

**Southwest Groundwater Treatment Plant,
Draft UPDES Permit No. UT0025836**

Comment Response Summary

Utah Division of Water Quality

May 9, 2012

PROJECT BACKGROUND AND DRAFT UPDES PERMIT OVERVIEW

The Southwest Groundwater Treatment Plant (SWGWTP) is part of a larger groundwater cleanup project currently underway to remediate groundwater in the deep aquifer contaminated by historic mining activities in Southwest Salt Lake County. This project will improve groundwater quality and prevent further contaminant migration in the Salt Lake Valley.

The pollutant of concern for this cleanup project is sulfate. The groundwater in the deep aquifer meets drinking water standards for all constituents except for sulfate. The Reverse Osmosis (RO) treatment process will be utilized to remove sulfate and other salts from the groundwater to produce drinking quality water. In this process, contaminants are separated from the water as it moves through the RO membrane and are trapped. Drinking quality water produced after treatment will be distributed to local drinking water systems. The wastewater, or byproduct water, produced during treatment consists primarily of dissolved salts and traces of selenium which must be disposed of.

The DWQ received an application from JWCD for a Utah Pollution Discharge Elimination System (UPDES) permit requesting approval to discharge the byproduct water via a 21 mile pipeline running from the SWGWTP in West Jordan to the mouth of Gilbert Bay along the south shore of the Great Salt Lake (GSL). In addition, approval was requested to discharge excess untreated groundwater to the Jordan River.

Draft permit effluent limits are based upon Utah Secondary Treatment Standards, Utah Water Quality Standards and best professional judgment (BPJ) for both proposed outfalls to the Jordan River and GSL.

The GSL is a saline, terminal lake for which there is currently only one numeric water quality standard. As such, BPJ was used to determine many of the effluent limits for this outfall. As a result, this permit contains extensive monitoring requirements, more than any other UPDES permit to date, that will allow continued evaluation of the underlying assumptions upon which the permit limits are based. These data evaluations, coupled with the tiered management responses associated with the numeric selenium standard, will allow the DWQ to confirm that the beneficial uses for Gilbert Bay and transitional waters will continue to be supported, if the permit is granted in the future.

MERCURY

Comment 1: It is unacceptable for DWQ to permit a mercury discharge from an unknown concentration in the aquifer that has an arbitrary limit based on an estimated total mercury load to the GSL. Under these conditions, adding a new mercury discharge to GSL is a risky experiment. DWQ needs to state the quantities of all pollutants in the discharge.

The August 2010 UPDES Permit Application and the Antidegradation Level II Reviews conducted for Outfalls 001 and 002 provide information on pollutants believed to be present in the effluent. No operational data are available for the newly-constructed SWGWTP therefore, the effluent concentration values for all of the constituents are estimated from the feed water concentrations and expected reverse osmosis efficiencies.

In the summer of 2011, after the public notice period had ended, JWCD was able to equip its wells and collect samples for low-level mercury analysis. The results demonstrate that the flow weighted average concentration of mercury in the Zone B extraction wells is below 8 ng/L (nanograms per liter). Given a concentration factor of 5 after the RO treatment, the calculated mercury loading to the GSL from Outfall 001 will be approximately 0.05 kg/yr or 14% of the effluent load limit specified in the draft permit.

The future draft permit will include a compliance schedule to allow the facility one year from the effective date of the permit to continue mercury characterization efforts. Data collected to date supports the inclusion of a 0.38 kg/yr mercury load limit in the draft permit.

Comment 2: The form and fate of mercury must be measured from the RO plant to the mixing zone in the Lake.

JWCD will be required to monitor the methyl mercury and total mercury concentrations of the byproduct (water and salts remaining after the reverse osmosis process) in April and June of each year to ascertain if mercury methylation is occurring in the 21 mile pipeline. DWQ anticipates that the byproduct mercury monitoring requirements may be modified in the future pending the outcome of these characterization efforts.

In addition, JWCD will be required to monitor the effluent from Outfall 001 for total mercury monthly as well as monitor eggs collected during the nesting season, macroinvertebrates, sediment and co-located water samples. The mercury in eggs and macroinvertebrates will be assumed to be methyl mercury.

No changes will be made in response to this comment.

Comment 3: We recommend a review in the final permit that discusses how capping the effluent's mercury load at 1% of the total mercury load for GSL would be protective of the receiving water's beneficial uses.

DWQ appreciates this comment and will consider alternative approaches in the revised permit. One approach to addressing this issue would be a method recommended by the USEPA: *Guidance for Implementing the 2001 Methyl Mercury Water Quality Criterion* (2009).

Comment 4: We are concerned that the actual load of mercury to Gilbert Bay will be more than what is estimated because no reliable estimates of a mercury load from the treatment plant to Gilbert Bay can be generated.

The estimate of mercury loads is based on mercury not being detected in the effluent. Mercury was assumed to be present at the detection limit and the resulting mercury loads will not exceed 0.38 kg/year. A compliance schedule will be included in the permit to allow the facility one year from the effective date of the permit to more fully characterize the aquifer. In the interim, DWQ believes the 0.38 kg/yr mercury load limit from this discharge is insignificant relative to other mercury sources to the GSL and should be protective. The facility must monitor monthly to

demonstrate compliance with the permit limit of 0.38 kg/yr. Violations of the effluent limit are subject to formal enforcement actions.

No changes will be made in response to this comment.

Comment 5: We are aware that there is no numeric mercury standard for open waters of GSL and this is likely the rationale behind JWCD being able to obtain a UPDES permit in the absence of reliable deep well data. However, because Hg concentration and load were identified as parameters of concern in the Gilbert Bay Level II ADR report, we believe an assessment beyond what was performed would be beneficial for estimating risks to the habitats in and near Gilbert Bay..... We believe an assessment to quantify the mercury load to receiving waters upstream of the mixing zone in Gilbert Bay will help natural resource managers accurately assess the risk posed from increased exposure of ecological receptors to mercury.

Assessing the potential impacts of mercury on the beneficial uses of GSL is an ongoing DWQ project. The current data are summarized in the biennial Integrated Report. The draft JWCD permit includes monitoring requirements for effluent and biota which may be revised as new information becomes available. The revised permit may also include additional monitoring for Class 5A and Class 5E waters.

Comment 6: Permit: Page 8, Section 6: the current language does not distinguish whether total and/or methyl mercury will be evaluated. We recommend, at a minimum, completing an evaluation of total mercury.

The language in the draft FSSOB and Permit was modified to clarify that total mercury will be evaluated in egg tissue, biota and sediment. Water samples collected will be analyzed for methyl mercury and total mercury.

Comment 7: Page 4, Mercury Effluent Limit for Outfall 001 to Gilbert Bay of the Great Salt Lake, 1st paragraph after bullets: Recommend removing or rewording the first sentence. Biochemical, pathological, immunological, and other types of health assessments in Great Salt Lake birds are very limited in scope. All of these types of health assessments have proven useful in avian mercury risk assessments performed outside of the Great Salt Lake. Only one of the three referenced studies performed active assessment of health effects (using biomarkers of effect), and the extent of those effects assessments were limited in scope relative to Gilbert Bay.

The text was revised as follows:

The lack of observed health effects is not conclusive because these studies were not designed to comprehensively evaluate the health of Great Salt Lake's birds nor the area of JWCD's discharge to Gilbert Bay. However, the lack of observed effects suggests that mercury is not currently causing widespread or severe detriments. More studies by U.S. Fish and Wildlife Service and Utah Division of Wildlife Resources are underway to further evaluate the potential for mercury to adversely affect GSL birds. DWQ will continue to monitor the outcome these studies in managing the water quality of Great Salt Lake.

Comment 8: *Page 4, Mercury Effluent Limit for Outfall 001 to Gilbert Bay of the Great Salt Lake, 1st paragraph after bullets: Recommend including dataset from Kevin Perry (Utah State University Dept. of Atmospheric Sciences) on dry deposition of mercury over Great Salt Lake. His estimate of mercury load is different than estimates from USGS. This demonstrates that there is uncertainty in the mercury load to the Great Salt Lake.*

DWQ agrees that there are uncertainties with the mercury loading estimates for GSL. The preliminary estimates by Dr. Perry show lower atmospheric inputs than estimated by Naftz et al. (2008). Dr. Perry proposed several potential explanations in his presentation to the Utah Mercury Workgroup:

- Turbulence might be greater over the lake than at the UT96 site
- Halogens in the lake could enhance conversion of Gaseous Elemental Mercury to Gaseous Oxidized Mercury in the surface layer
- Dry deposition of coarse mercury is not included in the deposition estimates
- Transient riverine influx during storms is not included in the riverine estimate.

