DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

PERMIT DECISION

ID: SPK-2008-00268

APPLICANT: Great Salt Lake Minerals Corporation
Tom Burton
765 North 10500 West
Ogden, Utah 84404

PROJECT NAME: GSL Minerals PS 113/114 Intake Canal Relocation

This document constitutes my Environmental Assessment in accordance with the National Environmental Policy Act, determination of compliance with the 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material, Public Interest Review, and Statement of Findings.

1.0 Authority

_**X**_ Section 404 of the Clean Water Act
___ Section 10 of the Rivers and Harbors Act of 1899
___ Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972

2.0 Proposed Project

A complete permit application was received on **March 3, 2008**.

2.1 Project Description. The applicant is proposing to relocate the southern portion of an existing water inlet canal to transport water from the North Arm of the Great Salt Lake to a solar evaporation pond complex in Clyman Bay. The project includes: relocating the western arm of the canal that parallels the dike of pond 113 to an alignment 200 feet north of the existing canal; widening and deepening the canal as it extends northeast from pump station 113 into Gunnison Bay; and extending the northern arm of the canal an additional 10,000 feet.

2.1.1 Project Changes since circulation of the Public Notice. The public notice (PN) correctly described the acreage of impact; however, the PN was in error regarding the width and depth of the proposed inlet canal. The PN identified the width as 40 feet and the depth as 5 feet, the correct dimensions are 50-60 feet in width and 11 feet in depth.

2.2 Project Purpose

2.2.1 Basic project purpose: The basic project purpose is to convey water from the Great Salt Lake to pump station 114.
2.2.2 Water dependency: The project does not involve discharges into special aquatic sites. Based on the basic project purpose, the project is water-dependent.

2.2.3 Overall project purpose: The overall project purpose is to maintain the existing rate of pumping brine needed into the West Ponds.

2.3 Need. The applicant believes there is a need to relocate and modify the existing intake canal in response to the historic low water level in the Great Salt Lake. The applicant states that the relocation is necessary so as not to undermine the structural integrity of the northern dike of pond 113 when deepening the canal. Additionally, the canal needs to extend further into the lake to ensure that brine can be pumped from the North Arm into the evaporation ponds for sulfate of potash (SOP) and mineral extraction during years of low lake elevations.

3.0 Scope of Analysis

The scope of analysis for the proposed project includes the project area located within the northern arm of the Great Salt Lake. The scope of analysis will also include upland areas within the project site.

4.0 Public Involvement

A public notice (PN) was issued on March 17, 2008 (see Appendix A). The PN was sent to adjoining property owners and individuals and organizations on the PN mailing list. The comment period for the PN ended on April 16, 2008.

4.1 PN Comments Received

4.1.1 Federal Agencies:

US Environmental Protection Agency, Region 8:

1. EPA believes the proposed relocation and expansion of the existing canal may result in substantial adverse effects on waters of the U.S.
2. EPA finds this project may have substantial and unacceptable adverse impacts on aquatic resources of national importance. Therefore, EPA recommends denial of the application as currently proposed. The EPA states that their letter follows the field level procedures outlined in the August 1992 Memorandum of Agreement between the EPA and the Department of the Army, Part IV, paragraph (3a) regarding Section 404(q) of the Clean Water Act.
3. EPA requests a full alternatives analysis be performed. EPA believes that the anticipated high spring runoff, which should lead to a higher level of the lake, may make this project unnecessary. If the applicant can demonstrate that the project is still needed, given the potential for rising lake levels, they should be required to investigate the rehabilitation of the current canals and reinforcement of the Pond 113 dike, rather than the relocation of the canals. EPA believes this action may minimize impacts to waters of the U.S.
4. The 404(b)(1) Guidelines require the applicant to mitigate for any unavoidable impacts to waters of the U.S. EPA recommends the applicant provide the Corps with a detailed mitigation plan for these impacts.
5. EPA has concerns regarding the relationship between the proposed project and the potential expansion of operations, as referenced in the PN. The PN states this project increases the capacity of the canal to deliver water to the existing operation as an "interim fix," until the proposed expansion is approved.

US Fish and Wildlife Service, Utah Field Office:

1. The USFWS provided comments to the Corps on a related action under PN SPK 2007-00121 (proposed 33,000-acre expansion by GSL), dated December 17, 2007. The Service has included herein information contained in its previous letter on avian use and water quality:

- Data for avian usage of Gunnison Bay (North Arm of the lake) is quite limited when compared to data for Bear River Bay (northeast portion of the lake) and other areas around the lake; however, the limited information that does exist indicates Clyman Bay and the western shore of Gunnison Bay have the potential to provide foraging and nesting habitat for shorebirds including the snowy plover and the American avocet.
- Gunnsion Island is one of the premier breeding colonies for American white pelican in North America. Utah's Pelican Management Act protects the Great Salt Lake pelican population and provides protection of Gunnison Island specifically for pelicans.
- Due to its location, predator access to Gunnison Island is rare and mosquitoes with West Nile Virus are less likely to arrive at the island. Other birds such as peregrine falcon also nest on the Bay's islands (Dolphin, Cub and Gunnison).

The Corps should evaluate impacts to the breeding colony of pelicans on Gunnison Island and to other shorebirds along the shoreline and at springs and wetlands within Clyman and Gunnison bays.

2. The analysis of projects in Clyman and Gunnison bays should evaluate how migratory birds would be affected under a high-water scenario, where lake levels rise and the south area of the Great Salt Lake may become too fresh to support large populations of brine shrimp; subsequently, salinities in the north arm may decrease to levels that would support large numbers of brine shrimp which would then attract large numbers of birds as happened in the 1980s.
3. The applicant has agreed to conduct limited water quality sampling to obtain selenium and mercury concentrations in their current discharges to Bear River Bay. The concern with the flushing of brines from GSL's solar ponds is that mercury and selenium may concentrated in the remaining brines and flushed back into Bear River and lake in a plume. The USFWS recommends the Corps evaluate the potential accumulation and release of selenium and mercury from the evaporation ponds and the impact such a release would have on wildlife. In addition, the USFWS recommends: 1) lowering the detection limit for mercury to freshwater water quality standard of 0.012 ppb; 2) collecting samples within the first few days of flushing rather than the last few days; and 3) sampling effluent from ponds in Gunnison Bay if they are flushed.
4. More salts are removed annually from the lake than are added by inflows and natural processes. Furthermore, some salts are harvested disproportionately to their concentration in the lake and to their ability to be replenished, including potassium. The USFWS recommends the long-term effects of the proposed project, in conjunction with existing mineral operations throughout the lake (i.e., cumulative effects), be evaluated to assess the impact on salt concentrations and proportions of minerals in the lake and how changes in these might affect the lake and its biotic community.
5. The PN states that a 14.7 acre berm would be created from the dredged material. The Corps should consider how this berm might modify and/or impede currents within the lake and whether such changes would have an impact on the cycling of nutrients, movement of aquatic life and impacts on aquatic-dependent wildlife. The height of the berm was not provided in the PN but the Corps should evaluate whether the berm might serve as a corridor or land bridge to Gunnison and nearby islands whereby predators might gain access to nesting birds. If the berm might act as a land bridge, particularly during low lake levels, alternatives such as alternating spoil, spreading the spoil or removing the spoil should be evaluated. The USFWS recommends the spoil material be evaluated for contaminants such as selenium and mercury and a determination made whether re-suspension of the material might release contaminants back into the water column.
6. The use of backhoes may result in the release of petroleum products and other fluids to waters of the U.S. Normally the Service would recommend equipment be kept out of the waterbody, but in this case other best management practices such as the use of

barges (from which the backhoe could operate) and liners and/or other containment materials may be necessary. The Corps should evaluate the potential for spills in its analysis and develop avoidance and mitigation measures to prevent and minimize the impact of spills and releases to waters of the U.S.

7. The Corps should evaluate the impacts of this project on lake levels, since the purpose of deepening and lengthening the water delivery system is to continue operation of the evaporative ponds during low lake levels. Under drought conditions, increasing salinity in the lake and decreasing surface area would slow evaporation; however, continued operation of the ponds effectively increases the surface area and likely speeds evaporation. Quantification of the lake-wide change in evaporation rates with and without the ponds might provide one method of determining the impact on lake levels, subsequent salinity concentrations and impacts on the availability of brine shrimp.
8. The Corps should evaluate the impacts of this proposed project on avian communities within the North Arm (Gunnison Bay) and in particular the white pelican on Gunnison Island. Items to consider include: but are not limited to: noise associated with construction activities and on-going pump operations; human disturbance during construction and maintenance activities; and possible increase in access for mammalian predators. The USFWS recommends construction activities occur outside the pelican breeding season.
9. Cumulative impacts should be addressed. The cumulative impacts discussion should, at a minimum, include evaluations within the region of influence of the proposal for: potential for additional fish and wildlife impacts due to energy development including oil and gas in the Great Salt Lake; impacts form increased habitat fragmentation; displacement of wildlife; and cumulative effects of lake level changes on project affected resources.

