe for the environment.

SVMO has worked with CDFG to develop, test and evaluate the avoidance measures identified in the Plan, and SVMO and CDFG have agreed to their continued operation. SVMO has worked with CDFG to develop, test, and evaluate the avoidance measures identified in the Plan, and SVMO and CDFG have agreed to their continued operation. This Mitigation Program was designed in cooperation with CDFG to fulfill the Section 3005 "reasonableness" criteria, represent a "feasible" level of avoidable take, and to maximize realistic mitigation options while minimizing take of birds and other wildlife.

However, additional mitigation may be proposed if the take observed at the subject area, despite the measures described on pages 14 through 16 of this Plan, is increasing over

a significant period of time. Accordingly, after five years from the effective date of this Plan, the annual take of birds in hand for that five-year period shall be averaged. To account for variables beyond the control of SVMO, if the average take for the five-year period exceeds 115% of 210 (= 241) birds in hand per year, the Department may require additional mitigation in the form of an additional payment by SVMO to the Department. This payment for additional mitigation shall be assessed at $218 per bird, for each such bird in hand taken in excess of 241 such birds per year for the five-year period. SVMO shall perform the same or greater level of search activity as performed in 2002 for each succeeding year. The five-year period will be computed using calendar years and shall be calculated for each year after five years from the effective date of this agreement. Notwithstanding the preceding sentence, if the 15% limitation is exceeded for any five-year period as calculated above, and the Department requires additional mitigation under this paragraph, the next five-year time period to be calculated will commence immediately after those years, so as to exclude those years for which SVMO has already made an extra mitigation payment under this paragraph.

In addition to the $218 mitigation payment above, pursuant to FGC 3005(b)(4), "the department shall monitor and evaluate implementation of the mitigation plan by the mine operator and require modification of the plan or other remedial actions to be taken if the overall reduction in take of avian or mammal species required pursuant to paragraph (3) is not being achieved".

Chapter 4 SVMO's Searles Lake 3005 Avoidance, Hazing and Bird Rescue Plan and Owens Lake Mitigation Program

Searles Lake Avoidance Program

SVMO will implement the onsite mitigation measures developed in cooperation with the CDFG, as follows:

1. Maintain and operate up to 22 propane cannons

SVMO will operate 22 propane cannons around the dredge and percolation ponds. SVMO will map the locations of these cannons as part of the Mitigation Plan. The cannons will be maintained in good operating order. The cannon locations may change from time to time in response to changes in pond configurations or bird use patterns. The locations will be optimized for maximum effectiveness.

2. Conserve and Maintain Netting at Existing Netted Areas

To minimize bird use of the existing Argus and Trona processed brine discharge channels, SVMO has installed netting over portions of the channels. SVMO staff and consultants will monitor the netting on a weekly basis, maintain the netting where gaps appear, and, when necessary, replace the netting to ensure its effectiveness in deterring birds. Inspection

reports will be maintained for CDFG inspection and an annual field inspection will be conducted by SVMO of the netted area to verify their adequacy and continued effectiveness in precluding access by birds.

3. Maintain the Mylar and Screecher Hazing System

An SVMO field crew will maintain the existing mylar hazing system by replacing lost or damaged mylar strips along the existing wire distribution system. Regular inspections will be conducted and new wire and mylar strips will be replaced as required. The mylar system will be mapped to ensure that it is maintained in good working condition. The screecher hazing system will be maintained in good working order.

4. Meet Future Hydrocarbon Limits in the Process Brine

As previously indicated, SVMO will comply with the modified Waste Discharge Requirements (WDRs) adopted for the process brine return flows. The discharge by SVMO of partially depleted brine to the Searles Dry Lake mineral resource is regulated by the Lahontan Regional Water Quality Control Board pursuant to three Waste Discharge Requirement (WDR) orders. They are Argus 6-00-52 with amendment; Trona 6-00-53 with amendment; and Westend 6-00-54 with amendment. Copies of these WDR orders are included in Appendix 1.

These WDRs allow discharge of native materials to the lake and trace amounts of non-native materials in quantities that do not impact the beneficial uses of the waters of the State in Searles Valley. Regular sampling and analysis of the discharge streams is required for constituents listed in the WDRs.

Human Hazing Activities

SVMO shall conduct hazing on a daily basis on the dredge and percolation ponds. This will include all equipment required to maintain daily hazing operations on the ponds. All personnel will be properly trained (based upon a training program agreed to by CDFG) and will carry out the following duties while on the lakebed:

a. Attempt to haze birds from the ponds.

b. Monitor the propane cannons, screeching devices and other avoidance measures and maintain them in good working order.

c. Monitor pond conditions and notify SVMO management of hazards or problems on the ponds that could contribute to additional take of birds.

d. Maintain daily logs of activities that shall be available for inspection by CDFG upon request.

