Western Zirconium
Draft Ground Water Permit No. UGW570002
Public Noticed 6/ 29 – 7/29 2013
Responsiveness Summary
August 5, 2013

1. Western Resource Advocates (WRA) comment:

"First, you note that the primary threat posed by Western Zirconium's wastewater ponds is the discharge of contaminated surface water to the GSL ecosystem. Statement of Basis (SOB) at 4. While we agree that this is an area of concern, we don't feel that it is appropriate to minimize the threat of the shallow ground water, especially if that ground water makes its way into Great Salt Lake. Unless there is reason to believe that this shallow aquifer is isolated, it is likely that discharge will be underground into the Lake."

DWQ Response:

Potential threats to the Great Salt Lake ecosystem posed by the contaminated ground water have been evaluated throughout the study and design phases of this remedial action. Properties of the shallow ground water system at the site are described in the Part III of the SOB:

"The ground water affected by the facility is a shallow, unconfined aquifer contained in the fine-grained lake sediments immediately underlying the evaporation ponds. The sources of the ground water in this aquifer are upward leakage from deeper confined aquifers, infiltration of precipitation and possibly recharge from Little Mountain."

"Ground water movement in the fine-grained sediments of the shallow unconfined aquifer is very slow, as seen by the fact that significant contamination has not reached the "sentry" monitor wells located approximately 700 to 1000 feet from the perimeter of the evaporation ponds after over thirty years of pond operation."

The upward flow of ground water from the deeper confined aquifers under the site has been demonstrated by years of monitoring data at Western Zirconium's nested piezometers, which reveal the hydraulic head at various depths below the ground surface at the same location; and also by the observation, as stated in Part IV of the SOB, that

"Initially, the first ponds had flexible membrane liners (FMLs) installed to line the ponds, but because of upwelling ground water under the site, large bubbles or "whales" formed under the FMLs and the liners had to be removed."

So while lateral flow in the shallow unconfined aquifer under the site is inhibited by the extremely fine-grained nature of the sediments it is contained in, upward flow from deeper confined aquifers causes shallow ground water to discharge to the surface, resulting in the marshy conditions of the mudflat environment. Under this flow regime, it is very unlikely that contaminated shallow ground water will

flow entirely in the subsurface to either the main body of the Great Salt Lake, 4 miles to the southwest, or to Bear River Bay, 6 miles to the north. **No further action will be taken by DWQ.**

2. WRA comment:

"Second, with that in mind, we feel that it would not have been unreasonable to require Western Zirconium to take proactive measures to decontaminate the shallow aquifer plume emanating from their facility and wonder why this action wasn't taken. While you state that the existing contamination "should decrease by natural attenuation," you offer no support for this assertion. SOB at 5. What timeframe would such natural attenuation take place in?"

DWQ Response:

Ground water remediation is very difficult in fine-grained aquifer materials, because such materials only allow for very slow ground water velocities. Depending on the contaminants involved, ground water remediation would involve either physically removing water and contaminants from the aquifer or introducing chemicals that would break the contaminants down or immobilize them, and either process would be extremely slow, require numerous wells to be drilled, and would leave behind pockets of untreated aquifer. Western Zirconium's discharge contains many different contaminants, as described in Part II of the SOB, several of which have been identified as being of ecological concern, shown in Table 2 of the permit. These different contaminants would require different strategies for ground water remediation, which could not be implemented simultaneously. Table 2 also shows that while levels of these contaminants within Western Zirconium's plume can be above the concentrations determined to be potentially harmful in the Ecological Risk Assessment, they are still at trace levels which would be difficult to reduce to even lower, harmless concentrations.

The contaminated ground water is not currently in a location where it would harm the Great Salt Lake ecosystem; it is only after it discharges to the surface that it could cause harm to organisms. Because ground water remediation would be difficult if not infeasible, DWQ considers it to be a better use of Western Zirconium's resources to cut off the source of contamination, allow the contaminated ground water to naturally attenuate, and prevent contaminated surface water from leaving Western Zirconium's property.

The permit is founded on the concept that the subsurface barrier wall will reduce discharge of Western Zirconium's process wastewater into the shallow ground water to *de minimus* levels. Uncontaminated water will still be entering the shallow ground water system by infiltration of precipitation and by upward leakage from deeper aquifers. Without leakage from Western Zirconium's wastewater ponds entering the system, concentrations of contaminants with the existing plume can only go down. The permit sets up a compliance monitoring plan to insure the remedial action is functioning as anticipated; if leakage from the ponds still occurs and affects the shallow ground water and surface water after construction of the subsurface barrier wall, Western Zirconium will be required to implement other strategies.

It is not known how long natural attenuation of the existing plume of contaminated ground water will take. Western Zirconium is still legally responsible as long as ecologically-harmful

concentrations of contaminants are being discharged from the shallow ground water into surface water**. No further action will be taken by DWQ.**

3. WRA comment:

"Third, it is unclear why you are issuing a ground water permit at this point in time related to the construction of a barrier that began in October, 2012, and that was approved for construction by your section in May 2012. *Id*. Remedies of this sort should not be approved for construction until all actions associated with the ground water discharge permit have been completed in order to provide the public with an opportunity to comment on the proposed action in a meaningful way. While we recognize that time is often of the essence in these situations, DWQ has been aware of this problem for over 20 years and the order from DWQ to correct the situation was issued in 1999. Certainly a few more months to allow the public notice and comment period to run its course would not have made a substantial difference in the outcome of this situation."

DWQ Response

Ideally, DWQ would like to issue both construction and ground water discharge permits concurrently, although there is no legal requirement to do so. A construction permit is needed to construct facilities related to an actual or potential discharge of contaminants to ground water, while a ground water discharge permit is need to operate them. In this case, construction of the subsurface barrier wall and related facilities was a very large construction project for Western Zirconium, with a tight schedule, requiring coordination between several different subcontractors and with construction possible in only a limited season. After a long delay in securing a permit for wetlands alteration from the Army Corps of Engineers, both Western Zirconium and DWQ wanted to start construction at the earliest possible date. At the same time Western Zirconium was developing and compiling information needed for a ground water discharge permit application.

In situations where the construction permit is issued before the ground water discharge permit, it is always understood at issuance of the construction permit, that it is at the permittee's risk in case deficiencies are identified during development of and public comment on the ground water discharge permit, that would require additional or different construction than that specified in the construction permit. **No further action will be taken by DWQ.**