4.1.2 Tribes: None received.

4.1.3 State and local agencies:

State of Utah, Office of the Governor, Public Lands Policy Coordination:

1. The Utah Division of Wildlife Resources (UDWR) is involved with the Corps, as well as other state and federal agencies, in the development of an EIS for the proposed expansion of GSL's evaporation ponds. The EIS will evaluate the environmental impacts from the long-term operation and maintenance of the facility. The Corps should carefully consider whether the proposed delivery canal reconstruction is connected to the proposed pond expansion. The two actions should be evaluated in the same NEPA document if they are part of a larger, interconnected project. Likewise, the two actions should be evaluated together if approval of the proposed delivery canal reconstruction would affect the forthcoming decision regarding the salt pond expansion.
2. The UDWR is concerned that the proposed dredging operations will come close enough to the nesting colony of the white pelicans on Gunnison Island to disturb nesting birds. There should be no hard structures within three miles of Gunnison Island and construction activities should cease from March 1st to June 1st to avoid wildlife disturbance.

4.1.4 Other organizations and individuals:

Western Resources Advocates (WRA):

1. Since the proposed 33,000 acre solar pond expansion project described in PN SPK-2007-00121 and the proposed intake canal modification described in PN SPK-2008-00268 are "connected actions", the Corps should incorporate the analysis of the intake canal project with the proposed solar pond expansion project into one Environmental Impact Statement. WRA believes these two projects are intertwined to the extent that they should not be separated in terms of analysis. The Corps should determine how these projects will cumulatively affect area wildlife.

2. If the Corps decides not to combine the analysis of the two projects a separate EIS should be prepared for the current project.
3. The Corps must analyze impacts to wildlife. A key point of analysis to wildlife is how will continued dewatering of the lake cause either by the proposed projects and/or global climate change impact wildlife. How will continued lowering of the lake impact Gunnison Island avian species. At roughly elevation 4,195 or a bit lower, the mudflat to Gunnison Island would be dry or mostly dry, allowing much easier access for humans and predators.
4. Lowering lake levels will also shrink the shoreline creating potential feeding problems for shorebirds/waterbirds.
5. Less water could further concentrate toxins that become trapped in the lake. How this water quality problem will continue to impact area avian species will need to be analyzed. Increased levels of toxin and water quality generally will need to be examined in terms of compliance with section 401 of the Clean Water Act.
6. Impacts to brine shrimp and brine flies, the primary migratory bird food sources should be analyzed as well.
7. The scoping notice (for the EIS) references the observation of snowy plovers in the area. A more formalized bird survey should be conducted to determine what species are present. Such a survey should account for birds at different lake elevations and subsequent salinities that drive bird food abundance; e.g., brine shrimp.
8. Glad to hear that the Corps will consider a range of alternatives since the alternative analysis is integral in the NEPA process.
9. The Corps should analyze the project together with the proposed evaporation pond expansion project. Analysis of these two closely related projects will also make more sense in terms of developing a wide range of alternatives.
10. The Corps should analyze alternatives that are less water dependent, and those that are least environmentally damaging. The current description of the project appears to be written unreasonably narrow, and confines the range of alternatives. The Corps should reword the purpose and need so that it may be broadened to encompass a wider range of alternatives.
11. The notice for this project states that mitigation has not yet been proposed. Another reason that the analysis for this project should be combined with the proposed pond expansion project is that this would enable the applicant to first, comprehensively avoid al impacts to the extent possible; secondly, to minimize environmental damage; and lastly, to mitigate the cumulative effects of the projects.
12. Mitigation within the Great Salt Lake ecosystem has had limited success, therefore any proposed mitigation from these projects should analyze the history and success of past mitigation efforts. Any compensatory mitigation (based on the inability to avoid certain impacts) should be in-kind mitigation.
13. Impacts of a continued low level of Great Salt Lake have not been fully explored. Numerous questions need to be addressed before a final decision is made on this application. What are the impacts of a continued lower level to Great Salt Lake? Are there ways to maintain an adequate level of water in Great Salt Lake? What is an adequate level? These questions regarding a navigable body of water, and a public trust need to be fully explored before a private company is allowed to "ensure water can be conveyed to the evaporation ponds during low lake levels."
14. A few thoughts about the potential impact of continued water elevations below about 4195 feet (MSL) on the Great Salt Lake:
    - Navigation between the Great Salt Lake Marina and Antelope Island could become extremely difficult. Dredging would be necessary to maintain a 7-foot draft (4195') for watercraft. Airboat access to the lake would also be affected.
    - Impacts to wildlife must be analyzed. Increased impacts to wildlife can be expected as a result of lowered lake levels. Impacts to American white pelicans from lowered lake levels are likely to occur.

- Reduced shoreline for shorebirds and other waterbirds. Reduction in available shoreline would reduce the areas of shorebirds, waterfowl and wildlife, water quantity (lake levels), water quality, and other resource values are based on increased temperatures. This analysis will help predict and guide management strategies in the future based on a warmer climate.
- Concentration of contaminants.
- Dust from the exposed lakebed could have negative health impacts.
- Bear River Bay below d-line at Bear River Migratory Bird Refuge could become drier. Freshwater inflow into Bear River Bay is critical to maintaining this unique habitat and food availability for bird use.
- There would likely be impacts on brine shrimp, brine shrimp harvesting, and brine-shrimp dependent birds.
- As the Great Salt Lake surface elevation nears 4193 the Gilbert Bay and Gunnison Bay essentially becomes two separate bodies of water. A canal at 4188 diverting water into an artificial pond would rain the Gunnison Bay without the effect of recharge from Gilbert Bay.

15. The Corps should analyze what the cumulative impacts to wildlife, water quantity, water quality and other resource values are based on increased temperature from global climate change.
16. This project coupled with the proposed expansion of the solar evaporation ponds will consume significant amounts of water. For this project alone, an amount in the range of 100,000 acre-feet of water could be consumed. Over the last 20 to 30 years, studies have attempted to define the effects of water development and other human-caused water use on lake level. The studies indicate that historically, for each 100,000 acre-feet of yearly depletion in the basin, the average level of the lake would be approximately one foot lower. The effect of this depletion on the lake elevation is greatest a low lake levels.
17. WRA recommends that a conservation pool be constructed in recognition of the public trust doctrine.
18. A public hearing should be held. A hearing is warranted since this project falls under section 10 of the Rivers and Harbors Act. There is also a high public interest in this project. The Division of Forestry, Fire and State Lands should be brought into the process.

4.2 Requests for Public Hearing: Western Resources Advocates requested a public hearing in their response to public notice, received by the Corps on April 17, 2008.

4.3 Response to PN Comments:

4.3.1 Federal Agencies:

US Environmental Protection Agency:

1. The proposed project would have relatively small and temporary impacts from construction. Pumping would not increase over the existing environmental condition (baseline) and therefore would not have any additional impact on lake levels over current conditions.
2. See response #1. Additionally, the amount of impact to the playa lakebed would be only a fraction of a percentage when would be disturbed is unvegetated, not a special aquatic site, and appears to have low habitat functions for brine shrimps and brine flies since the water and substrate have very high salinities. Accordingly, the applicant believes any adverse impacts resulting from the project would not be substantial (i.e., minor) and the permit should be granted as currently proposed.
3. The applicant has submitted an alternatives analysis for this project, and has examined different intake locations and methods of construction. Future weather conditions and potential high spring runoff are too unpredictable. Even if there is an above normal runoff into the lake this spring does not mean there will be an above normal runoff the following spring. Consistent intake of brine water from the lake

over a 7-month period is critical to the production of SOP and other mineral salts. Reinforcing the north dike of Pond 113 would require importing new, non-native fill or using existing material on-site from the lake. Relocating the western segment of the existing canal as proposed by the applicant, is the least environmentally damaging practical alternative because: 1) the existing segment of the canal would be restored by backfilling with native lakebed material that has been previously stored on-site adjacent to the canal; 2) no imported hard rock or riprap (which could become habitat for mammalian predators of birds) would need to be used; and 3) construction impacts (e.g., air quality, temporary haul roads, additional noise and activity, displacement of lakebed with non-native rock) from importing non-native fill would be far greater than the applicant's proposed method.

4. The applicant believes it has taken all necessary steps to avoid and minimize impacts to waters of the U.S., and still be able to meet its project purpose and need. See Section 3.0, Mitigation, for further details. EPA recommends a plan that would enhance and/or restore the lake's fringe wetlands. This project would not impact any wetlands or special aquatic sites since work would occur in unvegetated lakebed.
5. The proposed project would not expand existing operations. The purpose of extending the existing canal is to ensure an adequate supply of brine water to the West Ponds. Increased pumping would not result from this project. Other proposed projects by the applicant described in the PN are for reference, and are not dependent on this project. The "interim fix" mentioned in the PN is not related to the proposed pond expansion but to widening and deepening of the existing canal segment adjacent to the north dike of Pond 113 due to partial filling in of the canal with accumulated, precipitated salts and sediments.