Searles Lake Bird Rescue Program

a. SVMO personnel will conduct or contract for active bird rescue for birds identified during daily inspection of the site. The inspections will take place during normal business hours and occupy a duration of at least one hour per inspection, and cover the geography including the SVMO effluent brine pond. The extent of the total area to be inspected cannot be covered in each daily inspection. Each day will focus on any identified trouble areas and then progress to additional areas on a rolling basis. Daily logs will be retained identifying the area inspected. The total area subject to inspection can be described as the areas adjacent to the ponds and channels depicted in Figure 10. It can be expected that within one week's time all areas will be inspected.

b. SVMO will contract on a yearly basis with a licensed wildlife/bird "Rehabilitator" holding current state and federal permits, to care for, rehabilitate and release rehabilitated birds. The SVMO Bird Rescue Technician will receive training from the licensed Rehabilitator, and will be headquartered at the SVMO bird rescue facility on Searles Dry Lake. To insure daily care, the staff will consist of two technicians. The licensed Rehabilitator will be responsible for maintaining current permits, oversight of the bird rescue and rehabilitation program, training and supervision of SVMO bird rescue technicians, and monitoring bird visitation at the SVMO lake facilities.

c. If an apparently stressed bird is detected, SVMO field personnel will attempt to capture that bird and transport it to the SVMO bird rescue facility. All birds will be logged in, given case numbers, treated, fed, rehabilitated, and released per protocol(s) prepared by a qualified bird rehabilitator and approved by the CDFG. A copy of the current protocol prepared by IBRRC entitled Trona 3 Bird protocols is attached as Appendix 5.

d. For a seasonal period of increased bird sightings (a minimum of twelve to fifteen continuous weeks per year), SVMO will supplement its rescue team by contracting for the onsite presence of a CDFG approved rehabilitator, such as IBRRC who will assume primacy during those periods for conducting bird rescue operations. During the time of year, if any, when the rehabilitator is not at the facilities, SVMO personnel trained to use protocols developed and/or approved by the rehabilitator will conduct the bird rescue operations. The seasonal period will initially be based upon the study conducted by Eremico Biological Services (September 2000 - September 2001). Based upon observations in the following years, CDFG and SVMO may agree to shift the seasonal period to a different time period.

e. All birds shall be treated humanely, and rehabilitated whenever possible. Each bird will be examined and its condition assessed before rehabilitation is begun. If a bird is suffering from severe neurological complications from heat stress or dehydration, and unlikely to be successfully rehabilitated, the bird will be humanely euthanized pursuant to a CDFG approved protocol. Birds with severe trauma, broken limbs, or

injured eyes also will be euthanized by the approved protocol and the condition responsible for the euthanasia will be entered on the intake form. Birds that do not survive will be documented by logging them in with an identification number, including the date collected, the location found, the species, and any relevant comments. A photograph of each bird will be taken for CDFG's records.

f. SVMO will provide a monthly report to the CDFG indicating the number of birds recovered alive and dead, and its success rate in rehabilitating birds.

Searles Lake Rehydration Pond

SVMO will maintain the pond as a source of brackish water for birds to use as an alternative to the percolation ponds. This provides a non-interventional opportunity for birds to bathe, preen with non-toxic water, rehydrate and rest prior to departure. SVMO will maintain the facility in the following manner:

a. SVMO shall supply the rehydration pond with sufficient brackish water and monitor the water quality in the pond.

Owens Lake Mitigation/Compensation Program

Section 3005 requires the inclusion of "reasonable and practicable methods of mitigating the unavoidable take of birds and mammals." For purposes of this Section 3005 Plan, SVMO and CDFG have agreed that the unavoidable take will be 486 aquatic birds based upon estimates compiled from past observations and assumptions about undiscovered take. SVMO proposes to supplement its onsite mitigation program, bird rescue program and rehydration pond program with offsite mitigation.

Section 3005(b)(1) permits the mine operator to provide for offsite mitigation to compensate for unavoidable take of birds. After extensive work by the parties to develop such an offsite mitigation program, CDFG and SVMO agreed to implement an innovative mitigation compensation program at Owens Lake in conjunction with private landowners James Barger and Anthony Haralambos ("Owners"). The parties have identified specific measures that can be implemented at Owens Lake to create waterfowl habitat with sufficient area and productivity to assist in mitigating the unavoidable take of birds. When implemented, the offsite mitigation program, supported by a contribution by SVMO, is projected to fully compensate for the unavoidable take at Searles Dry Lakebed.