While several uncertainties exist, a difference in atmospheric deposition rates affects the source allocations for mercury (i.e., atmosphere vs. riverine). Whether the air deposition estimates of Naftz or Perry are used, SWGWTP will be an insignificant source of mercury to GSL.

No changes will be made in response to this comment.

Comment 9: *FSSOB: Page 4, Mercury Effluent Limit for Outfall 001 to Gilbert Bay of the Great Salt Lake, 2nd paragraph: Last sentence uses the term “insignificant.” Recommend using an alternate word. Significance is based on many things in addition to pollutant load. Additionally, the significance of the load cannot be adequately addressed since JWCD has not fully characterized mercury concentrations in the deep well aquifer.*

The term “insignificant” refers to the maximum allowable mercury load that DWQ has included in the draft permit compared to other sources of mercury loading to GSL and is not in reference to the actual load from the Southwest Groundwater Treatment Plant. An explanation of “significance” was added to the draft FSSOB.

Comment 10: *Please provide a rationale behind the selection of 1% effluent Hg load cap (0.38 kg/yr). Specifically, please explain why 1% is the preferred cap vs. any other percentage.*

The preferred cap for mercury is zero but this is not technically achievable. DWQ reviewed the available data regarding mercury concentrations in the groundwater that will be treated by reverse osmosis. This data was combined with the plant treatment efficiencies and capacities to generate an upper percentile estimate of potential annual mercury loads. This upper percentile estimate resulted in a load that was 1% of the total loading to GSL. One percent of the total mercury load is an insignificant contribution that is unlikely to be detectable in GSL.

The FSSOB will be revised to clearly explain the rationale for proposed mercury effluent limits and the actions that will ensure that the beneficial uses are protected. Currently available studies regarding avian health (see comment 28) support that widespread or severe health impacts are

not occurring. Additional loading of 1% is unlikely to change this condition and monitoring will be required to confirm this conclusion.

Comment 11: FSSOB: Page 4, Mercury Effluent Limit for Outfall 001 to Gilbert Bay of the Great Salt Lake, 4th paragraph: Please provide a rationale for monitoring mercury and methyl mercury during April and June. It's unclear why these two months were selected.

The draft permit requires JWCD to monitor the methyl mercury and total mercury concentrations of the byproduct in April and June of each year to ascertain if mercury methylation is occurring in the 21 mile pipeline. These months coincide with the water, sediment, bugs, and egg sampling in the delta. Methyl mercury will be measured in April and June only but the permit requires the effluent to be monitored monthly for total mercury.

No changes will be made in response to this comment.

Comment 12: We think that the potential for adverse public health consequences exists, related to heavy metals—especially mercury, and that potential threat has not been assessed. Mercury is not a combustible, cannot be destroyed and does not degrade. Therefore, the public health threat that this proposal represents steadily increases over time. The true extent of the threat may not be overtly manifested until decades later. This makes a thorough assessment of this potentially serious problem imperative before the project is approved.

DWQ agrees that discharges of toxic metals such as mercury require careful evaluation. The small amounts of mercury in the byproduct from the SWGWTP would ultimately be discharged to GSL with or without the plant due to the groundwater discharging to the Jordan River. The SWGWTP also provides a mechanism for treating mercury if future evaluations determine that the trace amounts cannot be safely discharged. Mercury can be removed from biologically active areas of the lake by permanent burial in sediment or volatilization from the water. Mercury is an element and while mercury does not degrade, it can change chemical forms (e.g., between elemental and methyl). The different forms have very different toxicological properties. The toxicity of mercury is highly dependent on the chemical form.

Mercury loading to the lake is suspected to be dominated by inorganic (that is, not methyl mercury) from air deposition^{1,2}. A portion of the elemental mercury is converted to methyl mercury by lake bacteria. After the conversion to methyl mercury, the exposure pathway between the methyl mercury and the receptors (humans or biota) must be complete for the exposure to occur. The highest concentrations of methyl mercury in the lake were measured in the deep brine layer at a median concentration of 0.024 µg/l⁽³⁾. If this water was potable, it

¹ Peterson, C. & M.S. Gustin. 2008. Mercury in the air, water and biota at the Great Salt Lake Utah, USA). Science of the Total Environment 405: 255–268.

² 2009 Mercury inputs to Great Salt Lake, Utah: reconnaissance-phase results
D. Naftz, C. Fuller, J. Cederberg, D. Krabbenhoft, J. Whitehead, J. Garberg and K. Beisner In: A. Oren, D. Naftz, P. Palacios and W.A. Wurtsbaugh (eds). Saline Lakes Around the World: Unique Systems with Unique Values. Natural Resources and Environmental Issues, volume XV. S.J. and Jessie E. Quinney Natural Resources Research Library, Logan, Utah, USA

³ Naftz, D. , Angerth, C. , Kenney, T. , Waddell, B. , Darnall, N. , Silva, S., Perschon, C., Whitehead, J., 2008, Anthropogenic influences on the input and biogeochemical cycling of nutrients and mercury in Great Salt Lake, Utah, USA: Applied Geochemistry, v. 23, no. 6, p. 1731-1744

could be safely used for drinking water for humans because the safe concentration for methyl mercury in drinking water for humans is orders of magnitude greater at 3.7 µg/l (USEPA Regional Screening Levels). The actual exposures to humans would be much less while engaging in recreational activities on the lake.

While direct exposures of humans to mercury in the lake are not of concern, waterfowl consumption advisories exist for mercury. Methyl mercury biomagnifies, that is, exposures via food increase for the higher trophic levels. For GSL, humans and birds are the higher trophic level consumers. Follow-up studies since the initial advisories were issued failed to confirm the same high levels of mercury in waterfowl⁴. The advisories will remain in place as a precaution until the reasons for the discrepancies between the initial and subsequent analyses can be determined.

DWQ has at least three mechanisms to ensure that the mercury in JVVCD's discharge remains at acceptable levels. First, JVVCD is required to use special analytical techniques to further characterize the type and concentration of mercury in their effluent for the first year of operations. If this data conflicts with DWQ's current conclusion that the mercury discharge limits are protective, the limits will be revised.

The second mechanism is that the permit is effective for five years. Every five years, the permit may be reissued. DWQ evaluates the permit limits as part of the process. The public is also given an opportunity to comment prior to the permit being reissued. Again, if new data indicate that the existing limits are not protective, the limits will be revised.

Lastly, DWQ continues to conduct investigations and assessments to determine if the lake is meeting its beneficial uses. Ultimately, these evaluations could determine that the beneficial uses are impaired due to mercury pollution. In this scenario, DWQ is required to develop a Total Maximum Daily Load (TMDL) and associated mitigation plan. The mitigation plan may call for point source reductions in mercury, in which case this permit would be reopened and modified accordingly.

No changes will be made in response to this comment.

SELENIUM CONCENTRATION LIMIT

Comment 13: DWQ has not confirmed the assertion in the 2001 Brix study that a 27 µg/L concentration will not be detrimental to the designated uses of the Lake and will not lead to a violation of the tissue-based standard for selenium.

Detrimental concentrations of selenium have not been measured in the limited number of eggs collected from the area of the Kennecott outfall. In addition to the results of Brix et al., this provides indirect support that 27 µg/l is an acceptable concentration. This permit contains extensive monitoring requirements that will allow continued evaluation of the underlying assumptions upon which these permit limits are based. These data evaluations, coupled with the

⁴ DWQ, 2010. Draft Great Salt Lake Assessment for Mercury Part-1 – 2010 Status of Scoping Level Assessment in Draft 2010 Integrated Report for Utah

tiered management responses associated with the numeric selenium standard, will allow the DWQ to confirm that the beneficial uses for Gilbert Bay and transitional waters will continue to be supported.

No changes will be made in response to this comment.

Comment 14: DWQ must not allow this discharge to occur until it formulates a numeric water-based concentration for selenium applicable to the GSL.

DWQ disagrees. The egg-based standard is legally and scientifically valid. The DWQ is working towards populating a model that will correlate tissue concentration and water column selenium concentration for Gilbert Bay using methods outlined in USEPA's *Guidance for Implementing the January 2001 Methylmercury Water Quality Criterion*. This guidance describes acceptable methods for implementing a tissue-based criterion.

No changes will be made in response to this comment.