US Fish and Wildlife Service:

1. These comments were originally provided in response to the proposed pond expansion and will be analyzed as part of the Corps' EIS. Based on available information for Gunnison Bay, shorebird use appears limited and sparse as compared to Bear River Bay and the southern portion of the Great Salt Lake, where the salinity is much lower.
2. Comment 3 has been taken under advisement and will be addressed in the EIS for the pond expansion. With respect to evaluating the effects of the proposed intake canal modification, the environmental baseline for NEPA purposes is the existing or current condition (i.e., current rate of pumping and discharge into Bear River Bay). The intake canal modification will not cause an increase to discharging or flushing brine back into Bear River over the existing environmental baseline condition, and therefore will not cause any additional effects over the present condition.
3. Comment 4 has been taken under advisement and will be addressed in the EIS for the pond expansion. With respect to evaluating the effects of the proposed intake canal modification, the environmental baseline for NEPA purposes is the existing or current condition. The intake canal modification will not cause an increase to the existing pumping rate of water into the West Ponds over the existing environmental baseline condition, and therefore will not cause any additional effects over the present condition.
4. The lake has a natural counter-clockwise coriolis circulation. The side-cast material would have very little effect on local currents, cycling of nutrients or movement of aquatic life in the deeper portion of the lake (e.g., the 10,000-foot intake section). In the shallower, western end of the lake, the berm may have some effects on currents, and should have very little impact on brine shrimp and brine fly habitats since they appear sparse in the project area. Depositing excavated native material on the lakebed, although in an elevated, berm form, would keep any excavated habitat on-site, allowing it to reestablish over time as opposed to eliminating such habitat by hauling it off-site. The berm would not serve as a corridor or land bridge to Gunnison and nearby islands since the intake canal would be no closer than 3.8 miles from the islands. Since most of the excavated material would be placed on dry or

very shallow water (otherwise, backhoes could not be used) the material would not be re-suspended or release potential contaminants into the water column.

5. The applicant would abide by all applicable laws, regulations, safety practices and BMPs governing potential spills of petroleum products and other potentially hazardous fluids into a waterbody. Use of barges is impracticable because the water level is very shallow during the construction period.
6. Using the current, environmental baseline condition (which includes current operations of pumping), the canal extension will not cause increased pumping; therefore, there will be no additional effect on lake levels. However, further analysis on lake levels from pumping will be discussed in the Corps' EIS for the pond expansion, including impacts on brine shrimp and other wildlife.
7. The applicant will discuss with the Corps and other agencies the appropriate time limits for construction activities to minimize noise impacts on Gunnison Island wildlife and the pelican breeding season. Construction activity will be about 4 miles away from the island, and this should minimize any potential human disturbance. On-going pump operations are seasonal and because of the distance (5 miles) to Gunnison Island, noise appears minimal. In preparation for the EIS, sound measurements will be taken during pumping operations and other activities at the West Ponds. Access to the island by potential mammalian predators will not result from the new intake modification because the intake at its closest point, including the berms, will be about 4 miles from the islands.
8. Since the proposed project is similar to a maintenance project with no change in pumping rate or volume, the project does not add to any cumulative impacts over the existing baseline condition. Cumulative impacts will be evaluated, however, under the EIS for the proposed pond expansion.

4.3.2 Tribes: None received.

4.3.3 State and local agencies:

State of Utah, Office of the Governor, Public Lands Policy Coordination:

1. The proposed intake project is a completely independent project and unrelated to the proposed pond expansion. The proposed pond expansion calls for moving the existing intake further north, and the existing canal would be backfilled and leveled to be incorporated into the new west pond system. The canal modification proposed under this project will not cause an increase in pumping.
2. Reconstruction of the intake canal will be extended northeast and will be no closer than about 3.8 miles from Gunnison Island. The applicant will discuss with the Corps and UDWR the appropriate time period that would minimize wildlife disturbance for each segment of the project.

4.3.4 Other organizations and individuals:

Western Resources Advocates (WRA):

1. The intake canal modification is not intertwined or a connected action to the proposed pond expansion. Both are separate and independent actions not related or connected to one another. The canal modification is primarily to extend the intake to a lower water level of the lake, and the rate of water intake will remain the same. The pond expansion project calls for constructing a new canal further north, and the existing one would be backfilled with native, stockpile material, since this area would become part of the expanded west pond system.
2. The proposed intake canal modification project would not significantly affect the quality of the human environment when compared to the current or existing environmental condition of the Great Salt Lake. The current condition of the lake includes existing operations of the Great Salt Lake Minerals Corporation in both the North Arm (i.e., the West Ponds) and Bear River Lake (east ponds and facilities). These operations include pumping brine water from the lake, which has been on-going since 1970. There will be temporary, short-term impacts from construction

but withdrawals of brine water from the lake would not increase over existing conditions.

3. At the present rate of pumping brine water into the pond, GSL does not expect the project will impact wildlife. It appears the present, historic low water level in the Great Salt Lake (not just the North Arm of the lake) is primarily due to drought conditions over the past few years and the normal high evaporation rate during the warmer months of the year. The pump stations (113 and 114) usually operate about 7 months out of the year. It has only been the past few years of below normal runoff into the lake that is the main cause of below normal water levels, and not the pumping of brine water into the evaporation ponds. GSL's pumping rate varies, with 100-120k acre-ft pumped in a normal season, and up to 160k acre-ft in a maximum evaporation year. At 4195 feet (the elevation exceeded from early March to mid-June of this year), the maximum pumping rate would draw the North Arm down by 0.57 ft (without replenishment from the South Arm) in a single season. In a normal year, with the North Arm at 4200 ft, the drawdown from pumping would amount to 0.32 ft. For comparison, the historical average evaporation rate from the Lake is about 3.75 feet/year (Waddell, K. M. and F. K. Fields. 1977. *Model for Evaluating the Effects of Dikes on the Water and Salt Balance of Great Salt Lake, Utah.* Utah Geol. And Mineral Surv. Water-Resources Bull. 21. 54 pp.). In most years, the withdrawal and evaporation from the North Arm is replaced by inflow from the South Arm. With respect to human or predator access to Gunnison Island if the water level falls below 4195, the water level would have to drop to 4193 ft for the island to be accessible by foot. Access would require at least a 10 mile round-trip across a saturated lakebed (probably very soft in most places below 4195), a daunting journey for most mammalian predators let alone a human. Access to Gunnison Island by foot by potential predators would be a small probability. Nevertheless, the Environmental Impact Statement (EIS) that is currently being prepared under the direction of the Corps of Engineers for the proposed pond expansions will address these issue of lake water levels, pumping, and potential impacts to wildlife in further detail.
4. It appears the present lowering of the lake levels is primarily a natural function caused by below normal runoff into the lake over the last few years (along with the high evaporation rate during the warmer months), and less so by the pumping of brine water into the evaporation ponds. In other words, even without pumping, the shoreline would naturally become more exposed than normal due to drought conditions. The North Arm of the lake is not optimal habitat (a low habitat function) for shorebird/waterbird feeding because of the high salinity (>25 %) in the water and substrate.
5. Issues concerning concentrating toxins will be examined in the Corps' EIS for the proposed pond expansion project, since greater amount of water will be pumped into the ponds. Compliance with section 401 of the Clean Water Act is not under the authority of the Corps but the state of Utah.
6. Brine shrimp and brine fly habitat in the North Arm of the lake appears to be very limited or has low function because of the high salinity in the water and substrate. At this high salinity level, the North Arm of the lake does not have conditions to support optimal habitat for these forms of wildlife. Migratory birds primarily feed in the southern part of the Great Salt Lake, where the salinity level is much reduced, and where there is more abundant and more optimal habitat for brine shrimp and brine flies to flourish. For the above reason, the proposed intake modification is expected to have only a minor impact on existing brine shrimp and brine fly habitat in the North Arm.
7. Comment noted. Bird surveys are being conducted for the Corps' EIS.
8. Comment noted. The applicant has submitted an alternatives analysis for the intake canal modification, and the EIS for the pond expansion will analyze a broader range of alternatives.

9. See response #1. The two projects are not closely related but independent of each other. The canal project is not dependent on the approval of the proposed pond expansion before the canal extension is constructed. Furthermore, the proposed pond expansion is not dependent on the approval of the canal extension. The canal extension is solely to obtain adequate supply of brine water during low lake water levels. Increased pumping will not take place as a result of the canal extension. The project's purpose is to maintain the status-quo of water intake. If the proposed pond expansion is approved and constructed, the intake would have to be relocated to accommodate the west pond expansion. A new intake is part of the proposed pond expansion project. The EIS for the pond expansion will consider a variety of alternatives, including alternative intake locations.
10. The applicant has submitted an alternatives analysis, including evaluating a less water dependent alternative (an elevated wooden flume alternative). Based on the alternatives analysis, the applicant believes its preferred alternative is the least damaging practical alternative. Additionally, a purpose and need description has been provided to the Corps for review.
11. The applicant believes avoidance and minimization measures have been carefully considered to the maximum extent practicable for the intake project, including an analysis of alternatives and their potential impacts. A description of the proposed mitigation measures has been submitted to the Corps that the applicant feels is commensurate with the scope and degree of potential impacts that might result from this project.
12. Comment noted on limited success of mitigation within the Great Salt Lake. The applicant is proposing avoidance and minimization measures, include restoring 9.2 acres of the western end of the canal adjacent to Pond 113. Additionally, excavated native, lakebed material will be left on-site (as opposed to hauling the material away) to allow for re-establishment or recolonization of the material.
13. See Response #2 concerning lower water levels. These questions will be further addressed in the Corps' EIS on the proposed pond expansion project.
14. Navigation, wildlife, brine shrimp habitat, brine shrimp harvesting, and shorebirds/waterbirds are primarily found in the southern arm of the Great Salt Lake. Except for Gunnison Island, which is an important nesting and roosting site for the white pelican, the North Arm is not considered to be optimal habitat for wildlife because of the high salinity in the water and substrate. The proposed intake modification and continued pumping 7 months/year in the North Arm is expected to have only a minor impact on wildlife, shrimp habitat and harvesting, shorebirds/waterbirds and on navigation in the southern portion of the lake. The below normal lake water level is more of a response to below normal seasonal runoff into the lake and much less so to the existing pumping in the North Arm of the lake. Since existing pumping draws down the North Arm by a few tenths of a foot (see response #3), additional concentration of contaminants over and above the natural concentration of contaminants from reduction of water level caused by evaporation and low seasonal runoff into the North Arm is probably small. The proposed intake canal project should have no effect on freshwater inflow into Bear River Bay. The Corps EIS will address these and other issues in greater detail for the proposed pond expansion.
15. The Corps will consider cumulative impacts based on increased temperature from global climate change effects in the EIS for the pond expansion.
16. The statement concerning pumping 100,000 acre-feet of water yearly would lower the lake level by one foot is not accurate. GSL's pumping rate varies, with 100-120k acre-ft pumped in a normal season. At 4195 feet (the elevation exceeded from early March to mid-June of this year), the maximum pumping rate would draw the North Arm down by 0.57 ft (without replenishment from the South Arm) in a single season. In a normal year, with the North Arm at 4200 ft, the drawdown from pumping would amount to 0.32 ft. For comparison, the historical average evaporation rate from the Lake is about 3.75 feet/year (Waddell, K. M. and F. K. Fields. 1977. *Model for*