To arrive at appropriate mitigation, please note that the injury at Searles Lake was converted to an estimated loss in bird days. Correspondingly, the offset/compensation at Owens Lake was calculated as the gain in bird days. The gain in bird days was derived from a Resource Equivalency Analysis (REA) using existing information about the kinds of birds that frequent marsh areas associated with Owens Lake, and that are found elsewhere in the Owens Valley.

Owens Lake has been largely dry since 1924, when the waters of the Owens River were diverted to Los Angeles via the newly constructed Los Angeles Aqueduct. There are still some wetland and marsh areas associated with the Owens Lake at the Delta at the north edge of the lake, and in isolated marshes associated with springs principally on the west and northeast edges of the lake. There is a considerable amount of groundwater under the playa, however, and the presence of numerous springs attests to artesian pressure.

In anticipation of exploiting these groundwater resources, the Owners purchased 292 acres of land on and adjacent to the Owens Lake playa for the purpose of developing a duck club. They worked with CDFG to acquire the necessary permits for the construction of up to 150 acres of ponds on the playa portion of the property, with the permit including the development of up to three wells, and the improvement of the existing road that provided access to the property. When SVMO approached these owners about a cooperative agreement that would permit the site to function as compensatory mitigation under this 3005 Plan, an artesian well had already been drilled, and pond construction was approximately one-third completed. Constraints in financial resources had halted the development of the property for an indefinite period of time. The owners were therefore receptive to entering into an agreement with SVMO and CDFG that would permit the property, developed according to the conditions of the existing permit, to function as offsite mitigation for SVMO.

SVMO has agreed with CDFG that SVMO will contribute to the Owens Lake waterfowl habitat creation project as follows:

1. Provide CDFG with $300,000 within one year of approval of the Section 3005 Plan.

2. The Lahontan Regional Water Quality Control Board will provide up to $250,000 from its separate agreement with SVMO to support the Owens Lake project, or similar project.

3. Contribute up to $10,000 per year toward operation and maintenance costs for pumping and delivery of water.

The Owners have been developing a waterfowl habitat project that has been partially constructed at Owens Lake. Meetings with CDFG and the Owners have identified the following specific actions/facilities where SVMO's contribution will be used to permit full development of the project at Owens Lake. The following specific actions/facilities are listed in order of priority for funding by CDFG at Owens Lake. The specific actions and facilities may include:

1. Drilling sufficient wells (1-2 more) to assure adequate water production for the project. The wells have already been permitted, and one well has been drilled.
2. Equip the wells with diesel pumps if there is not sufficient artesian flow.
3. Improve the existing road to the project from Route 190 by introducing a gravel cap and some compaction to accommodate heavy equipment to fully develop the project.

4. Complete the construction of the two large ponds as designed.
5. Install pipelines, valves, and any other associated water delivery infrastructure.
6. Place and operate a re-circulation pump for discharge and reclamation of water from the drains for soil reclamation and return of usable water to the ponds.
7. Plant the ponds with appropriate emergent aquatic vegetation, saltgrass stabilization on the berms, and trees and shrubs for habitat improvement.

Scaling Bird Benefits Associated with Owens Lake

Introduction

Based on historic wetland ecosystem values at Owens Lake, CDFG and SVMO are confident that sufficient habitat value will be created by the mitigation activities outlined above. To analyze the offsite mitigation at Owens Lake to mitigate the unavoidable take at Searles Lake, SVMO conducted the following evaluation of past aquatic-bird presence and activity and prepared an estimate of future aquatic-bird presence and activity associated with the proposed pond creation at Owens Lake.

The purpose of this section is to describe the ecological (bird) benefits associated with the proposed activities at Owens Lake. The types of benefits produced are intended to have a biological and geographical nexus to the natural resource and the services that are estimated to have been lost at Searles Lake. SVMO has consulted with CDFG, and CDFG has found that the scaling approach is acceptable.

For purposes of the Section 3005 Plan, SVMO and the CDFG agree that a Resource Equivalency Analysis (REA) provides a usable and understandable framework for the quantification of bird service losses and gains. REA attempts to quantify the extent of damage inflicted on a receptor, in this case birds, and the resulting loss of services. Conventionally, any damage or loss is measured in area years of habitat or animal years. CDFG and SVMO agree that the use of 'Bird-Use Days' will provide the most suitable common metric for estimating bird loss and gain.