Comment 15: It has been suggested that the permit effluent limit for selenium could be removed from the Jordan Valley permit and DWQ could rely exclusively on the egg tissue standard to regulate the Jordan Valley discharge. This would violate the law. According to federal regulations which apply to Utah's UPDES program, every UPDES permit must include requirements necessary to achieve water quality standards. 40 C.F.R. § 122.44(d)(1); 40 C.F.R. § 123.25 (applying 40 C.F.R. § 122.44 to states). Pursuant to this requirement, permit "[l]imitations must control all pollutants" which have the "reasonable potential to cause, or contribute to an excursion above any water quality standard, including State narrative criteria for water quality." 40 C.F.R. § 122.44(d)(1)(i). Plainly, the concentration of the toxic pollutant selenium in the Jordan Valley discharge of 51 to 52 ug/L has the reasonable potential to cause or contribute to a violation of the numeric and narrative standard applicable to selenium. Moreover, the data and analysis cited in these comments confirms this point. Where this potential exists and where the state has developed numeric criteria for a particular pollutant in order to protect water quality, "the permit must contain effluent limits for that pollutant." 40 C.F.R. § 122.44(d)(1)(iii). Because Utah has numeric selenium standard for Gilbert Bay in the form of a tissue-based standard, DWQ must include an effluent limitation for selenium in the Jordan Valley permit. Section 122.44 also requires that, where a state relies on a narrative standard to protect water quality, as Utah does for the transitional wetlands, the permitting authority is still required to "establish effluent limits using one or more of the" options spelled out in the rule. 40 C.F.R. § 122.44(d)(1)(vi). In any case, the permit must include an effluent standard.

Consistent with the original draft permit, the subsequent draft permit for the SWGWTP will include a concentration limit for selenium for Outfall 001 to Gilbert Bay of the GSL. The effluent limit is the same as Kennecott Utah Copper's (KUC) Outfall 012.

No changes will be made in response to this comment.

Comment 16: *It is possible that a Hot Zone of Selenium exists in the Lake at the end of the discharge channel. Additional sampling should be required to confirm or deny the existence of such a zone and DWQ should request that it be added to the monitoring plan.*

Evaluating the existence of a Hot Zone of Selenium in the lake, at the end of the channel, is beyond the scope of JVWCD's UPDES permit. Assessing the condition of GSL is the responsibility of DWQ and other agencies.

No changes will be made in response to this comment.

Comment 17: *The EPA will announce new national standards for selenium contamination in 2012. Building the pipeline to transport Kennecott's waste water should be delayed until these new standards are announced.*

Similar to other water quality criteria promulgated by EPA, the revised freshwater selenium criteria will not likely be applicable to GSL due to the fact that it is a saline lake. A reopener provision is included in the draft permit, Part IV.O, that allows DWQ to revise the permit, if issued in the future, if a new applicable standard becomes available during the permit cycle.

No changes will be made in response to this comment.

Comment 18: *Until the State of Utah can develop a sustainable lake level, measure the potential impact of selenium on brine shrimp, and a federal/state water quality standard which protects/sustains the lakes inhabitants is developed any approval of the Jordan Valley proposal to dump selenium into the lake would be premature. The current proposal should not be approved.*

Water quantity is beyond the authority of DWQ, however water quantity can be an integral part of water quality. For that reason, UPDES permit limits are based on the most limiting conditions, typically low water. In addition, DWQ can determine a water body is impaired because of inadequate or altered hydrology. DWQ is still in the process of characterizing GSL including defining limiting conditions. The selenium standard for Gilbert Bay is protective of waterfowl and other lake life. The standard is based on the most sensitive toxicological endpoint for lake organisms: bird reproduction. Brine shrimp are not as sensitive to the toxic effects of selenium as birds. Therefore, if bird reproduction is protected, all other uses of GSL including brine shrimp health will also be protected.

No changes were made in response to this comment.

Comment 19: *Page 3, Monitoring Programs, last paragraph: The first sentence of this paragraph states that a concentration of 27 ppb Se (after the mixing zone) is predicted to not exceed a concentration that will be detrimental to aquatic life. The rationale behind this determination is unclear, especially considering the first sentence of the next paragraph states that some uncertainty remains about the potential effects of selenium on the biota of the Great Salt Lake. We recommend removing any language that makes predictions about effects and simply state what uncertainty exists and how it will be addressed through monitoring.*

The language in this section will be modified in the next draft permit to clarify as per the comment.

MIXING ZONE

Comment 20: Because the combined discharges have no mixing zone for the better part of a mile, DWQ should apply existing freshwater numeric standards for selenium and mercury.

The discharge channel formed by KUC's 012 discharge point does not consist of fresh water, it is brackish water. Therefore, freshwater standards are not applicable.

No changes will be made in response to this comment.

Comment 21: R317-2-5 limits mixing zones to 200'; however, current conditions do not provide for mixing within at least the first 4,000'.

At current lake levels, the outfall will initially discharge to Class 5E, transitional waters and no mixing was assumed. If lake levels rise sufficiently, the discharge will be to Class 5A, Gilbert Bay. The mixing zone was applied where the discharge leaves the transitional waters and mixes with open waters of Gilbert Bay (Class 5A). Class 5E has no numeric standards but the Narrative Standard (R317-2-7) applies. The proposed effluent limits will comply with the requirements of the Narrative Standard and the Gilbert Bay selenium standard. Bird eggs will be collected from the Gilbert Bay (Class 5A) area to determine if Gilbert Bay is meeting its beneficial uses. Bird eggs will also be collected from the JWCD/KUC outfall delta (Class 5E) as part of this permit to confirm that the discharge is not adversely affecting birds in the delta.

No changes will be made in response to this comment.

Comment 22: DWQ must not allow a Se concentration higher than 27 ug/L in the effluent because there is not a mixing zone.

Effluent limits ensure that water quality standards are not exceeded. No numeric water quality standard is available for the Class 5E transitional waters but compliance with the Narrative Standard is required. Based on the lack of adverse effects observed for previous discharges at similar concentrations, the proposed selenium effluent limits will comply with the Narrative Standard and demonstrate that existing uses will be protected.

No changes will be made in response to this comment.

SELENIUM TISSUE BASED STANDARD AND EGG, BIOTA, WATER AND SEDIMENT MONITORING OF DELTA

Comment 23: DWQ must remove the statement in the Draft SOB that "[l]oading increases of up to 300% (4,500 kg/yr to 9,000 kg/yr) are predicted to remain protective of the tissue-based standard."

This statement will be removed in the next draft permit.

Comment 24: We recommend immediately resampling the lakewide sampling sites developed earlier during the Se standard setting process prior to commencement of new discharges to establish current conditions. We also recommend continuation of monitoring all surface water sites entering Gilbert Bay to accurately characterize surface water sources.

JVWCD voluntarily conducted monitoring of the egg/sediment/macroinvertebrates of the delta area in Spring 2011. JVWCD will provide the data from this sampling event to DWQ by late Spring 2012. It is expected that JVWCD will again voluntarily conduct monitoring of egg/sediment/macroinvertebrates of the delta area in Spring 2012.

A comprehensive monitoring plan for Great Salt Lake is being developed by DWQ to establish a consistent lake-wide monitoring network. Sampling began in 2011. Routine monitoring of riverine inputs will continue.

No changes will be made in response to this comment.

Comment 25: Because of the uncertainties in the model, and uncertainties in the baseline we recommend that new discharges be awarded using an adaptive management approach using small volumes and including an adequate time to monitor GSL changes associated with these controlled releases, perhaps 3 years or a statistical analysis estimating equilibrium has been reached.

This permit contains extensive monitoring requirements that will allow continued evaluation of the underlying assumptions upon which the permit limits are based. These data evaluations, coupled with the tiered management responses associated with the numeric selenium standard, will allow the DWQ to confirm that the beneficial uses for Gilbert Bay and transitional waters will continue to be supported. Also, the SWGWTP will not start at full capacity. They will discharge approximately 1 million gallons per day (less than the permitted value of 3 MGD) to Gilbert Bay until they complete the final phase of the project which is estimated to be 10 to 15 years after the plant is operational in 2012. Therefore, an iterative approach is intrinsically utilized in this permit.

No changes will be made in response to this comment.

Comment 26: Studies should be initiated to evaluate the sublethal effects of selenium (and mercury) on these birds. Studies should be initiated to determine off-site effects such as lowered winter survival, nesting effects, disease prone, etc.

The selenium standard for Gilbert Bay is based on sublethal effects. Importantly, the basis for the standard is the most sensitive known toxic effect. Under this paradigm, if bird reproduction is protected, other adverse ecological effects will not manifest. Studies of general bird population dynamics is beyond the scope and purpose of the monitoring of the delta and beyond DWQ regulatory authority.

No changes will be made in response to this comment.