Evaluating the Effects of Dikes on the Water and Salt Balance of Great Salt Lake, Utah. Utah Geol. And Mineral Surv. Water-Resources Bull. 21. 54 pp.). In most years, the withdrawal and evaporation from the North Arm is replaced by inflow from the South Arm. The proposed canal modification would not cause greater usage of water; it is a preventative measure for lower lake levels. A more in-depth evaluation of pumping and effects on lake water levels will be discussed in the Corps' EIS.' policy is to encourage mitigation that is commensurate in scope and degree of impact of the proposed activity. In this case, GSL believes the project impacts are minor, and the avoidance and minimization measures outlined in the Mitigation (paragraph 3, below) are commensurate in scope and impact of the canal modification. Creating a conservation pool for this project would go beyond the scope and potential impacts of this project. A conservation pool and other mitigation alternatives will be evaluated in the Corps EIS for the pond expansion.

17. The public trust doctrine is under the state of Utah's control and responsibility and not the Corps of Engineers. WRA has not provided any details about the recommended conservation pool in its letter so it is difficult to evaluate this recommendation. When evaluating potential mitigation (including avoidance, minimization and compensation), the Corps' policy is to encourage mitigation that is commensurate in scope and degree of impact of the proposed activity. In this case, GSL believes the project impacts are minor, and the avoidance and minimization measures outlined in the Mitigation (paragraph 3, below) are commensurate in scope and impact of the canal modification. Creating a conservation pool for this project would go beyond the scope and potential impacts of this project. A conservation pool and other mitigation alternatives will be evaluated in the Corps EIS for the pond expansion.
18. The applicant believes a public hearing is not warranted for this project because: 1) it would cause only minor and temporary impacts, 2) the project will not cause cumulative impacts since pumping will stay within the current environmental baseline, 3) it is independent of the proposed pond expansion, and 4) the proposed pond expansion and potential cumulative impacts are being evaluated in an EIS, which includes scoping meetings and public hearing(s) open to the public. Additionally, the Corps has not declared the Great Salt Lake to be a navigable water of the U.S. pursuant to section 10 of the Rivers and Harbors Act of 1899.

5.0 Alternatives Considered

5.1 No Action (no permit issued) Under the No Action Alternative, a Corps permit would not be issued for the proposed project, and thus the project purpose would not be fulfilled. No environmental impacts that might be associated with the modified intake canal would occur. However, the north dike of pond 113 could become unstable and could seriously jeopardize the continued salt making operation of the West Ponds. Additionally, if a breach were to occur in the dike, water quality and floral and fauna of the North Arm of the Great Salt Lake could be seriously impacted from the much higher salinity brine in the ponds. The applicant is the largest producer of Sulfate of Potash (SOP) in North America. SOP is a specialty fertilizer for turf grass and agriculture sold nationwide, as well as in South America, Asia and Australia. Inability to or curtailment of use the West Ponds resulting from the no action alternative could seriously impact the national turf grass and agricultural market (in particular organic farming of fruits and nuts), and international markets, which are dependent on the use of SOP.

5.2 Onsite Alternatives

5.2.1 Proposed Action (Applicant Preferred):
The proposed modification of the intake canal by the Great Salt Lake Minerals Corporation (GSL) includes: (1) relocating the western arm of the canal that parallels the dike of pond 113 (approximately 8,000 feet long) to an alignment 200 feet north of the existing canal; (2) widening and deepening the canal as it extends northeast from pump station 113 into Gunnison Bay; and (3) extending the northern arm of the canal an additional 10,000 feet.

The relocated western arm of the canal would be approximately 8,000 feet long (about the same length as the existing arm), 60 feet wide (maximum) at the surface and 28 feet wide at the bottom of the canal, and approximately 11 feet deep (Figures 3 and 4). Excavation would be by backhoe, and the material would be sidecast adjacent to each side of the canal. Total excavated material would be approximately 232,000 cubic yards. The discontinued portion of the canal would be filled with the previously-excavated material that had been side-cast adjacent to the canal in order to strengthen the toe of the dike (Figure 3). These actions would restore 9.2 acres of playa lakebed. Relocation of the western arm of the intake canal is necessary for the stability of the existing dike because this portion of the canal is too close to the outboard toe of the dike. The new, relocated portion of the canal would be about 300 feet north of the dike (or about 200 feet north of the existing canal).

The remainder of the existing canal would remain in its present location but would be deepened and widened to the same widths as the relocated canal (50 to 60 feet at the surface and 28 feet at the bottom of the canal) with the depth being shallower as it proceeds further into Gunnison Bay (depth will vary from 11 feet at pump station 113, to 6 feet at the terminus of the canal. Widening and deepening the canal are necessary to ensure adequate pumping depth of brine water in the canal as needed. The material would be placed on each side of the canal onto previous side-cast material, which would minimize disturbance of the bottom of the lakebed. Approximately 122,000 cubic yards would be excavated from this 18,750-foot segment of the canal.

The applicant states that the existing intake canal needs to be extended another 10,000 feet to lake elevation 4191 (MSL datum) to obtain adequate water depth for intake of brine from Gunnison Bay. Excavation would be completed by backhoe and material sidecast to each side of the canal. The side-cast material would cover about 9.1 acres of adjacent, unvegetated playa lakebed. Approximately 111,000 cubic yards would be excavated to extend the existing canal. The extension would encroach no closer to Gunnison Island than the existing canal, which is approximately 3.8 miles at its closest point.

Although the pump stations 113-114 intake canal would be widened and deepened, the total amount of brine pumped from the North Arm of the Great Salt Lake would not change. Improvements to the canal are needed because of the low water level of the lake, to ensure adequate depth of brine water in the intake canal, and to ensure stability of the northern dike of pond 113. Widening of the surface of the canal is needed as it is deepened (up to 11 feet deep) in order to stabilize the side slope of the canal. A vertical wall canal, 11 feet deep, with no side slopes, would either fail or be too unstable, and would require constant maintenance (and therefore more frequent disturbance to the lakebed).

5.2.2 On-Site Alternative 2:
An alternative considered was to construct an elevated wooden flume over the lakebed paralleling the existing canal. The wooden flume would avoid the need to excavate an extension of the canal in the lakebed. The wooden flume would extend from the approximate location of PS 114 to PS 113 (paralleling the north dike of Pond 113), then proceed northeast and terminate at the approximate location of where the new intake canal would be located. The new, wooden flume would be approximately 36,750 feet long, the same length of the existing canal plus the proposed extension, and would be approximately the same width and depth of the proposed canal modification (about 11 feet deep by 28 feet wide at the bottom of the flume at PS 113 to 6 feet deep by 28 feet wide at the intake. If the flume is constructed with a sloped wall, then the top of the flume would be about 50 feet wide). Wooden piles would need to be driven into the lakebed to support the flume. Also, a new pump station would have to be constructed in the lake near the water intake of the flume, which would require a new, permanent fill pad to support the pump station, pipes and attendant facility for maintenance and repair. A new pump station would be need at this location to lift the water from the lake onto the elevated flume. Also pump stations 113 and 114 would have to be modified to move the lake water from the flume into the evaporation ponds, including realignment of the existing intake pipes, which could require some

permanent filling and disturbance of new lakebeds around the new pipes. Additionally, a new road dike would need to be constructed across the lake to the new intake pump station in order to transport operators, maintenance personnel, and maintenance and repair equipment, including a crane, to service the pump station and maintain the flume. Constructing a wooden flume would not eliminate the need to stabilize the north dike of pond 113. An elevated wooden flume alternative was rejected because:

- A new pump station facility and associated fill pad would permanently impact or displace new lakebed areas. Since the new pump station would be at a lower level in the lake, the fill pad would have to be constructed several feet above elevation 4205 to ensure the pump station would not be inundated during high water levels and wind/wave action. Large amount of fill material, including rock, would have to be imported or hauled onto the site, which would cause large amounts of dust, noise, and disturbance to the lakebed flora and fauna for several months.
- A new haul road would have to be constructed out to the new pump station site to bring material to construct the pump station and flume. The haul road would be a permanent impact displacing new lakebed surface areas.
- An elevated flume over the lakebed would require many piles to be driven into the lakebed over a 36,750-foot distance (almost 7 miles). Piles would permanently displace lakebed surfaced areas. Driving piles could have large noise impacts over long distances. An elevated flume would still cause long-term, lakebed impacts associated with shading over a 28-foot wide by a 7 mile corridor.
- Construction and maintenance costs for the flume and new pump station would be many times more than the applicant's preferred alternative. Also, a new pump station would increase energy consumption without any additional benefits over the preferred alternative.