After calculating the loss of services or natural resources, the goal is then to determine the size, and other parameters associated with a restoration project that would result in a gain equal to the lost environmental services or natural resources. The proposed project at Owens Lake will provide the same environmental (bird) services and be in the same approximate general geographical area as the services lost. In determining the appropriate size for a project, the preference for present services over future benefits is accounted for through discounting. (For a full description of the REA process, definitions and discounting, see National Oceanographic and Atmospheric Administration, 1995. Damage Assessment and Restoration Program (revised 1996), Habitat Equivalency Analysis Policy and technical Paper Series, No. 95-1.)

The following section describes the assumptions and calculations associated with the REA. The REA process consists of two distinct phases. Phase 1 involves the calculation of lost

services, or "debit," for Searles Lake. The calculation of lost bird services is discounted into perpetuity using the following equation:

Total Bird Loss into Perpetuity = D/R

Where D = annual bird loss (in days) and R = a discount rate. The discount rate (conventionally 3%) provides an estimate of the total bird loss into perpetuity. The parameters used by the model to calculate the "debit" term include:

1. Number of birds lost per year
2. Mean lifespan for each group of birds
3. 3% Discount rate

Phase 2 involves the calculation of the estimated gain in services, or "credit," associated with the proposed activities at Owens Lake. The present day value of the total bird service gain is calculated as follows:

Total Bird Gain into Perpetuity = C/R

Where C = annual bird gain (in days) and R = an annual discount rate. The parameters used to calculate the "credit" include:

1. Acreage of proposed project at Owens Lake
2. Estimated Mean Number of Birds Per Acre at Owens Lake
3. 3% Discount Rate
4. Percentage of Year that Birds are Present at Owens Lake

Debit Assumptions

The future annual loss of aquatic birds has been previously estimated to be 486. We have not attempted to look at seasonal variation in bird loss and have simply taken the annual loss of aquatic birds. The assessment does not consider the cause of death and uses the 486 figure without interpretation.

Debit Analysis

In conjunction with representatives from CDFG, the debit calculation for Searles Lake has been estimated as the annual loss of ducks plus the annual loss of grebes, estimated to be 445 and 41 respectively (Table 3). The annual loss of ducks and grebes has been discounted at 3% to obtain the total number of discounted lost ducks and grebes estimated at 14,833 and 1,367, respectively. To estimate the number of lost years for ducks and grebes, we have multiplied the totals for each group by the corresponding mean life expectancy (ducks = 2.2 years; grebes = 2.6 years) to obtain a total of 36,187 lost bird years (Table 4). We then multiplied the lost bird years by 365 to obtain a total (discounted) lost bird-days of 13,208,133.

Table 3
SEARLES LAKE DEBIT CALCULATION IN BIRD-DAYS

Bird Groups	Bird Year Multiplier (Lifespan)
Ducks	2.2*
Grebes	2.6*

Note: * Our definition of ducks includes a few non-duck species. Please refer to Footnote #2, page 24.

Table 4
ESTIMATED DEBIT (BIRD LOSS) EXPRESSED AS BIRD YEARS AND BIRD DAYS FOR DUCKS AND GREBES FOR EACH YEAR 1998-2001 AND 2002 INTO PERPETUITY

Year	Birds Lost Ducks	Birds Lost Grebes	Total Lost (Discounted)		Total Lost Bird-Years	
			Ducks	Grebes	Ducks	Grebes
1998	445	41	501	46	1,102	120
1999	445	41	486	45	1,070	116
2000	445	41	472	43	1,039	113
2001	445	41	458	42	1,008	110
2002 into perpetuity	445	41	14,833	1,367	32,633	3,553
				Total Lost Bird-Years Total Lost Bird-Days		36,187 13,208,133

Anticipated Benefits Associated with Owens Lake

Owens Lake is situated within the Owens Valley, which provides a convenient flyway for migrating birds between the eastern Sierras and the Inyo mountains. This unique region contains five of the six major habitats found in California and is within the Pacific Flyway. The Eastern Sierra Audubon Society list the Owens Lake area as a birding "hotspot" and indicate that the area is an important migratory flyway and particularly attractive to waterfowl and shorebirds. The Owens Valley Committee (OVC) is a non-profit citizen action group dedicated to protecting the natural resources of the Owens Valley[2]. The OVC estimate that 241 species of birds use Owens valley and suggest that these birds are

[2] http://www.ovcweb.org/About%20OVC/AboutOVC.html

dominated by grebes, pelicans, cormorant, bitterns, herons, egret and a broad variety of waterfowl[3]. The OVC bird list includes over 25 species of waterfowl that spend some of their time within the valley and at least 25 shorebird species that either breed in the area (e.g., western snowy plover, American Avocet), winter or pass through on migration.