Comment 27: Annual sampling of eggs in this outfall nesting area is critical for monitoring these combined discharges. Sampling activities may result in the decline of bird nesting and thus eggs available for assessment. It is also a concern that certain species are more sensitive, e.g. snowy plover, and should be protected.

The draft permit includes the requirement for annual sampling of no more than 20% of the available bird eggs. The intent is to collect an adequate number of eggs for a statistically valid comparison with the selenium triggers. DWQ collects additional eggs from other shore habitats around Gilbert Bay. The eligible species, number of eggs to be sampled, and methods were closely coordinated with the wildlife stewards from Utah Division of Wildlife Resource and U.S. Fish and Wildlife. U.S. Fish and Wildlife Service issue the permits for taking bird eggs.

No changes will be made in response to this comment.

Comment 28: Data collected during the Se Standard Project show that the eggs at KUCC discharge site are at the threshold that should trigger modification of the monitoring plan. See Draft Permit, page 9. Three of 8 eggs collected during the Se standard process exceeded the 6.4 ppm dw. We are not comfortable with DWQ's unequivocal position that mutations associated with Se and Hg do not exist.

The selenium water quality standard is a geometric mean and the geometric mean did not exceed 6.4 mg/kg selenium so no additional actions beyond routine monitoring are required. Regarding mutations, DWQ's position is that mutations attributable to mercury or selenium have not been observed. Future observations to the contrary could cause this position to be reevaluated.

DWQ's statements regarding mutations are based on hundreds of observations from the existing following studies. All studies have limitations, such as limited sample numbers, snapshot in time, study was designed for a different purpose, or insensitive methods, but together they support that mutations in bird populations at Great Salt Lake are not occurring or are occurring infrequently.

Vest, J.L., M.R. Conover, C. Perschon, J. Luft, and J.O. Hall. 2009. Trace Element Concentrations in Wintering Waterfowl from Great Salt Lake. Arch. Environ. Contam. Toxicol. 56:302-316

Conover, M.R. and J.L. Vest. 2008. Selenium and Mercury Concentrations in California Gulls Breeding on the Great Salt Lake, Utah, USA. Environ. Tox. Chem

Cavitt, J.F. and K. Stone. Concentration and Effects of Selenium on Shorebirds at Great Salt Lake, Utah in 2009 Development of a Selenium Standard for the Open Waters of Great Salt Lake prepared by CH2MHill

Cavitt, J.F., and K. Stone. Selenium and Mercury Concentrations in Breeding Female Avocets at Ogden Bay, Great Salt Lake, Utah, 2007 in 2009 Development of a Selenium Standard for the Open Waters of Great Salt Lake prepared by CH2MHill

Conover, M.R., J. Luft, and C. Perschon. Concentration of Selenium in Eared Grebes from the Great Salt Lake, Utah in 2009 Development of a Selenium Standard for the Open Waters of Great Salt Lake prepared by CH2MHill

Cavitt J.F., M. Linford, and N. Wilson. 2011. Selenium Concentration in shorebird Eggs at Great Salt Lake Utah 2010 Report

Waddell, B. et al., 2009 Assessment of Contaminants in the Wetlands and Open Waters of the Great Salt Lake, Utah 1996-2000,.

U.S. Fish and Wildlife Service recently (spring 2011) collected approximately 900 eggs from GSL and surrounding wetlands. The egg collections included eggs that failed to hatch. The study will attempt to determine if mercury or selenium may be causing a higher reproductive failures.

No changes will be made in response to this comment.

Comment 29: *DWQ must include, and allow the public to comment on, the sampling and analysis plan associated with the Jordan Valley discharge as part of the permitting process.*

The public had an opportunity to review and provide comments on the sampling and analysis plan during the 30-day public comment period which occurred February 9 to March 9, 2011.

Comment 30: *We recommend that concurrence be obtained on the plan from USFWS, Utah Office and UDWR State office on methodology and species.*

Both agencies reviewed the draft sampling and analysis plan and provided comments to DWQ during the public comment period. The sampling and analysis plan was revised as appropriate based on those comments.

Comment 31: *We recommend that contingency decisions be identified when bird eggs are unavailable or nesting pairs reach a certain minimum density.*

This comment has been incorporated into the sampling and analysis plan. If 8 bird eggs are not available, then JWCD must collect as many as possible, but not to exceed 20% of the available eggs. DWQ relies on U.S. Fish and Wildlife Service to determine what species and how many can be sacrificed.

Comment 32: *We recommend that DWQ consider providing an alternate label to this monitoring component (Great Salt Lake Monitoring Program) to avoid confusion with other more broadly-based lake monitoring programs.*

The *Great Salt Lake Monitoring Program* will be changed in the draft permit to the *KUC/JWCD Joint Discharge Transitional Wetland Area Monitoring Program*.

Comment 33: *We recommend that the selenium implementation provisions be revised to require specific enhanced monitoring relevant to JWCD's discharge and a process for evaluating the*

data related to the same. Any TMDL or other State-related obligations do not need to be (and would be premature if) specified in the JWCD permit.

DWQ agrees and appreciates the commenter bringing this issue to our attention. DWQ is responsible for assessing if Gilbert Bay waters are meeting the water quality standards. Therefore, the selenium triggers will be modified in the draft permit as follows:

Implementation of the 12.5 mg/kg Se Tissue Based Standard for the discharge delta:

JWCD is subject to the following actions when the annual geometric mean concentrations outlined below exist in bird eggs collected in as part of the approved *KUC/JWCD Joint Discharge Transitional Wetland Area Monitoring Program*:

5.0 mg/kg: JWCD will evaluate the adequacy of the *KUC/JWCD Joint Discharge Transitional Wetland Area Monitoring Program* with regards to data gaps and areas of uncertainty. The evaluation, and revised monitoring plan, if appropriate, will be submitted to DWQ for approval within 180 days of notice that this condition exists and approved by the Executive Secretary within 270 days.

6.4 mg/kg Se and above: JWCD must re-evaluate the existing Level II Antidegradation Review including the alternatives analysis for reductions in Se loading and re-submit to DWQ a Level II Antidegradation Review for Outfall 001 within 180 days of notice that this condition exists and approved by the Executive Secretary within 270 days.

9.8 mg/kg Se and above: JWCD will prepare and implement a plan to decrease bird exposures to Se in the delta. The plan, including an implementation schedule, must be approved by the Executive Secretary within 180 days of notice that this condition exists.

12.5 mg/kg Se and above: The reopener provision for this permit will be exercised and JWCD will be subject to additional load restrictions.

Comment 34: *We recommend JWCD conduct monitoring in or near the transitional wetlands to determine if increased flow from Treatment Plant effluent is adversely affecting bird nesting or habitat or food sources.*

As previously stated, this permit requires more extensive monitoring than any other UPDES permit. Also, water quantity issues are not under the purview of the UPDES program. Qualitatively, the habitat in the discharge area isn't of particularly high quality. Based on observations in other GSL wetlands of increased invertebrate abundance and diversity with decreasing salinity, the introduction of a less salty water source is expected to increase food sources for wildlife. Wildlife biologists have commented that they expect to see an increase in bird use as a result of the continuous discharge.

No changes will be made in response to this comment.

Comment 35: *We recommend the GSL monitoring program include an assessment of reproductive success of nests from or near Gilbert Bay in addition to analysis of avian egg mercury and selenium concentrations.*

Reproductive failure in the wild may be caused by many non-water quality related issues (e.g., predation, weather) that are beyond the scope of this permit. DWQ has agreed to supply nest coordinates to allow the tracking on the nests by other agencies such as USFWS who have the authority and expertise for more-detailed investigations.

No changes will be made in response to this comment.

Comment 36: *Page 9, Section 8: Avocet geometric mean egg selenium concentration from 2006 was 5.1 ug/g d.w. These samples were collected from Saltair. This elevated concentration triggers the initiation of monitoring, assessment and potential management actions. We assume that implementation of a monitoring program is a requirement of the permit because the lowest egg selenium concentration trigger is exceeded at Saltair.*

Seven eggs collected from Saltair had a mean selenium concentration of 4.7 $\mu\text{g/g}^5$. As identified in Table 1 of the *KUC/JVWCD Joint Discharge Transitional Wetland Area Monitoring Program*, the objective of the monitoring is to assess the potential impacts of the effluent in the transitional waters (Class 5E) and demonstrate compliance with the Narrative Standard for this specific location. Selenium concentrations in eggs that trigger additional responses in the permit were drafted in accordance with this specific objective. The intent of these triggers is to prevent adverse impacts in the Class 5E waters. The selenium triggers in UAC R317-2-14 are not applicable to *KUC/JVWCD Joint Discharge Transitional Wetland Area Monitoring Program* because assessment of selenium in Gilbert Bay (Class 5A), in general, is the responsibility of DWQ and is outside the scope of this permit. Also, please see response to Comment 33.