5.2.3 On-Site Alternative 3:

A variation of an elevated flume alternative would be to construct the flume on the surface of the lakebed instead of elevating it, thereby reducing construction impacts, and the possible need for a new intake pump station. This alternative was rejected because:

- Constructing a flume on the lake bottom would disturb and cover 36,750 feet of new lakebed habitat. The applicant's preferred alternative would disturb about 18,000 feet of new lakebed.
- Pump stations 113 and 114 intake pipes would have to be modified and reconfigured to pump water from the flume. This reconfiguration could require additional fill and permanently impact additional lakebed habitat to support realignment of the pipes and associated structures.
- Construction and maintenance costs would be several times higher than the cost of the applicant's preferred alternative without reducing aquatic impacts.

5.2.4 On-Site Alternative 4:

To minimize disturbance of lakebed substrate, the excavated material from the canal could be hauled off-site instead of sidecast adjacent to the canal. This would reduce area impacted by 23.8 acres (see Table 1). Removing excavated material would require loading the material onto trucks. This alternative was rejected because:

- Loading a total of 343,000 cubic yards of material onto trucks for transport would be a major logistical problem, and could have a major, short-term impact to local air quality, traffic as well as noise impacts to bird populations. Assuming 10 to 15 cubic yard trucks are used, it would take an equivalent of between 22,867 and 34,300 truck loads or 45,734 to 68,600 round-trips to haul the material away. There would be direct, adverse impacts on the haul route of the lakebed from the continual line of heavy trucks moving back and forth over many months, including the associated impacts from exhaust emissions, noise, vibration and dust on air quality and nearby wildlife. More than likely mats would be placed over the lakebed to spread the weight of the trucks along the haul route, and prevent them from sinking but this coverage of lakebed would require a larger surface area of disturbance than

disposing of the material on-site adjacent to the canal because the haul route has to span the entire length of the canal, approximately 7 miles. An alternative to mats (if mats are not sufficient to carry the weight of loaded trucks) would be to engineer a temporary haul road over the lakebed. This would take a larger surface area and would require importing thousands of tons of rock and foundation soil to construct the haul road, and then eventually removing all such material after improvements to the canal are completed. Construction of an engineered haul road over placement of mats would be much more expensive and the associated impacts would also be much greater. Air quality impacts, impacts from construction equipment, rocks and foundation soil would be much greater than placement of mats.

- Finding an appropriate disposal site or sites that would accept such a large amount of material could be a permitting challenge along with its related disposal environmental impacts.
- Hauling and disposing 343,000 cubic yards of material would be very costly.
- Removing excavated material off-site would be removing native lakebed material that could otherwise be habitat if left adjacent to the canal since much of the lakebed along the existing canal is exposed even under a normal rainfall year, especially at the western end of the canal. Even with above normal rainfall, much of the area is inundated for only a few short months because of the high evaporation rate in the North Arm of the lake as seasonal air temperatures increase. Leaving the excavated native material adjacent to the canal would preserve or conserve lakebed habitat although there would be short-term disruption during the excavation and deposition process. The native substrate would be mounded but would stay on-site and could be recolonized in the short term since the material will remain in the same area.

5.3 Offsite Alternatives

5.3.1 Off-Site Alternative 1:
A site in the western portion of the lake that is south of the railroad causeway. This would entail construction of a new canal and pump station(s). This area was rejected because:

- The salinity level in the south arm of the lake is too low for optimal production of SOP. Lower salinity brine water would take a much longer evaporation process, and therefore would be less efficient and increase production cost without any added benefits.
- Although a new intake canal and pump station(s) could be constructed, this would entail new playa lakebeds and associated flora and fauna that would be impacted. Potential impacts to brine shrimp habitat and associated industry, potential impacts to bird use, and potential impacts to special aquatic sites would higher south the railroad causeway than in Gunnison Bay.
- Construction cost would be at several times higher than modifying the existing intake canal.
- Added cost of and time to obtaining necessary state land leases and mineral rights or long-term leases if the land is owned by the Federal government or is under private ownership.

5.3.2. Off-Site Alternative 2:
Modifying the existing Behrens Trench as an intake canal. Behrens trench, located at the southeast end of the West Ponds, is a 21-mile trench used to export processed (higher salinity) brine from the West Ponds to the East Ponds in Bear River Bay of the Great Salt Lake for further evaporation. It is an export canal and not an intake canal. Export of high salinity brine from the West Ponds occurs approximately 5 months per year (around June through October). It is possible to modify the operation of pump station 112 and use the west end of the Behrens trench as an intake canal to pump brine water from the lake into the West Ponds when it is not used for export. This alternative was rejected because:

- As with areas south of the railroad causeway, the brine water quality in the south end of Gunnison Bay is less saline (more diluted), due to inflow through the culverts

underneath the causeway from the South Arm of the lake. This is the reason why the intake canal is situated north of the West Ponds; to take advantage of the much higher concentration salinity brine water available.

- Intake of brine water into the West Ponds occurs about 7 months per year (April through October). Intake and export occur more-or-less concurrently to optimize efficiency of the pond evaporation process. Because pump station 112 and the Behrens Trench are simultaneously operational during much of the time the pump stations 113-114 intake canal is operational, using the Behrens Trench as an intake canal would make the operation very inefficient, and increase production time of SOP.

6.0 Environmental Setting, Consequences and Mitigation

6.1 Physical/Chemical Characteristics

6.1.1 Substrate: The substrate involved is unvegetated playa lakebed that occasionally becomes inundated during winter and spring runoff. The higher end of the project site closer to Pond 113 is less frequently flooded than the lower end, near the intake of the canal.

Alternative 1. Under this alternative, no permit would be issued and the substrate at the site would remain the same.

Alternative 2. Under this alternative, approximately 56.8 acres would be disturbed from both excavation (33 acres) and deposition of side-cast material (23.8 acres). Approximately 8,000 linear feet (or 9.2 acres) of the south arm of the existing canal would be restored by backfilling with native, lakebed material previously sidecast from the original excavation. This will allow this arm of the canal to restore itself to its former biological condition. The remainder of the canal will be enlarged and lengthened. Since no imported fill or structures are involved, the substrate will remain the same, even at the side-cast areas adjacent to the canal. It is expected the disturbance of the substrate habitat of the stockpile areas will only be temporary and short term and should recolonize over time. The canal bottom will be mostly submerged with lake brine since the bottom elevation will be below the surface elevation by several feet. Side-cast material will be the same native soils as the receiving locations, which are adjacent to the canal. These stockpiled locations will be a few feet above the surface elevation of the lake and for the most part, will not be periodically inundated by lake water except during above normal rainfall years. The overall impact to the substrate would be less than significant.

6.1.2 Current patterns and water circulation: Currently, the lake has a natural counter-clockwise coriolis circulation. Lake levels naturally fluctuate on a seasonal and annual basis depending on rate of rainfall, inflow and evaporation.

Alternative 1. Under this alternative, no permit would be issued and the current patterns and water circulation for the lake would remain the same.

Alternative 2. Under this alternative, the lake has a natural counter-clockwise coriolis circulation. The side-cast material should have very little effect on local currents in the deeper portion of the lake (e.g., the 10,000-foot intake section). In the shallower, western end of the lake, the berm may have some effects on currents, but should have very little impact on brine shrimp and brine fly habitats since they appear sparse in the project area. The proposed project will have no effect on normal water level fluctuations over the baseline condition since no additional water intake will occur over its current rate of intake. The overall impacts to current patterns and water circulation would be less than significant.

6.1.3 Suspended particulates/turbidity:

Alternative 1. Under this alternative, no permit would be issued and the suspended particles and turbidity of the lake would remain the same.

Alternative 2. Under this alternative, excavation of the new western arm of the canal north of Pond 113 will occur in the dry areas and will not create any suspended particulates or turbidity. Most of the excavation will be done with the canal isolated from the lake by plugging the northeast end to prevent lake brine from filling the canal. Portable pumps by the pump station will pump leakage brine from the canal back to the lake. Backhoes will work in the bottom of the canal on mats. Because of the long distance from the excavation to the portable pumps, any sediment caused by excavation will have settled. Stockpiled areas may release some suspended material and turbidity during periodic inundation as the lake level rises seasonally. When the pumps are drawing water into the canal, there will be some suspension and turbidity within the canal, most of which will settle out at the bottom of the canal along with precipitated salts. Overall impacts to brine shrimp, brine flies or other invertebrates are expected to be less than significant.

6.1.4 Normal water level fluctuations: The Great Salt Lake has fluctuated from historic highs of 4212 in 1986 and 1987 to historic lows of 4191 in 1963.

Alternative 1. Under this alternative, no permit would be issued and lake levels would either increase or decrease depending on existing conditions.