The entire area is incorporated within the Pacific Flyway and thus any existing or proposed water body is likely to provide resting, foraging and other benefits to migratory and resident aquatic bird species. Indeed, in a region with few permanent sources of water the provision of ponds is likely to be of significant benefit to birds particularly during the winter and the spring and fall migratory periods. The old adage "build it and they will come" is probably particularly true for an arid region where permanent sources of water are relatively few and far between. Some support for this notion is demonstrated by the diversity and relative abundance of bird species at the few existing ponded areas that have been identified by the Eastern Sierra Audubon Society as bird hotspots.

The creation of two (total 117.5 acre) ponds and the proposed aquatic and terrestrial (fringe) vegetation would also facilitate an 'edge effect' and provide conditions suitable for other groups of birds such as shorebirds as well as some passerine species. As the area matures the vegetation growth associated with the ponded areas would benefit a broader range of species and thereby provide suitable conditions for species associated with different ecological conditions/habitats. Thus, the reliability associated with permanent water at these Owens Lake ponds would also benefit other wildlife species such that the net environmental benefit of the project would extend beyond the target species associated with Searles Lake. Additional benefits such as human-use (e.g., bird watching) would also be provided.

Credit Analysis: Bird-Use Days

Bird species lists obtained for Searles Lake were compared with bird lists obtained from the OVC, the Kern River Audubon Society, and county information. The bird lists for Searles Lake and Owens valley area are remarkably similar and support the contention that Searles Valley and Owens Lake are both on the same migratory bird flyway and hence have a similar bird species composition. We have restricted our credit analysis to only those species recorded both at Searles Lake and Owens Lake. However, there were some species that had been observed at Owens Lake and nearby areas that had not been observed at Searles Lake. Consequently, our credit calculation, in our view, under-estimates the full potential of Owens Lake. The input values for the credit calculation are provided in Table 5 and the species common to both lakes are listed in Table 6. Due to the uncertainties associated with the number of species, breeding pairs and nesting success at the existing ponds we have not attempted to develop a credit analysis of the benefits associated with habitat created for these birds. Consequently, we consider the 'breeding bird credits' to be a real but unquantified contribution to the project benefits. Based on an assessment of available bird data for the region, and particularly the OVC bird

[3] http://www.ovcweb.org/OwensValley/OwensLakebirdlist.html

list, that waterfowl most likely to breed at the created ponds will include, but not be limited to, gadwall, mallard, Canada goose, and cinnamon teal. Other water-associated species that are likely to breed include American coot, western snowy plover, Virginia's rail, American Avocet, Wilson's phalarope and other shorebird species.

SVMO intends to build ponds that maximize the extent of suitable pond conditions on the lake. Studies of Owens Lake commissioned by SVMO has indicated that the soils and other conditions (e.g., the configuration of the pond dikes, water depths, etc.) are suitable to create and maintain two ponds, one of 45.5 acres and a larger 72 acre pond, and thus provide a total pond acreage of 117.5 acres.

We have used an estimated number of birds per acre (11.5) that was a derived mean from two outside sources provided by CDFG. If we then multiply the estimated birds per acre (11.5) by the number of acres (117.5), we obtain 1,351.25 birds. The discount rate of 3% is a standard figure and is the percentage conventionally used in this type of analysis.

In Table 6, we list the species and number of birds injured or collected at Searles Lake in 2001. We then calculated the percentage of each species to the total number (462) of birds collected. We have assumed that these percentages represent the proportion of each species present at both Searles Lake and Owens Lake. Using available information on bird species composition and seasonal attendance, we were able to gauge the proportion of the year spent by each species at Owens Lake and from this number calculate the estimated number of bird days per year (Table 6). The sum of the total number of bird days for each species in one year at Owens Lake was calculated by multiplying the estimated number of birds present by the probable number of bird days. We obtained a total of 462,721 bird days per year. By dividing this number by the discount (3%), we estimate 15,424,041 bird-use days would be gained into perpetuity.

Table 5
INPUT VALUES FOR CREDIT REA[4]

Acres	Birds / Acre	Discount Rate	Estimated Total Birds
117.5	11.5	3%	1,351.25

[4] Sources fo bird seasonality data include: Audubon Christmas Bird Counts for Bishop, Kern Valley, OVC bird list, Birders Guide to Southern California Birds. H. Holt 1990, ABA. Discussions with local ornithologists.