No changes will be made in response to this comment.

Comment 37: *The final permit should not be issued before the completion of the public comment process on the Comprehensive Sampling and Analysis Plan.*

The 30-day public comment period for the sampling and analysis plan ended on March 9, 2011.

Comment 38: *DWQ must formulate a contingency plan for monitoring the impacts of this discharge if there are not sufficient eggs available in the outfall area.*

The permit contains extensive monitoring requirements of the effluent as well as the delta area. JVWCD must monitor the effluent regardless of the availability of the eggs. If birds are not present in the delta, then birds are not being exposed and no additional bird sampling is warranted in association with this permit. DWQ continues to monitor selenium concentrations in bird eggs independent of any UPDES permits.

⁵ Ohlendorf, H. and G. Santolo. 2007. Selenium in Marine Birds *in* Development of a Selenium Standard for the Open Waters of the Great Salt Lake

No changes will be made in response to this comment.

Comment 39: There are up to 0.75 miles of transitional wetlands between the discharge site and the shoreline of Gilbert Bay which may be affected before the effluent reaches the mixing zone. We recommend a statement that addresses how selenium may affect areas between the discharge point and mixing zone.

No numeric standard for Selenium is available for the transitional waters (mudflat wetlands, Class 5E) between the outfall and Gilbert Bay. This area is a saline mudflat created when the GSL receded. As stated in the draft FSSOB, DWQ will apply the Gilbert Bay selenium standard to these Class 5E waters to assess compliance with the Narrative Standard, UAC R317-2-7.2.

No changes will be made in response to this comment.

Comment 40: Page 7, Great Salt Lake Monitoring Program, 2nd paragraph: We anticipate a detailed Sampling and Analysis Plan (SAP) will be developed for an assessment of contaminant concentrations in eggs, water, sediment, and macroinvertebrate. We recommend JWCD collaborate with Utah Division of Water Quality, Utah Division of Wildlife Resources, U.S. Fish and Wildlife Service, and potentially other entities on development of the SAP. A monitoring program may need to involve effects assessments (e.g., measure of reproductive success) in addition to exposure assessments.

JWCD has coordinated with various stakeholders in development of the SAP. In addition, the UDWR and USFWS submitted comments on the SAP during the public comment period. Information gathered during the spring 2011 sampling event will be used to evaluate JWCD's compliance with the tissue based Selenium standard and the narrative standard. Effects assessments are out of the scope of this permit and will not be included in the SAP.

No changes will be made in response to this comment.

WET

Comment 41: The permit should include WET testing to analyze the toxicity of the whole effluent. It is crucial to determine if the combination of the pollutants in the effluent is toxic. This is particularly true because the KUCC discharge will be mixing with the Jordan Valley discharge. We urge DWQ to find a suitable test organism. Because the effluent is composed of fresh water that does not mix with the saline waters of Great Salt Lake for a considerable distance and over a significant time frame, it may be appropriate to use a freshwater species as a test organism. Without an appropriate test organism, the proper conclusion may well be that nothing can survive in the effluent and the effluent is toxic. If so, the permit would have to be adjusted accordingly.

The appropriateness of either including or excluding Biomonitoring (Whole Effluent Toxicity - WET) testing requirements for Outfall 001 was extensively evaluated in the development of this permit. As a result of further evaluation, and in response to this comment, DWQ will include a requirement for JWCD to conduct WET testing. Because the effluent is brackish, JWCD will need to conduct studies to find an appropriate test organism for DWQ's approval. The final

permit includes a compliance schedule to allow for studies with an end date of 90 days prior to commencing discharge at Outfall 001.

CUMULATIVE IMPACTS

Comment 42: Completing a cumulative impacts assessment would show that JWCD and the UDWQ considered the relationship among all the ecological processes at work in the receiving waters. A more thorough evaluation is warranted for this permit because of the existing concerns regarding selenium and mercury exposure and effects to wildlife of Great Salt Lake.

The permit and the Field Sampling Plan were developed with the ecological processes in mind. JWCD will monitor bird eggs in the delta and DWQ assesses the open waters of GSL as part of its ongoing ambient water quality monitoring program. These assessments inherently measure cumulative effects, e.g., selenium concentrations in the sediment, bugs, and eggs represent the cumulative impact of selenium releases to date. The water concentrations in Gilbert Bay represent the cumulative impacts of all historic inputs of selenium.

No changes will be made in response to this comment.

Comment 43: Although the Groundwater Cleanup Project was described as a 40-year process, and although the permit renews every 5 years, it is for all practical purposes in indefinite permit. Because of that, the loadings/concentrations over time will have additional significant impacts to wetlands and the GSL where process retain and recycle certain elements such as Se and Hg. Therefore, the time limits for these discharges should be clearly stated in the permit.

UPDES permits are on a 5-year renewal cycle, allowing for public input and permit modifications if needed. However, there is no guarantee that this permit will be renewed with the same effluent limits and monitoring conditions.

The draft permit contains monitoring conditions and effluent limits that will be protective of the beneficial use of Gilbert Bay of the Great Salt Lake. Extensive monitoring requirements included in the draft permit will allow DWQ to assess on a regular basis if the assumptions behind the effluent limits are justified. If the permit needs to be modified at anytime during the permit cycle, the draft permit includes a re-opener provision that allows for this. Therefore, time limits will not be stated in the draft permit.

No changes will be made in response to this comment.

Comment 44: DWQ should evaluate the cumulative discharges known or expected. For instance, if it is known or reasonably expected that Kennecott will be asking for an increase in their discharge permit, this should be the basis of discussion of impacts, in addition to the permit under consideration.

DWQ will consider impacts from increases in loading to the delta area when and if there is a need to modify either KUC or JWCD's UPDES permits.

No changes will be made in response to this comment.

Comment 45: Cumulative impacts of this project in conjunction with multiple permits for other projects affecting the Lake (e.g. GSLM expansion) have not been examined.

The GSL has five distinct beneficial use classifications, each with their own geographical boundary. JWCD will discharge to Gilbert Bay which has a use classification of 5A. Great Salt Lake Minerals discharges to Bear River Bay of the GSL which has a use classification of 5C. Great Salt Lake Minerals proposed expansion is a separate issue that is currently being reviewed in detail.

During the permit development process, Level I and Level II Antidegradation Reviews were conducted which took into consideration the ambient conditions of Gilbert Bay with a beneficial use classification of 5A. Based upon these reviews, the DWQ determined that the discharge will not cause an impairment to the beneficial uses of Gilbert Bay.

No changes will be made in response to this comment.

Comment 46: There is no mention in the draft UPDES permit of other sources of contaminants into the south shore of the Great Salt Lake, specifically the habitats near the discharge point. Additional sources of contaminants of concern, including selenium and mercury, may include KUCC Outfalls 012 and 004, C-7 ditch, Goggin Drain, Lee Creek drain, historical causeway near Saltair and other potential sources of pollutants that may bioaccumulate in the biota.

The scope of the UPDES permit is limited to the effluent from the permitted facility. The ambient conditions of Gilbert Bay and the potential impacts on the beneficial uses that the JWCD discharge may have were studied during the permit development. All existing sources of contaminants are reflected in the ambient conditions of Gilbert Bay.

In the future, if a TMDL is completed for Gilbert Bay, all sources of contaminants will be identified and quantified in detail at that time. A TMDL may also include load allocations that may require dischargers like JWCD to reduce their contributions.

No changes will be made in response to this comment.

LEVEL II ADR

Comment 47: Utah DEQ should require that the waste be contained in a way that does not cause it to spread elsewhere in Utah's (or anyone's) environment. The most sound alternative to the Proposal is to capture the waste stream, wherever it is generated, and dispose it to an approved facility, many of which are local, require minimal transport, and would neither impact Utah's waterways at all nor clog transportation routes.

The RO plant will produce a liquid waste stream at a rate of 3 MGD. This is a large quantity that cannot be disposed of at a landfill or other solid waste repository.

As part of the Antidegradation Level II Review, JWCD evaluated 19 disposal alternatives. Of these alternatives, discharge to the GSL was selected as the most feasible, least degrading option.

If a facility selects the least degrading, feasible treatment alternative and can meet the effluent limits and conditions in the UPDES permit (which are protective of the beneficial use of the receiving waters) then the DWQ cannot require that the facility utilize other specific treatment.