Alternative 2. Under this alternative, the proposed project would proceed. Based on an analysis of the effects of GSLM pumping on water levels, dated November 20, 2008, the total lake elevation drawdown from pumping at a lake elevation of 4195 would be 0.22 feet. At 4185, the elevation of the bottom of the proposed canal the drawdown was estimated at 0.32 feet. However, if lake elevations approached 4185 pumping would likely cease due to difficulties in pumping brine at shallow depths. Overall impacts to water level fluctuations are expected to be less than significant.

6.1.5 Flood hazards & floodplain values: Due to fluctuations of lake elevations, flooding may result during periods of high lake levels particularly after several wet cycles of above-average precipitation. In response to several years of high lake levels of nearly 4212 in 1987, pumps at the West Desert Pumping Stations began pumping water out of the lake. The pumping station is maintained to this day and can begin pumping at an elevation of 4208. Presumably, the pumping station would reduce the possibility of flood related damages in the future.

Alternative 1. Under this alternative, no permit would be issued and the flood hazards and floodplain values for the lake would remain the same.

Alternative 2. Under this alternative, the proposed project would occur. However, since the project will not increase water levels in the lake it is unlikely that flood hazards or floodplain values would be affected. Overall impacts would be less than significant.

6.1.6 Storm, wave, and erosion buffers: As a terminal lake, storm, wave, and erosion buffers for the Great Salt Lake are located exclusively along the shoreline. Typically, the gentle slope of the lake's shoreline and the lack of significant wave action would negate the need for erosion protection.

Alternative 1. Under this alternative, no permit would be issued and the storm, wave, and erosion buffers for the lake would remain the same.

Alternative 2. Under this alternative, the proposed project would proceed. Since stockpiled materials from the excavations would be limited to dry areas, overall impacts to storm, wave, and erosion buffers would be less than significant.

6.1.7 Erosion and accretion patterns: Lakebed and playas within the project area are flat and unvegetated with no erosion gullies or mounding . Accretion patterns within existing intake canals are due to pumping of the lake water for mineral extraction. Evaporation and settling of suspended sediments requires periodic maintenance within the canals.

Alternative 1. Under this alternative, no permit would be issued and the erosion and accretion patterns would remain the same.

Alternative 2. Under this alternative, the proposed project would proceed. Based on observation from previous canal excavation projects adjacent to the project area, no erosional gullies or mounding would occur. Accretion of sediment/salts within the new portions of the canal would require future maintenance. Overall impacts to erosion and accretion patterns would be less than significant.

6.1.8 Water quality, including salinity gradients: Salinity within the Great Salt Lake varies depending on the location and is dependant on the amount of inflow, the inflow salt content, and evaporation. If inflow is low or evaporation rates are high, then lake levels would decrease causing and increase in salinity. Salinity of Gunnison Bay within the north arm of the lake is currently measured at 28%. The Great Salt Lake has its own category of beneficial use and is protected for primary and secondary contact, recreation, aquatic wildlife and mineral extraction. Most of these beneficial uses (except for mineral extraction) are more applicable to the southern portion of the lake, and are much less so or not relevant in the North Arm of the lake. Numerical standards for pollutants are lacking for Great Salt Lake although a standard for selenium (in the open water) is being developed by Utah Department of Environmental Quality.

Alternative 1. Under this alternative, no permit would be issued and water quality and salinity gradient would remain not be affected by this project.

Alternative 2. Under this alternative, the proposed project would proceed. Rate of intake of brine from the Great Salt Lake will remain at its current volume and rate, which is the environmental baseline from which the proposed project is evaluated. There is no return flow or discharge from the west salt evaporation ponds back into the North Arm, and thus the higher salinity brine in the ponds would not affect water quality in the lake. Surveys were undertaken in 2008 by SWCA Environmental Consultants to sample for the possible presence of potential chemicals of concern (PCOCs), which included heavy metals, pesticides, PCBs, and total petroleum hydrocarbons (TPHs). Results of the sampling effort indicate that of all the PCOCs analyzed, only cadmium and lead were measured in concentrations slightly above laboratory detection limits; however, levels of cadmium and lead were typical of natural background conditions. The survey indicates that the potential for altering the geochemical conditions, for the PCOCs analyzed, as a result of the excavation and stockpiling should be minimal. Overall impacts to water quality, including salinity gradients would be less than significant.

6.1.9 Aquifer Recharge: Contribution of water to aquifer recharge from the Great Salt Lake is likely minimal, due to its position as a terminal lake with impermeable soils.

Alternative 1. Under this alternative, no permit would be issued and aquifer recharge functions of the lake would be unaffected.

Alternative 2. Under this alternative, the proposed project would proceed. Given the impervious lakebed soils and low elevation, overall impacts to aquifer recharge functions would be less than significant.

6.1.10 Baseflow: There is no evidence that the area of the project site is supported by groundwater inflow. Most of the area is typically dry except during the winter and spring surface runoff.

Alternative 1. Under this alternative, no permit would be issued and aquifer baseflow conditions would remain unchanged.

Alternative 2. Under this alternative, the proposed project would proceed. Overall impacts to baseflow would be less than significant.

6.1.11 Mixing zone, in light of the depth of water at the disposal site; current velocity, direction and variability at the disposal site; degree of turbulence; water column stratification discharge vessel speed and direction; rate of discharges per unit of time; and any other relevant factors affecting rates and patterns of mixing: The discharge site for the dredged materials will be in dry portions of the lakebed. Therefore, no mixing is likely to occur.

Alternative 1. Under this alternative, no permit would be issued and no effect of mixing would occur.

Alternative 2. Under this alternative, the proposed project would proceed. Overall impacts from mixing of discharge would be less than significant.

6.2 Biological Characteristics.

6.2.1 Special aquatic sites (wetlands, mud flats, vegetated shallows, riffle and pool complexes, coral reefs, sanctuaries, and refuges): The project area is located in unvegetated playa. No wetlands are found within the areas that would be impacted from the excavation or side casting.

Alternative 1. Under this alternative, no permit would be issued and no special aquatic sites would be impacted.

Alternative 2. Under this alternative, the proposed project would proceed. Overall impacts to special aquatic sites would be less than significant.

6.2.2 Fish, crustaceans, mollusks, and other aquatic organisms in the food web: There are no fish inhabiting the Great Salt Lake. The North Arm of the Lake is not known to have high habitat functions because of the high salinity water (≥25%) and substrate. There is probably some habitat for brine shrimp and brine flies but their optimal habitat occurs in lower salinity waters south of the railroad causeway in the southern portion of the Great Salt Lake. The brine shrimp industry is located in the southern part of the lake.

Alternative 1. Under this alternative, no permit would be issued and aquatic organisms would be unaffected.

Alternative 2. Under this alternative, the proposed project would proceed. Overall impacts to aquatic organisms would be less than significant.

6.2.3 Wildlife values: The Great Salt Lake is important habitat for migratory birds. Gunnison Island, located in the North Arm of the lake about 5 miles east of the salt evaporation ponds, is a state wildlife management area where public access is restricted. Gunnison Island has one of the three largest White Pelican colonies in North America and a very large nesting colony of California Gulls. Peregrine falcons are also known to nest on the island. Surveys were conducted for shorebird use as part of the EIS for the solar evaporation pond expansion project (Corps Number: SPK-2007-00121) and are currently ongoing. Preliminary results of snowy plover surveys between Spring 2007 and Autumn 2008 state that 2 nests were found near the dike structures, one on top of the dike and one within the adjacent playa. Nesting season for snowy plovers is generally April through July.

Alternative 1. Under this alternative, no permit would be issued and wildlife values would be unaffected.

Alternative 2. Under this alternative, the proposed project would proceed as planned. Because Gunnison Island is an important nesting site for several bird species, construction of the intake will be no closer than about 3.8 miles from the island. The existing intake canal at its closest point is about 4 miles northwest of the island, and thus the expanded intake will be no closer in distance than it is now. The Corps has imposed 3 and 4 mile buffers around Gunnison Island the past for work activities by GSL. To minimize impacts to nesting snowy plovers, work on the proposed project will be prohibited from 1 April to 31 July. Overall impacts to wildlife would be less than significant.

6.2.4 Threatened and endangered species: Not applicable. This project does not provide or have potential habitat for federally listed threatened or endangered species.

6.2.5 Biological availability of possible contaminants in dredged or fill material, considering hydrography in relation to known or anticipated sources of contaminants; results of previous testing of material from the vicinity of the project; known significant sources of persistent pesticides from land runoff or percolation; spill records for petroleum products or designated (Section 311 of the CWA) hazardous substances; other public records of significant introduction of contaminants from industries, municipalities, or other sources: Surveys were undertaken in 2008 by SWCA Environmental Consultants to sample for the possible presence of potential chemicals of concern (PCOCs), which included heavy metals, pesticides, PCBs, and total petroleum hydrocarbons (TPHs). Results of the sampling effort indicate that of all the PCOCs analyzed, only cadmium and lead were measured in concentrations slightly above laboratory detection limits; however, levels of cadmium and lead were typical of natural background conditions. The survey indicates that the potential for altering the geochemical conditions, for the PCOCs analyzed, as a result of the excavation and stockpiling should be minimal.

Alternative 1. Under this alternative, no permit would be issued and levels of potential contaminants would remain the same.