Table 6
BIRD SPECIES COMPOSITION FOR BOTH SEARLES AND OWENS LAKE

#	Species	Water Column Activity	Searles 2001 Injury	% Birds Injured at Searles Lake	Estimated Period of Attendance	Owens Lake % Year User Days	Owens Lakes Days Use Per Year	Total Owens Lake Bird-Use Day/Year
1	Eared Grebe	DIV	19	4.4	W,Sp	50.0%	182.50	7,454
2	Pied-billed Grebe	DIV	18	4.2	W,Sp,S,F	100.0%	365.00	14,122
3	Grebes spp.	DIV	8	1.9	W,Sp	100.0%	365.00	6,277
4	California gull	SUR	1	0.2	F,W	50.0%	182.50	392
5	Ring-billed gull	SUR	1	0.2	F,W	50.0%	182.50	392
6	DC cormorant	DIV	5	1.2	F,W	50.0%	182.50	1,961
7	American Coot	SUR	70	16.4	W,Sp,S,F	100.0%	365.00	54,921
8	American wigeon	DAB	7	1.6	F,W	50.0%	182.50	2,746
9	Canada goose	SUR	1	0.2	F,W	50.0%	182.50	392
10	Gadwell	DAB	14	3.3	F,W	50.0%	182.50	5,492
11	Mallard	DAB	85	19.9	F,W	100.0%	365.00	66,689
12	Northern Shoveler	SUR	13	3.0	F,W	50.0%	182.50	5,100
13	Northern Pintail	DAB	4	0.9	F,W	50.0%	182.50	1,569
14	Green-Winged Teal	DAB	4	0.9	F,W	50.0%	182.50	1,569
15	Blue-Winged Teal	SUR	6	1.4	F,W	50.0%	182.50	2,354
16	Cinnamon Teal	SUR	7	1.6	F,W	50.0%	182.50	2,746
17	Teal spp.	DIV	14	3.3	F,W	50.0%	182.50	5,492
18	Bufflehead	DIV	13	3.0	F,W	50.0%	182.50	5,100
19	Scaup spp.	DIV	28	6.5	W,Sp,F	75.0%	273.75	16,476
20	Duck spp.	DAB	56	13.1	W,Sp,S,F	100.0%	365.00	43,936
21	Common Golden Eye	DIV	1	0.2	F,W	50.0%	182.50	392
22	Common Merg	DIV	1	0.2	F,W	50.0%	182.50	392
23	Merganser spp.	DIV	1	0.2	W,Sp,S,F	100.0%	365.00	785
24	Redhead	DIV	38	8.9	W,Sp,S,F	100.0%	365.00	29,814
25	Ring-necked duck	DIV	1	0.2	W,Sp,S,F	100.0%	365.00	785
26	Ruddy duck	DIV	12	2.8	W,Sp,S,F	100.0%	365.00	9,415
Totals			428	100.0			6,478.75	286,764
Bird Days into Perpetuity		117.5	Acres					15,424,041

Discussion of Debit and Credit Analysis

The number of bird-day credits estimated into perpetuity for Owens Lake is the sum of the bird-use days 15,424,041 (total pond acres 117.5; see Table 7). We estimated the bird-day debit associated with Searles Lake to be 13,208,133 and thus obtain a net bird gain associated with the proposed project at Owens Lake of 2,215,908 (Table 7).

Table 7
SUMMARY OF THE ESTIMATED DEBIT AND CREDIT
EXPRESSED IN BIRD-USE DAYS

	Credit Owens Lake Total Bird Days	Debit Searles Lake Total Bird Days	Credit / Debit Differential
Bird-Use Days (117.5 acre pond)	15,424,041	13,208,133	2,215,908

SVMO's assessment has combined several assumptions and a relatively simple analysis in an attempt to scale the level of bird loss with a project that might provide an in-kind compensatory gain.

We believe that our assessment has been conservative and that the true gain in ecological (bird) credits will be substantially greater as the benefits to breeding birds and non-target species has not been calculated.

We recognize that the birds/acre estimate is a sensitive input value to our model. We believe that the number of birds/acre is perhaps most influenced by the suitable conditions at the ponds and the habitat creation that will assist in attracting and maintaining the numbers of birds we predict. To this end we note that the proposed project will include a carefully planned and variable submarine contour providing variable water depths suitable for a range of waterfowl species. We also understand that the project will include small-vegetated islets that will provide shelter, cover and resting areas for waterfowl as well as nesting opportunities. The proposed mix of aquatic and terrestrial vegetation will provide suitable foraging conditions for a wide range of waterfowl species. Thus the ponds will not only provide suitable resting and shelter areas, but will also facilitate suitable forage conditions, that will nourish migrant birds and thereby increase the probability of enhanced survival, during an otherwise stressful period in their lifecycle.