No changes will be made in response to this comment.

Comment 48: How can the Utah DEQ justify that this Proposal (to pump shallow and deep groundwater, where contamination has relatively low impact on human health and the environment, treat the groundwater with RO, and dispose the RO waste to surface waters which causes greater exposure and environmental impact) is preferred over alternatives that would cause much less adverse impact on human health and the environment? More environmentally-responsible and preferred alternatives are in place in many other states and should be considered in this proposal. These alternatives include:

- a. Pumping Kennecott-contaminated groundwater, treat the water with RO, and dispose of the waste to Kennecott's facilities, and/or one of the many approved facilities just west of Kennecott.*
 - b. Providing water rights holders the opportunity to use their groundwater if they wish, treat the water at the point of extraction, and dispose the waste to an approved facility. I know some of these people and know they have a municipal water supply, so Kennecott could buy their water rights. Direct disposal to the public's open water is not a responsible solution to the problem caused by Kennecott's contamination.*
- a. The antidegradation review for Outfall 001 to Gilbert Bay considered 19 alternative discharge options. The two referred to were included in the evaluation. Kennecott has said that the nutrients from shallow groundwater would foul their treatment processes. Upsetting Kennecott's treatment process could result in a net increase in selenium loading to Great Salt Lake which would not be considered a less-degrading treatment option. In addition, landfills are not permitted to accept liquids therefore they would not accept the RO byproduct.
 - b. The DWQ is charged with protecting water quality. Water quantity issues are under the purview of the Division of Water Rights within the Department of Natural Resources.

No changes will be made in response to this comment.

Comment 49: Please explain how the Utah DEQ has considered and balanced economic benefits for the public and the environment and not favored just one or two corporate entities?

JVWCD is a public entity and supplier of drinking quality water to the Salt Lake Valley and is not a corporation. The antidegradation review ensures that degradation of water quality only occurs for important social or economic reasons.

No changes will be made in response to this comment.

Comment 50: How has the Utah DEQ measured the environmental and economic impacts of mitigating adverse consequences and compared those measures to the lower-impact alternative of not discharging the waste to open waters of the State?

A full evaluation of all of the alternatives to discharging to waters of the State in addition to the social and economic importance of the project were included in the Level II Antidegradation Review as an addendum to the FSSOB. This document was available for review during the public comment period.

No changes will be made in response to this comment.

Comment 51: We recommend that JWCD and the DWQ demonstrate the process of elimination that was used to determine which pollutants in the discharge effluent will potentially cause a degradation of water quality and other environmental attributes.

The antidegradation review identifies all anticipated constituents in the effluent that degrade water quality. Any constituent in the effluent that is present at concentrations greater than background degrades water quality (R317-2-3.5.b.1.).

No changes will be made in response to this comment.

Comment 52: We recommend adding a section to the ADR that reviews levels of all contaminants in the discharge and provides a rationale why each contaminant will or will not result in a degradation to water quality. Based on data provided by JWCD, we anticipate substantial loads of other contaminants, such as arsenic (49 to 149 kg/year), cadmium (2.2 to 6.2 kg/year), hexavalent chromium (49 to 132 kg/year) and nickel (21.4 to 61.7 kg/year) to be additional stressors to the transitional wetland habitat to Gilbert Bay and the wildlife that depend on the wetland.

Degradation is not based on loading but on concentration (R317-2-3.5). The concentration of arsenic, cadmium, chromium, and nickel are less than or equal to existing concentrations in GSL.

No changes will be made in response to this comment.

Comment 53: We strongly urge DWQ to delay the completion of the proposed pipeline and discharges pending independent scientific verification of the many alternatives that have not been adequately considered, their ecological and human health advantages and disadvantages, the relative costs of each and of the whole system, and the ethical basis for this choice, pending thorough debate in the public forum.

All alternatives have been adequately considered. Beginning in 2003, nineteen alternatives were investigated based upon input from a stakeholder group that included individuals from advocacy groups, local, state and federal governments and property and well owners in the affected area. A technical memo, outlining the feasibility of each alternative was included in the Level II ADR as an addendum to the FSSOB. Both documents were available for review during the public notice period.

The issues with the sulfate contaminated aquifer have been studied since 1991. Over the years, the public has been engaged in the process through public meetings, invitations to comment and participation in the stakeholder forum.

No changes will be made in response to this comment.

Comment 54: Please stop this crazy scheme. We all know that the right thing to do includes building a retention pond and not dumping the low concentrations (of what becomes toxic as concentrations build) into our lake.

Because JWCD has demonstrated that the effluent will comply with the requirements of the Clean Water Act and the Utah Water Quality Act, a UPDES permit must be granted under the law.

Nineteen alternatives to discharging to waters of the state were evaluated, including a retention pond, in the Level II ADR that was included as an addendum to the draft FSSOB. This alternative was not selected because it has the potential to create a new selenium exposure site in addition to the cost of purchasing the land (1,000 acres) which would be 20 times the cost of building the pipeline to the Great Salt Lake. Evaporation at the retention pond would further concentrate selenium and potentially attract birds which may result in detrimental exposures.

No changes will be made in response to this comment.

Comment 55: This poisonous water would be better off in something designed to handle poisonous wastes like the tailings impoundment as opposed to causing further harm to the Great Salt Lake.

The alternative to discharge to Kennecott's tailings impoundment was evaluated and a technical memo summarizing the feasibility of this alternative was included in the Level II ADR as an addendum to the draft FSSOB.

Kennecott has an existing UPDES permit which allows discharges from the impoundment to the Great Salt Lake. The impoundment is not designed for treatment and discharges about 6 months out of the year.

No changes will be made in response to this comment.

JORDAN RIVER AND DOWNSTREAM WETLANDS

Comment 56: The impact of lost Jordan River flow into GSL wetlands from the net loss of 3 million gallons/day of shallow wells pumping will be significant but has not been calculated. As more wells along the Jordan River are added, greater impacts to Jordan River flows into the wetlands will have major impacts to beneficial uses.

The DWQ is charged with protecting water quality. Water quantity issues are under the purview of the Division of Water Rights within the Department of Natural Resources. JWCD has indicated that they have obtained the appropriate water rights to complete their project from the shallow wells. Therefore, the withdrawals that they will make have been calculated and the impacts evaluated.

No changes will be made in response to this comment.

Comment 57: *The impact of replacing geologically slow seepage of shallow groundwater into the Jordan River compared to pumping, treating, and discharge of contaminant concentrate to the Jordan River have not been explained or fully evaluated.*

As detailed in the FSSOB, discharges to the Jordan River will consist of only untreated groundwater (feed water). No RO byproduct will be discharged to the river. The impact of the untreated groundwater to the Jordan River was evaluated with the completion of Level I and Level II Antidegradation Reviews. Based on these evaluations, the discharge will not cause or contribute to a violation of water quality standards.

No changes will be made in response to this comment.

Comment 58: *DWQ must evaluate the change in concentration and water supply to the Jordan River and down stream wetlands.*

DWQ has evaluated the impact of the discharge of feed water from Outfall 002 to the Jordan River and determined that it will not cause or contribute to a violation of water quality standards. The Division of Water Rights within the Department of Natural Resources administers the appropriation and distribution of the State's water resources.

No changes will be made in response to this comment.

Comment 59: *Some of Jordan Valley's effluent will periodically flow into the Jordan River and downstream wetlands of Great Salt Lake. Cumulative effects on essentially terminal wetlands should be evaluated for selenium and mercury. In addition, baseline conditions in wetlands should be established and the cumulative effect of selenium and mercury concentrations should be determined.*

Groundwater that is discharged to the Jordan River via Outfall 002 is water that would make it to the Jordan River over time. As outlined in the FSSOB, the amount of Selenium that will be discharged to the Jordan River is significantly below what the WLA calculated the facility could discharge. Baseline assessment of the wetlands is out of the scope of this UPDES permit but part of DWQ's ongoing monitoring and assessment program.

No changes will be made in response to this comment.

Comment 60: *Page 8, Outfall 002, Shallow Aquifer Discharges to the Jordan River: Please provide a rationale behind selection of a 30% safety factor for the effluent selenium concentration.*

As stated in the draft FSSOB, the selenium concentration used to calculate the load is based upon the anticipated effluent concentration of 7.9 ug/L plus a 30% safety factor. The resulting concentration is 10.3 ug/L. Wasteloads calculated based upon flows of 1 MGD and 4.6 MGD resulted in allowable selenium concentrations of 17.4 ug/L and 63.4 ug/L respectively.