Alternative 2. The new western arm of the canal project will be excavated in the dry as well as a portion of the 10,000-foot extension. The native material will be disposed of on both sides of the canal, which are also dry. Restoration of the canal segment adjacent to the north dike of Pond 113 will also be done in the dry. Any potential contaminants in the sediments are not expected to be released or made biologically available for work conducted in the dry. The remainder of the existing canal will be plugged and drained before excavation commences. Since the material will be side cast onto dry areas adjacent to the canal, the excavated material will dry out thereby minimizing the release of any potential contaminant. The 2008 survey for PCOCs indicates that the potential for altering the geochemical conditions, for the PCOCs analyzed, as a result of the excavation and stockpiling should be minimal. Overall impacts to water quality, including salinity gradients would be less than significant.

6.3 Human Use Characteristics.

6.3.1 Water supply and conservation: The Great Salt Lake is not used for water supply because of its naturally high salinity level.

6.3.2 Aesthetics: The remoteness of the area means very few people travel the distances to view the west side of the lake required to observe the viewshed.
Alternative 1. Under this alternative, no permit would be issued and the areas aesthetics would remain unchanged.

Alternative 2. Under this alternative, the proposed project would proceed. The proposed modified intake canal would be essentially along the same alignment as the existing canal but

longer, wider and deeper. The canal is a very low profile construction since it is excavated in the lakebed and is normally inundated with lake brine water. Except from the air or on top of a nearby dike, the canal cannot be seen. The dikes from other areas of the lake (and therefore the canal) are not visible because of the curvature of the earth and their relatively short height so there is no impact from places like Promontory Point, or Monument Point. Overall impacts to aesthetics would be less than significant.

6.3.3 Traffic/transportation patterns: Not applicable. There is relatively no public or private transportation within the north arm of the lake.

6.3.4 Noise: Surveys to assess noise impacts from construction and brine pump use as part of the EIS for the solar evaporation pond expansion project (Corps Number: SPK-2007-00121) are currently ongoing. Preliminary results indicate that noise associated with pump operation dropped to ambient levels at ½ mile from the pump. Noise on Gunnison Island was at completely ambient levels and most affected by wind.

Alternative 1. Under this alternative, no permit would be issued and the noise levels would remain unchanged.

Alternative 2. Under this alternative, the proposed project would proceed. Based on preliminary surveys, the overall impacts from noise would be less than significant.

6.3.5 Safety: Not applicable. No effect on any public safety during construction since the area is relatively isolated, and the public rarely visits this area of the lake. There are no public destinations in this area.

6.3.6 Recreation: Not applicable. There will be no effect on public safety during construction since the area is relatively isolated, and the public rarely visits this area of the lake. There are no public destinations in this area.

6.3.7 Recreational and commercial fisheries: Not applicable. There are not recreational or commercial fisheries on the Great Salt Lake.

6.3.8 Navigation: Not applicable. The lake is very shallow in this area, especially in the summer, and little, if any, boating occurs in this area of the North Arm of the Great Salt Lake.

6.3.9 Energy needs: Not Applicable. Other than during construction, no major, additional energy needs will result from the canal improvement project. Existing pump stations (113 and 114) will be used. The pumps always operate at maximum capacity, so no additional energy will be consumed.

6.3.10 Mineral needs: The Great Salt Lake is an important commercial source for various mineral salts; such as, potassium, sodium chloride and magnesium. GSL is the primary North American producer of organic sulfate of potash (SOP) and magnesium chloride.

Alternative 1. Under this alternative, no permit would be issued and GSL production of mineral salts may decrease with falling lake levels.

Alternative 2. Under this alternative, the proposed project would proceed. Production of mineral salts by Great Salt Lake Minerals Corporation would likely remain the same.

6.3.11 Economics: GSL is the largest producer of organic SOP in North America, and any disruption to the supply of SOP from the Great Salt Lake would have a sizeable, negative economic impact on SOP users nationally. SOP is a specialty fertilizer used by the commercial turf industry and agricultural sector of this country. It is especially suited for fruit and vegetable

growers. SOP from the Great Salt Lake is also sold in South America, Asia and Australia. Royalty revenues and annual mineral leases of sovereign state lands of the lake provide millions of dollars to the state of Utah as well.

Alternative 1. Under this alternative, no permit would be issued and supply of SOP may be disrupted if lake levels decrease.

Alternative 2. Under this alternative, the proposed project would proceed. The project would allow for continued mineral extraction at existing levels with decreasing lake elevations, therefore SOP supply would not decrease as a result of lower lake levels.

6.3.12 Food and fiber production: The Great Salt Lake is not a direct source of food or fiber production for human consumption. There are no fish in the lake, and there are no invertebrates in the lake that are harvested for human use. However, a nationally important product produced by GSL from the lake is SOP, a vital, specialty potassium fertilizer used for fruits, vegetables, tea, tree nuts, turf, and other high-value crops. The lake is the largest source of SOP in North America, and any major disruption to producing SOP could have a negative impact on food production of fruits and vegetables, especially organically grown fruits and vegetables.

Alternative 1. Under this alternative, no permit would be issued and food and fiber production may be affected by a decrease in SOP supply from decreasing lake levels.

Alternative 2. Under this alternative, the proposed action would proceed. The project would allow Great Salt Lake Minerals Corporation to maintain existing levels of SOP extraction if lake levels decrease.

6.3.13 Prime and unique farmland: Not applicable. There is no prime or unique farmland within the project boundary.

6.3.14 Considerations of property ownership: Not applicable. There is no private property within the project boundary.

6.3.15 Land use: Use of solar evaporation ponds to produce mineral salts in the North Arm of the lake is an allowed use. GSL has been producing salt in the Great Salt Lake since 1970.

Alternative 1. Under this alternative, no permit would be issued and land use would remain the same.

Alternative 2. Under this alternative, the proposed project would proceed. The lake bottom would be lowered as part of the trench excavation. Overall impacts due to changes in land use would be less than significant.

6.3.16 Historic properties: The project site is a lakebed that has been periodically inundated. Fluctuation of lake levels has flooded the area and likely prevented significant human habitation. No known historical structures or pre-historical sites are known to exist within the survey area.

6.3.17 Parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar areas: Not applicable. No parks, national or historical monuments, national seashores, wilderness areas, research sites, or similar areas are located within the project site.

6.3.18 Air Quality: The proposed permit has been analyzed for conformity applicability pursuant to regulations implementing Section 176(c) of the Clean Air Act. It has been determined that the activities proposed under this permit will not exceed de minimis levels of direct emissions of a criteria pollutant or its precursors and are exempted by 40 CFR Part 93.153. Any later indirect emissions are generally not within the Corps continuing program responsibility and generally cannot be practicably controlled by the Corps. For these reasons a conformity determination is not required for this permit action.

6.3.19 Other considerations: None.

7.0 Indirect Effects

The proposed project is to modify the existing intake canal because of the very low water level in the North Arm of the lake. Without extending the intake canal, obtaining sufficient brine water to produce SOP and other mineral salts would be jeopardized. Since the amount and rate of water intake would remain the same after the project is completed, the proposed project is not growth-inducing nor would it cause expansion of production. The canal modification is not likely to induce changes in land use patterns, population density or growth rate, or affect changes in air.

8.0 Cumulative Effects

This analysis summarizes each of the resource areas that would potentially experience cumulative impacts, and is considered in combination with the other past, present, and reasonably foreseeable projects in the area. For this analysis, project vicinity is defined as the project site within the northern arm of the Great Salt Lake. Overall the project will result in minimal impacts to the natural and the human environment.

The evaporation ponds and original canals were constructed in the early 1990's after receiving a Department of the Army 404 Permit in 1991. Additional 404 permits were issued in 1995 to excavate an additional canal and to maintain existing ones, and in 2008 to continue required maintenance in response to lower lake levels. Given the limited use of the north arm of the lake, it is unlikely that there would be significant cumulative effects when considered with past projects. Sufficient information is not available to determine the potential effects that lower lake levels resulting from pumping would have on the perimeter of the lake. Based on the Hydroikos study, the extent that lake levels would decline due to pumping would be 0.22 feet when the lake is at an elevation of 4195. Impacts to the shoreline due to this decline are believed to be minimal.

Great Salt Lake Minerals Corporation is currently seeking authorization to expand the current solar evaporation pond operation by an additional 33,000 acres. The proposed pond expansion, if authorized, will overlap this project. Two of the proposed solar ponds, 7,000 and 18,000 acres, are proposed to be constructed adjacent to the west pond complex and the existing canals would be backfilled and restored with native lakebed material then converted for use as solar evaporation ponds.

9.0 Compliance with Federal, State, and/or Local Laws

9.1 Environmental Justice (Title VI of the Civil Rights Act and Executive Order 12898). The proposed action is not expected to negatively impact any community, and therefore is not expected to cause disproportionately high and adverse impacts to minority or low-income communities.

9.2 Endangered Species Act (ESA) of 1973. The proposed project is in compliance with the ESA (see also Section 6.2.4).

9.3 Magnuson-Stevens Fishery Conservation and Management Act *(MSFCMA).* The proposed project is in compliance with the MSFCMA.

9.4 Section 401 of the CWA. The proposed project is in compliance with the Section 401 of the CWA. The Water Quality Certificate Waiver (WQCW) was effective on May 17, 2008.

9.5 Section 176(C) of the Clean Air Act (CAA) General Conformity Rule Review. The proposed project is in compliance with the CAA (see also Section 6.3.18).