A site visit to Owens Lake with CDFG personnel and other parties included discussions on the suitability of the proposed area for a waterbird pond(s). We believe that the collective view (by CDFG, Agrarian Research and Management Company Ltd, and AES Inc.) is that the area is eminently suitable for waterfowl and that the addition of (albeit unquantified) nesting birds would assist in reducing the variability and uncertainty associated with the unknown densities of birds that would use the proposed ponds. With the addition of nesting birds to the compliment, the anticipated benefits to migratory birds would thereby render the proposed activity appropriately compensatory for the alleged loss at Searles Lake.

Although this approach does not attempt to factor any behavioral or density dependence issues into the model, the two ponds with a surface area of 117.5 acres may well support a disproportionably larger aquatic (particularly duck) population. This may be reflected in three ways. First, the site is relatively isolated and surrounded by other-wise inhospitable

habitat with few if any other water sources, thus birds will be attracted to the site and will 'fill-in' in larger numbers (densities) than in other less water-stressed areas. Second, migratory aquatic bird species rarely hold territories and thus there are unlikely to exclude birds due to competition for resources. As we have indicated above, the proposed introduction of relatively extensive and varied aquatic and terrestrial vegetation zones will not only facilitate suitable forage conditions but will also minimize competition for food. Third, with the provision of a year-round water supply, species may stay longer than at other more ephemeral water bodies, and thereby increase the number of bird-use days at the site. Based on the foregoing, the estimated number of birds/acre (11.5) is probably an underestimate and is likely to be considerably higher at the proposed site. If the assessment were correct, then the overall benefit of the site would substantially compensate the alleged level of loss at Searles Lake.

The Owens Lake pond project would provide substantial benefits to the same bird species that were implicated in the bird loss at Searles Lake. The Owens Lake project will provide considerable benefits to a broad range of other taxa that might use the area. The creation of ponds at Owens Lake may also facilitate suitable conditions for birds that would otherwise have few, if any, refueling and resting stops through an otherwise inhospitable environment. Consequently, it is feasible, but difficult to quantify, that the presence of the Owens Lake ponds may assist birds by providing an important rest/fueling stop. Such birds are likely to be in better body condition and thus more able to cope with the rigors of migration and have the capability to fly through the area and on to their respective wintering or breeding areas.

Conclusion

The unavoidable take from SVMO's ongoing mining operations has been defined in Chapters 3 and 4, annually estimated at 486 aquatic birds. Section 3005 requires mitigation of unavoidable take of birds and mammals. SVMO is committed to implementing the measures outlined above, or measures for an alternative location or combination of measures, to offset the unavoidable take on Searles Dry Lakebed.

This approach allows CDFG to control the ultimate mitigation; it provides habitat value and in-kind bird value within the same general area of the inland flyway; and it represents a well-defined program for SVMO to fully mitigate its obligations under Section 3005 by supporting habitat in the region that will be available for the long-term. SVMO will implement the onsite and offsite mitigation plans, as outlined above, to compensate for the estimated 486 aquatic birds unavoidably taken each year.

The above REA when applied to the creation of two permanent ponds at Owens Lake would appear to substantially compensate the estimated loss at Searles Lake. Indeed, the relatively low bird density estimate we have used, the high probability of facilitating breeding birds and the benefits to other bird species, particularly shorebirds, would suggest that the ecological credits associated with the Owens Lake ponds dramatically compensate the alleged level of loss at the SVMO facility.

Chapter 5 Monitoring Plan

Monitoring is required by Section 3005. Section 3005 (b)(3) states: *"The mine operator shall submit monthly monitoring reports on avian mortality to the department to aid in evaluating the effectiveness of onsite mitigation measures."*

Section 3005 (b)(4) further addresses monitoring requirements and states: *"The department shall monitor and evaluate implementation of the mitigation plan by the mine operator and require modification of the plan or other remedial actions to be taken if the overall reduction in take of avian or mammal species required pursuant to paragraph (3) is not being achieved."*

SVMO has developed a program to submit monthly monitoring reports on avian mortality to CDFG to aid in evaluating the effectiveness of the onsite mitigation measures. SVMO or its contractor, IBRRC, collects data under the monitoring program. SVMO submits the collected data to CDFG in its monthly reports, in accordance with the objectives of Section 3005(b)(3). This Mitigation Plan has relied upon the data compiled by that program, including the total number of birds observed at Searles Lake, to create an estimate of the annual number of birds at risk on the lakebed.