The use of a 30% safety factor is standard engineering practice. With the safety factor, the resulting effluent limit is significantly below the allowable selenium concentrations calculated in the wasteload and therefore is more restrictive.

No changes will be made in response to this comment.

FSSOB/PERMIT

Comment 61: *Please include the calculation and assure numbers are correct especially where changing between pounds and kilograms.*

The calculations and conversions completed for the permit were verified and are available for review. They will not be included in the draft permit. Please contact Kim Shelley at 801-536-4385 or kshelley@utah.gov for further information

No changes will be made in response to this comment.

Comment 62: *The time limits for these discharges should be clearly stated in the permit, and an attempt at quantifying the long-term cumulative impacts should be made. It is our understanding that DWQ has no plans to do this.*

UPDES permits are re-evaluated and renewed on a 5-year cycle and take into consideration the receiving water conditions at that point in time. However, there is no guarantee that the permit will be renewed at the end of each cycle. If the facility can demonstrate that they can meet the permit effluent limits and conditions, then the permit will likely be renewed. DWQ does not set time limits for permits outside of the 5-year cycle. See response to Comment 1 regarding cumulative impacts.

No changes will be made in response to this comment.

Comment 63: *The Fact Sheet/Statement of Basis is not written in clear language that the public can understand. It is written in a way that provides only convoluted information, and statements as facts that contradict one another. Key points of concern are:*

- a. *Fact Sheet statement: "Discharges of water from the shallow aquifer wells would eventually reach the Jordan River, due to the fact that the natural flow pattern of the shallow aquifer is to the Jordan River" does nothing to answer the question of how riparian areas will be impacted in the area of drawdown. How can this statement be true for the area of extraction or if the shallow groundwater that recharges the Jordan River will not degrade the riparian area in which extraction takes place?*
- b. *The Fact Sheet/Statement of Basis is unclear about waste disposal to the Jordan River, and makes statements that allude to untreated water being discharged to the Jordan River, which is why the previous proposal was withdrawn. When and why will untreated water be discharged to the Jordan River, and what are the expected environmental impacts?*

The SWGWTP is a complex project. DWQ has made every attempt to communicate the information in a clear and concise manner in the FSSOB. Below is a response to the specific comments:

- a. The Division of Water Rights within the Department of Natural Resources administers the appropriation and distribution of the State's water resources. Discussion of the extraction of shallow water and its effect is not within the purview of this UPDES permit.
- b. In 2003, JWCD requested approval to discharge RO byproduct to the Jordan River. The permit was granted by DWQ. Shortly after this, JWCD rescinded their application and the permit was abandoned. In 2010, JWCD requested approval to discharge untreated groundwater (from shallow wells) to the Jordan River. The RO byproduct is being pumped to the GSL via a 21 mile pipeline. The two proposals are very different. The untreated groundwater will be discharged to the Jordan River under cleaning, maintenance and pressure relief conditions. A wasteload calculated for the shallow well discharges to the Jordan River under these conditions demonstrate that water quality standards will not be violated as a result of these discharges.

No changes will be made in response to this comment.

Comment 64: Page 7, table for Outfall 001: We recommend using the same frequency of monitoring for total mercury and total selenium. Selenium is currently listed as 2 times weekly and mercury is monthly. Same recommendation for outfall 002.

Selenium and mercury have different monitoring requirements for two reasons. The selenium monitoring is to determine compliance with the permit whereas the primary purpose of the mercury monitoring is to characterize mercury concentrations in the effluent. Low-level mercury analysis requires ultra-clean sample collection and analysis. Only a few laboratories nationwide offer this analysis and none are in the State of Utah. Therefore, the sample collection and analysis is very labor intensive and costly. Selenium analysis, however, can be easily collected and analyzed by laboratories in-state. Based upon this, the DWQ will keep the mercury monitoring frequency as monthly and selenium monitoring frequency as twice weekly in the draft permit unless the new mercury data indicates a change in frequency is warranted.

Selenium should be monitored more frequently because the effluent concentrations were determined to have a "reasonable potential" for causing an exceedance of water quality standards. Mercury concentrations are low but exactly how low are currently unknown. The mercury monitoring requirements are designed to fill this data gap. The mercury data will be reviewed and the mercury monitoring requirements could be eliminated, reduced, kept the same, or increased in the future.

No changes will be made in response to this comment.

Comment 65: There is an inconsistency between the process diagrams and under what conditions the FSSOB says the facility will discharge to the Jordan River.

The flow diagram for the Normal Operating Condition included with the UPDES Permit Application could have shown shallow wells discharging indirectly to the Jordan River under pump to waste conditions from the individual well locations, which would have been consistent with the FSSOB. However, because the pump to waste discharges will not have permit limits associated with them, the discharges were not included in the diagram.

No changes will be made in response to this comment.

Comment 66: Page 2, Operating Conditions, 1st paragraph: Flow diagrams for normal operating conditions do not show that groundwater from shallow wells is discharged to the Jordan River. These diagrams demonstrate that groundwater from shallow wells is discharged only during start-up and cleaning and maintenance of the shallow well RO system. Please address this inconsistency.

The observation is correct. The flow diagram for the Normal Operating Condition could have shown shallow wells discharging indirectly to the Jordan River from the individual well locations. See response for comment number 65.

No changes will be made in response to this comment.

Comment 67: Page 2, Pump to Waste Start-Up Condition: This section needs to be in agreement with all other language in supporting documents that discuss discharges of deep well water to the Jordan River. It currently states that both deep and shallow wells will discharge into the Jordan River. As stated previously, this appears to be in disagreement with flow diagrams. Please address this inconsistency.

The purpose of the Process Flow Diagrams was to illustrate how the water is directed at the treatment plant site. A flow diagram was not included for the Pump to Waste Start-up Condition described in the Statement of Basis because the pump to waste conditions will occur at individual well locations and not at the SWGWTP site.

No changes will be made in response to this comment.

Comment 68: Page 2, Cleaning and Maintenance Conditions for the Shallow Aquifer Wells, 2nd paragraph: Recommend removing term "uncontaminated" on second line. A well water concentration of 7.9 µg Se/L may be considered contaminated in some environments.

In this context, the word "uncontaminated" refers to groundwater that is not impacted by historic mining practices.

The language will remain the same in the next draft permit.

No changes will be made in response to this comment.

Comment 69: Permit, Page 8, Section 6: The current language does not distinguish whether total and/or methyl mercury will be evaluated. We recommend, at a minimum, completing an evaluation of total mercury.

The draft permit was revised to clearly identify “total mercury” as opposed to “mercury”.

Comment 70: *We have questions regarding how the Waste Load Analyses for Conservative Substances were calculated. It's unclear how receiving waters of Bingham Creek, Jordan River, Trimble Creek, and Butterfield/Midas Creek could have a combined effluent/receiving water selenium concentration of 0.018 µg/L, despite all of them receiving effluent from different deep wells at different flows and selenium concentrations. We have similar questions regarding the receiving water TDS concentrations. In addition, it is unclear why these calculations are provided in the information packet because it is our understanding that the only receiving waters are Gilbert Bay (receiving deep and shallow well water), Jordan River (receiving shallow well water), and the Utah and Salt Lake Canals.*

Discharges to the receiving waters of Bingham Creek, Trimble Creek, Butterfield/Midas Creek and the Utah and Salt Lake Canal will occur during pump to waste conditions and will consist of groundwater from individual wells. As outlined in the draft FSSOB, these discharges will be infrequent, of short duration and will not cause or contribute to a violation of water quality standards. Therefore, they will not have effluent limits associated with them. The wasteload analysis for these discharges was included with the draft permit for informational purposes.

No changes will be made in response to this comment.

Comment 71: *There is a typo at bottom of FSSOB page 6, “b”: “sheet” should be “sheen”.*

Thank you for bringing this to our attention. The typo will be fixed in the draft permit.

Comment 72: *Page 1, Description of Facility, 3rd paragraph: The paragraph states that start-up flows from deep and shallow wells will be discharged through storm drain systems and at various times to the Jordan River. This statement is not in agreement with the process diagrams which were provided as Section 3 of the UPDES permit application. According to those diagrams, contaminated deep well water is never pumped into the Jordan River (Atencio 2010); instead, deep well water is always sent as overflow to Gilbert Bay during start-up, cleaning, and maintenance of the deep well RO system. The same flow diagrams demonstrate that shallow well water is sent to the Jordan River during start-up and cleaning and maintenance of the shallow well RO system. Additionally, Slide 23 of Mark Antencio's presentation from March, 2010, concludes that there will be no deep well discharge and no by-product discharge to the Jordan River. Please address this inconsistency.*

Deep groundwater will be discharged to Jordan River tributaries (streams, storm drains, and canals) from the individual well locations on a very limited basis during the Pump to Waste Start-up Condition which will occur 0.1 % of the time. The process diagrams in the UPDES Permit Application are for discharges occurring at the two permitted outfalls, Outfall 001 to GSL and Outfall 002 to Jordan River from the SWGWTP.