9.6 Section 106 of the National Historic Preservation Act (NHPA). The proposed project is in compliance with the NHPA.

9.7 Executive Order 11990: Protection of Wetlands. The proposed project is in compliance with Executive Order 11990.

9.8 Executive Order 11998: Floodplain Management. The proposed project is in compliance with Executive Order 11998.

9.9 Executive Order 13175: Consultation with Indian Tribes, Alaska Natives, and Native Hawaiians. The proposed project is in compliance with Executive Order 13175.

9.10 Other related federal/state/local laws or regulations: No other applicable federal, state, or local laws have been identified.

10.0 Public Interest Review

10.1 The relative extent of the public and private need for the proposed work has been considered: The proposed project has been evaluated above in Section 6.0. Based on the information provided, there is a private and public economic benefit from the proposed project.

10.2 The practicability of using reasonable alternative locations and/or methods to accomplish the objective of the proposed structure or work has been evaluated: Alternatives to the proposed project were evaluated in Section 5.0. Alternatives analyzed were the no-build alternative, four on-site alternatives, and two off-site alternatives. Alternatives to the proposed project were eliminated due to not meeting the project purpose, cost, logistics, and greater impacts to the aquatic environment.

10.3 The extent and permanence of the beneficial and/or detrimental effects that the proposed structures or work may have on the public and private uses which the area is suited has been reviewed: The permanence of the proposed canals are dependent on future lake levels and the pending authorization of the proposed 33,000-acre solar evaporation pond expansion which would develop portions of the canals into solar ponds (Corps Project Number SPK-2007-00121).

11.0 Evaluation of Compliance with 404(b)(1) Guidelines

11.1 Alternatives Test: Based on the discussion in Section 4.0, are there available, practicable alternatives having less adverse impact on the aquatic ecosystem and without other significant adverse environmental consequences that do not involve discharges into "waters of the U.S." or at other locations within these waters? [Note: An asterisk* denotes a finding of non-compliance with the guidelines.]

___ **Yes.*** _X_ **No. Explain rationale for decision:** Per Section 5.0 no off-site alternatives appear to be practicable. Based on information submitted by the applicant, the no-build alternative is not practicable and may result in decreased mineral extraction by Great Salt Lake Minerals Corporation and a decrease in supply of minerals, including SOP, if lake levels recede.

Based on Section 4.0, if the project is in a special aquatic site and is not water dependent, has the applicant clearly demonstrated that there are no practicable alternative sites available?

_X_ **Yes.** ___ **No*. Explain rationale for decision:** The project is water-dependant and is not located within a special aquatic site.

11.2 Special Restrictions. Will the discharge:

Violate state water quality standards?

___ **Yes*.** _X_ **No. Explain rationale for decision:** Based on available information, the project should not violate state water quality standards.

Violate toxic effluent standards under Section 307 of the Clean Water Act?

___ Yes*. _X_ No. Explain rationale for decision: Based on available information and the results of the SWCA October 16, 2008 sampling results, the activity should not violate toxic effluent standards under Section 307 of the Clean Water Act.

Jeopardize endangered or threatened species or their critical habitat?

___ Yes*. _X_ No. Explain rationale for decision: This project does not provide or have potential habitat for federally listed threatened or endangered species.

Violate standards set by the Department of Commerce to protect marine sanctuaries?

___ Yes*. _X_ No. Explain rationale for decision: The project site is not within a marine sanctuary.

Evaluation of the information in Section 6 above indicates that the proposed discharge material meets testing exclusion criteria for the following reason(s):

( ) based on the above information, the material is not a carrier of contaminants.

(X) the levels of contaminants are substantially similar at the extraction and disposal sites and the discharge is not likely to result in degradation of the disposal site and pollutants will not be transported to less contaminated areas.

( ) acceptable constraints are available and will be implemented to reduce contamination to acceptable levels within the disposal site and prevent contaminants from being transported beyond the boundaries of the disposal site.

11.3 Other restrictions:

Will the discharge contribute to significant degradation of "waters of the U.S." through adverse impacts to:

Human health or welfare, through pollution of municipal water supplies, fish, shellfish, wildlife and/or special aquatic sites?

___ Yes*. _X_ No. Explain rationale for decision: See Sections 6.2.2, 6.2.3, and 6.3.1.

Life stages of aquatic life and/or wildlife?

___ Yes*. _X_ No. Explain rationale for decision: See Sections 6.2.3 and 6.3.1.

Diversity, productivity, and stability of the aquatic life and other wildlife? Or wildlife habitat or loss of the capacity of wetlands to assimilate nutrients, purify water or reduce wave energy?

___ Yes*. _X_ No. Explain rationale for decision: See Sections 6.1.6, 6.2.3 and 6.3.1.

Recreational, aesthetic, and/or economic values?

___ Yes*. _X_ No. Explain rationale for decision: See Sections 6.3.2, 6.3.6 and 6.3.7.

11.4 Actions to minimize potential adverse impacts. Will all appropriate and practicable steps be taken to minimize adverse impacts of the discharge on the aquatic ecosystem? Does the proposal include satisfactory compensatory mitigation for losses of aquatic resources?

_X_ Yes. ___ No*. Explain rationale for decision: The Special Conditions to the permit, identified in Section 12.3 will serve to minimize the adverse impacts to the aquatic and to stipulate appropriate compensatory mitigation to the unavoidable losses to jurisdictional waters.

12.0 Findings

The selected alternative is the Least Environmentally Damaging Practicable Alternative, with inclusion of the special permit conditions listed in Section 12.3.

12.1 Public Interest Determination.

I find that issuance of a Department of the Army permit, as prescribed by regulations published in 33 CFR 320 to 330, and 40 CFR 230:

_X_ Is not contrary to the public interest (with the inclusion of special permit conditions presented in Section 12.3 of this document).

___ Is contrary to the public interest for the following reason(s):

12.2 Compliance with the 404(b)(1) Guidelines:

___ The discharge complies with the guidelines.

_X_ The discharge complies with the guidelines, with the inclusion of the appropriate and practicable general and special conditions (listed below in Section 13.3) to minimize pollution or adverse effects to the affected ecosystem.

___ The discharge fails to comply with the requirements of these guidelines because:

___ There is a practicable alternative to the proposed discharge that would have less adverse effect on the aquatic ecosystem and that alternative does not have other significant adverse environmental consequences.

___ The proposed discharge will result in significant degradation of the aquatic ecosystem.

___ The discharge does not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem, namely....

___ There is not sufficient information to make a reasonable judgment as to whether or not the proposed discharge will comply with the guidelines.

12.3 Special Conditions: The following special conditions will be included in the permit to ensure the project is not contrary to the public interest and complies with the 404 (b)(1) Guidelines:

1. To mitigate for the loss of 9.1 acres of waters of the United States the permittee shall purchase 2.28 credits (0.25:1 ratio) of playa at Machine Lake Mitigation Bank, a Corps approved wetland mitigation bank. Evidence of this purchase shall be provided to this office prior to proceeding with any activity otherwise authorized by this permit.

2. In order to minimize project related impacts to nesting snowy plovers, all work associated with the proposed project, including excavation, stockpiling, and vehicle operation shall be avoided from 1 April to 31 July. If work activities are required to be performed between April 1 and July 31, the applicant shall notify the Utah Regulatory Office of the Army Corps of Engineers prior to working within this timeframe. In such case, a qualified biological monitor shall be required to be onsite to survey for nests until work ceases. If nesting snowy plovers are present, no construction will occur until the young are fledged. Additional protocol details will be determined by the Corps if necessary.

3. Staging, maintenance, and fueling of motor vehicles and equipment shall be performed in upland areas or out of water areas to include spoil piles or dikes to prevent spillage from occurring in waters of the United States in accordance with state of Utah spill prevention plan requirements.

4. To document pre- and post-project construction conditions, the permittee shall submit pre- and post-construction photos of the project site within 30 days after project completion.

5. The permittee shall provide a complete set of as-builts of the completed work within waters of the United States to the Corps of Engineers. The as-builts shall indicate changes made from the original plans in indelible red ink. These as-builts shall be provided to this office no later than 60 days after the completion of construction.

6. The permittee must allow representatives from the Corps of Engineers to inspect the authorized activity and any mitigation, preservation, or avoidance areas at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

12.4 Finding of No Significant Impact (FONSI): Having reviewed the information provided by the applicant and comments from interested parties and based on the assessment of environmental effects in this document, I find that the proposed project will not have significant adverse effects on the quality of the human environment. Therefore, an Environmental Impact Statement will not be prepared.

13.0 List of Agencies and Persons Consulted
US Fish and Wildlife Service, Nathan Darnall
Utah Division of Water Quality, Theron Miller

14.0 References

Hydroikos Ltd. November 20, 2008. Effects of PGSLM Pumping on Water Levels. Internal Report.

SWCA Environmental Consultants. October 16, 2008. GSLM PS114 Canal Sediment Sampling Results. Internal Report.

Prepared by: _____ _____
John Urbanic, Project Manager Date

Approved by: _____ _____
Jason Gipson, Chief Date
Nevada-Utah Regulatory Branch

APPENDIX A

PUBLIC NOTICE

APPENDIX B

PROJECT DRAWINGS AND MAPS

APPENDIX C

PUBLIC NOTICE COMMENTS & OTHER AGENCY DOCUMENTS