SVMO proposes to continue to carry out this monitoring by utilizing hazing teams or a qualified contractor. During daily hazing activities on the percolation ponds, team members or the qualified contractor will compile a list and number of all aquatic birds observed at Searles Dry Lakebed during operating hours.

To ensure that the hazing team members are qualified to record birds, a qualified biologist or ornithologist will train the staff to recognize all of the types of birds historically known to visit Searles Dry Lakebed. Training will also include giving practical guidance on counting birds and how to systematically survey and record the findings. Once trained, these individuals will monitor and record birds observed on the lakebed (field notes will be taken of birds not known to the team members for later identification). Only qualified and thoroughly trained SVMO staff shall take part in monitoring activities. The CDFG may assist with screening and approving such personnel.

If a contractor is utilized for this task, the qualifications of the contractor will be submitted to the Department for review and approval prior to initiating field activities.

Daily monitoring logs will be compiled and these will be integrated into monthly logs that will be submitted to CDFG for review and retention. An annual report will be compiled by SVMO or its contractor for submittal to and retention by the Department. The CDFG may conduct external audits of activities to ensure quality and objectivity in SVMO's self-reporting.

The field team or contractor will keep a record of all birds collected from Searles Dry Lakebed. A separate record will be kept for birds rescued and their ultimate fate and for all dead birds collected from the lakebed. The total number of birds that die (either after

having been rescued or found on the lakebed) will be compiled on a monthly and annual basis. Monthly reports will be submitted to CDFG with all pertinent information and an annual report will be compiled by SVMO for submittal to the Department. The annual report will identify the number of birds rescued during a calendar year and the number of birds unavoidably taken.

The combined database of birds at risk, rescued, and unavoidably taken constitutes the monitoring report for the mitigation and bird rescue operations. The CDFG and SVMO agree to confer about the avoidance measures in 10 years, consistent with the requirements of Section 3005 to review the avoidance measures in light of experience at the site and increased information or changes in science or technology applicable to the avoidance or overall reduction methods. SVMO agrees to incorporate feasible, proven and cost-effective changes to those measures if such new or improved technology is developed. Any improvements determined to be warranted will be made as soon as reasonably feasible after the CDFG determines the need for such improvements.

Implementation of the monitoring program outlined above is designed to comply with the requirement for monitoring in Section 3005.

Chapter 6 Conclusions

In order to conserve native wildlife populations, including birds, federal and state laws have been passed to regulate or limit hunting, fishing and other potential threats to wildlife in an effort to prevent population declines and to conserve existing wildlife populations at healthy, i.e., sustainable, levels. The conservation of various wildlife populations, including birds, has been achieved by restricting or controlling hunting and fishing pressure through the adoption and enforcement of regulations, primarily at the State level. Wildlife populations have also been assisted by non-governmental programs through the efforts of wildlife and conservation organizations and private individuals and companies. SVMO is committed to practicing its permitted mining operations in an environmentally responsible manner. Moreover, SVMO will maintain, review and update its operational activities and procedures in order to minimize threats to the environment and wildlife species.

When regulatory controls are combined with both public and private habitat enhancement specifically for birds, conservation efforts have been successful, not only in maintaining birds populations, but in enhancing them. Surveys conducted by Outdoor California (July-August 2000, Volume 61, No. 4) within the Pacific flyway indicate that duck and geese populations are the highest they have been since the middle of the 20th Century. Specifically, an article ("California: Winter Host for the Pacific Flyway") in the referenced Outdoor California by Cliff Feldheim states at page 4: "The past five years have been some of the most productive on record, and eight of the 10 most common species of ducks are at or near record highs." It is apparent that the general populations of a majority of the bird species being impacted on Searles Dry Lakebed have not significantly suffered as a result of historic losses due to mining operations.

Further, as SVMO's conservation efforts at Searles Dry Lakebed over the past three years demonstrate, the take of birds can be minimized in accordance with the objectives of Section 3005 and Section 3800 of the Fish and Game Code. With its commitment in this Section 3005 Plan to compensate for unavoidable take, SVMO can completely fulfill the objectives of these sections.

Over the past three years, SVMO has expended considerable funds (in excess of several million dollars) to demonstrate its good faith in meeting CDFG objectives to reduce avian mortality in Searles Valley. The preparation of this Section 3005 Plan is further evidence of SVMO's efforts to meet bird conservation objectives of the Department, within the legal framework established by the State.