No changes will be made in response to this comment.

MISCELLANEOUS

Comment 73: Technically and politically, this proposal contradicts the mission, vision and values of the Utah DEQ. How can the Utah DEQ profess to “walk the talk” of its own stated mission, including pollution prevention, when low-impact alternatives exist?

The DEQ has adhered to its mission to safeguard human health and quality of life by protecting and enhancing the environment specifically by:

- Requiring UPDES permit conditions to be protective of human health and the environment using the best available science.
- Engaging advocacy groups and the public at large for their input.
- Carefully considering all comments received.
- Responding in a timely and effective manner to questions.
- Considering all impacts.

It is important to note that DWQ must follow the framework of our rules when drafting UPDES permits.

No changes will be made in response to this comment.

Comment 74: Please explain how the Utah DEQ has considered the following long-term adverse impacts:

- a. *Drawdown of shallow groundwater along the Jordan River to the extent that the riparian areas in those areas would dry out or otherwise adversely impacted.*
 - b. *Air quality degradation due to contaminants becoming airborne as the Great Salt Lake continues to recede.*
 - c. *Killing and sampling wildlife (e.g. bird eggs) to determine if this proposal is adversely impacting that wildlife, as opposed to preserving the wildlife by not dumping the waste in these waters at all and therefore not having to kill and sample the wildlife at all for this purpose.*
- a. The Division of Water Rights within the Department of Natural Resources administers the appropriation and distribution of the State's water resources. An evaluation of the effect of drawdown along the Jordan River is not under the purview of the UPDES program. However, the UPDES permit program does consider the most limiting conditions when calculating effluent limits.
 - b. Evaluations of potential air quality impacts is not under the purview of the Division of Water Quality and will not be addressed under this UPDES permit.
 - c. DWQ is developing alternative methods for determining compliance with the selenium egg standard. Until these methods are developed, measuring selenium in the eggs is the only reliable method available. USFWS is the trustee for migratory birds and has primary responsibility for their protection. USFWS issues permits for egg collection after considering factors such as potential impacts to the bird population.

No changes will be made in response to this comment.

Comment 75: *UDEQ contradicts its own values if the Proposal is approved. Please explain how the Utah DEQ meets, exceeds and does not contradict its own mission, vision and values for each of the following UDEQ statements:*

- a. *Mission Statement, which reads: "DEQ's mission is to safeguard human health and quality of life by protecting and enhancing the environment."*
- b. *The Utah DEQ Vision statement, which reads: "A quality environment will be achieved through careful, open, and fair consideration of the concerns of all Utahns; Excellence in science, communications, and operations; Timely, effective, and consistent response to all customers; and Actively promoting pollution prevention."*

With the issuance of the UPDES Permit for the Southwest Groundwater Treatment Plant, and the work that has lead up to this point, DEQ adhered to its mission and vision statements because the following will be accomplished:

-A 40 square mile plume of sulfate contaminated groundwater in the Southwest portion of Salt Lake County will be remediated. The project will improve groundwater quality and will prevent further contaminant migration.

-At treatment plant build out capacity, 14 million gallons a day of drinking quality water will be offered for sale to JWCD member agencies for distribution.

-A Se standard was developed for the Great Salt Lake. The standard was 4 years in the making and 1.2 million dollars spent on studies to develop the standard. The process included a science panel, stakeholder involvement and many opportunities for public participation.

-During the drafting of the permit and the public comment period, DEQ representatives met with numerous stakeholders, held public information meetings, provided updates to stakeholders, offered an extended public comment period and used the best available science to draft the permit conditions.

No changes will be made in response to this comment.

Comment 76: *The applicant answered "No" in the NPDES permit regarding Clean Air Act requirements for attainment areas, however this project will emit contaminants to the air. How will this project be compliant with CAA regulations for the Salt Lake Valley and surrounding environs?*

JWCD answered "No" to the question on the UPDES permit application to insure that the pH of the drinking water matches other supplies, the project will discharge carbon dioxide which naturally occurs in the groundwater and is not a result of historic mining activities. The annual mass of carbon dioxide discharged from the treatment plant will be equal to the annual discharges of three vehicles.

No changes will be made in response to this comment.

Comment 77: *Please explain how the Utah DEQ has fulfilled its regulatory obligation to meet the requirements of the Clean Water Act by investigating and considering all known or suspected contaminants of concern (not just selenium) that are expected to be part of the waste stream.*

JVWCD completed an Antidegradation Level II Review for Outfall 001 to the GSL and Outfall 002 to the Jordan River. This was done in accordance with Utah Administrative Code (UAC R317-2-3). The antidegradation review (ADR) is a requirement for any project that will increase the level of pollutants in waters of the state. This process considers all parameters in the effluent, requires the facility to evaluate other treatment alternatives, complete a social and economic analysis, and selects the least-degrading feasible treatment alternative.

Both Antidegradation Level II Review documents were made available during the 60-day public comment period.

No changes will be made in response to this comment.

Comment 78: *Kennecott should be required to pay for studies recommended by all commenters.*

This UPDES permit is for JVWCD, not KUC. As such, JVWCD is responsible for the costs associated with meeting the permit requirements. It is not within DWQ's jurisdiction or authority to allocate costs of permit compliance.

No changes will be made in response to this comment.

Comment 79: *There has been inadequate public involvement and outreach about this proposal.*

By rule, DWQ is only required to public notice draft UPDES permits for 30-days. Given the complexity of this permit and the high public interest, the Division has gone above and beyond the basic public comment period requirement with an enhanced public outreach plan that included the following:

- A Public Information meeting on March 22, 2010.
- A 60-day public comment period from December 1, 2010 to February 1, 2011.
- A public hearing held on January 4, 2011.
- Multiple meetings with advocacy groups to discuss their concerns with the discharge and discuss comments on the initial draft permit with the goal being a better product.

No changes will be made in response to this comment.

Comment 80: *What are the short- and long-term plans for mitigating adverse impacts on the environment? (air and water quality, and drying out riparian areas).*

The DWQ has included a re-opener provision in the JVWCD permit that will allow the permit to be re-opened, for cause, at any time during the 5 year permit cycle. This may include opening the permit if new information becomes available regarding the effluent or the impact to the mudflat area. Air quality and water quantity issues are not within the scope of this UPDES permit and are addressed by other agencies.

No changes will be made in response to this comment.

Comment 81: *I strongly advise that DWQ require data be submitted in electronic spreadsheet format with each monitoring report, in addition to the raw data. That ensures DWQ can check the raw data against the tabulated data, and enables DWQ to track trends and enforce compliance on its own, and not rely entirely on contractors, especially since the UDEQ is approving "self-monitoring" for the generators.*

As with most environmental programs, the UPDES program relies on self-monitoring and reporting. Facilities with UPDES Permits are required to submit self-monitoring reports summarizing analytical data for the particular monitoring period. These reports are signed by an authorized agent of the facility. By signing the document, the person certifies that the information contained in the report is accurate and representative.

The DWQ conducts compliance inspections of major facilities at least once every three years. The inspector will verify that what was reported on the report is the same as what is on the lab sheet for a selected sample period.

Any falsification of reports submitted to the DWQ is subject to a formal enforcement action as per R317-1-8.

No changes will be made in response to this comment.

Acronym List

ADR:	Antidegradation Review
DEQ:	Department of Environmental Quality
EPA:	Environmental Protection Agency
FSP:	Field Sampling Plan
FSSOB:	Fact Sheet/Statement of Basis
GSL:	Great Salt Lake
JVWCD:	Jordan Valley Water Conservancy District
KUC:	Kennecott Utah Copper
MGD:	Million Gallons per Day
RO:	Reverse Osmosis
SAP:	Sampling and Analysis Plan (also referred to as FSP)
SWGWTP:	Southwest Groundwater Treatment Plant
TMDL:	Total Maximum Daily Load
UDWR/DWR:	Utah Division of Wildlife Resources
UDWQ/DWQ:	Utah Division of Water Quality
UPDES:	Utah Pollution Discharge Elimination System
USFWS:	United States Fish and Wildlife Service
USGS:	United States Geological Service
WET:	Whole Effluent Toxicity
WLA:	Wasteload Analysis