Department of Energy
Office of Legacy Management

MAR 24 2005

Mr. Gary Janosko, Chief
Fuels Cycle Facilities Branch
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U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Mr. Dean Henderson, Project Manager
Division of Radiation Control
Utah Department of Environmental Quality
168 North 1950 West
Salt Lake City, UT 84114-4850

Subject: Transmittal of *2004 Annual Status Report for the Salt Lake City, Utah, UMTRCA Title I Processing Site* - WM-41

Dear Mr. Janosko and Mr. Henderson:

The enclosed report presents the results of the 5-year monitoring program evaluation as called for in the *Long-Term Management Plan (LTMP) for the Salt Lake City, Utah, UMTRA Project Processing Site*. The evaluation recommends to discontinue all monitoring at the site because 5 years of monitoring results have demonstrated that the following *LTMP* criteria (Section 3.1, paragraph 1, page 5) for discontinuing monitoring have been met:

- No reversal of the ground water hydraulic gradient;
- a decrease in the uranium and molybdenum concentrations in the ground water as anticipated; and,
- no unacceptable risks related to pumping of ground water by Central Valley Water Reclamation Facility, the current property owner, or the storm drain sump.

In addition to meeting these required criteria the aquifer is designated as limited use as a result of ambient arsenic contamination not associated with the Salt Lake City processing site.

Please provide comments or concurrence with the proposed recommendation at your earliest convenience (the next sampling event is scheduled for December 2005). If you have any questions, please call me at 970/248-6004.

Sincerely,

Michael K Tucker

Michael K. Tucker
Site Manager

Enclosure

cc w/o enclosures:
S. Hall, Stoller
Project File: SLC 535.10 (Thru A. Temple)

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2004 Annual Status Report for the Salt Lake City, Utah, UMTRCA Title I Processing Site

Summary

Ground water and surface water monitoring was performed at the Salt Lake City Processing Site on December 13 and 14, 2004. Monitor wells were found to be in excellent condition. Water quality results indicate that uranium and molybdenum concentrations are below their respective maximum concentration limits (MCL) at all ground water and surface water locations. Ground water level data were collected in conjunction with the ground water and surface water quality samples. Ground water level measurements indicate an upward hydraulic gradient continues to exist, which prevents contaminants in the shallow unconfined aquifer from migrating downward into the deeper uncontaminated confined aquifer.

The Central Valley Water Reclamation Facility (CVWRF) property manager verified that no unauthorized construction or ground water withdrawal occurred during the past year. No cause for maintenance or a follow-up visit was identified.

The water-monitoring program at this site started in early 2000. As specified in the Long-Term Management Plan (LTMP), an evaluation of the water-monitoring program was performed following the minimum 5 years of monitoring that was completed with the December 2004 sampling. Based on established criteria, it is recommended that all water monitoring be discontinued. Discontinuation of water monitoring is dependent on concurrence by the U.S. Nuclear Regulatory Commission (NRC) and the State of Utah.

1.0 Introduction

This report presents the results of the annual U.S. Department of Energy (DOE) monitoring of the Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Processing Site at Salt Lake City, Utah. The CVWRF owns all of the former processing site and controls access to the land and to ground water beneath the site. S.M. Stoller Corporation, the DOE Legacy Management Contractor at Grand Junction, conducted the monitoring on December 13 and 14, 2004. The monitoring was conducted in accordance with the *Long-Term Management Plan* [LTMP] *for the Salt Lake City, Utah, UMTRA Project Processing Site* (GJO-2002-307-TAR, January 2002).

The purposes of the annual ground water and surface water monitoring were to confirm compliance with the *Ground Water Compliance Action Plan* [GCAP] *for the Salt Lake City, Utah, UMTRA Project Site* (Document Number U0039502, May, 2000); confirm the integrity of the monitoring locations at the site; identify changes in conditions that may affect site protectiveness; and determine the need, if any, for maintenance or additional monitoring.

2.0 Final Site Conditions

A shallow unconfined aquifer contains two constituents of potential concern—uranium and molybdenum—as a result of historic uranium processing operations. Throughout the region this aquifer also has widespread arsenic contamination resulting from former lead, copper, silver, and gold processing activities (molybdenum also was a byproduct of these processing activities),

which were independent of uranium processing. Useable ground water exists in a deeper confined aquifer. An upward hydraulic gradient within the deeper aquifer prevents degradation by the overlying contaminated shallow unconfined aquifer.

The shallow aquifer is not a current or potential source of drinking water due to widespread ambient arsenic contamination, unrelated to the site, which cannot be cleaned up using treatment methods reasonably employed in public water supply systems. Sources of potable water are readily available from municipal water supply systems in the vicinity of the site. Future use of ground water from the shallow aquifer is unlikely based on historical trends and the rapid expansion of commercial and industrial facilities in the area. Therefore, with NRC concurrence, supplemental standards were applied to the contaminated ground water in the shallow aquifer.

Ground water from the shallow aquifer is expressed in four shallow ponds located on the golf course that were constructed on the southern portion of the site following remediation. The pond water, which is used only for irrigating the golf course, contains detectable levels of uranium and molybdenum; however, concentrations since 2001 are well below the MCLs of 0.044 and 0.1 milligrams per liter (mg/L), respectively, and within the background range for the shallow aquifer. A health risk assessment (LTMP, Attachment E) indicated that there is no unacceptable risk from incidental exposure to the pond water.

Long-term monitoring of ground water and surface water is not normally required under a supplemental standards compliance strategy; however, NRC and the Utah Division of Radiation Control (UT-DRC) stipulated limited monitoring as part of the GCAP. Monitoring was to continue for a minimum period of 5 years (through 2004). At the end of this period, and in accordance with the GCAP and LTMP, the monitoring results would be evaluated and a recommendation for continuing, discontinuing, or modifying the monitoring would be made in consultation with NRC and UT-DRC. This monitoring evaluation and recommendation are presented below in Sections 7.0 and 9.0, respectively.

Soils contaminated with residual radioactive material were left in place at several locations on the original property, as shown on Figure 1. NRC concurred that these contaminated soils pose no unacceptable risk to human health or the environment. DOE, UT-DRC, and the CVWRF jointly established institutional controls governing soil excavation and the construction of structures in areas where contaminated soils remain. Section 8.0 further discusses institutional controls at the site.

3.0 Site Access and Features

3.1 Facility Access

The former processing site, currently owned by the CVWRF, has been redeveloped as a regional wastewater treatment facility, a solid waste transfer facility, and a golf course. Visitors must check in at the Administration Building of the CVWRF before accessing the on-site monitoring locations.

Access to portions of the wastewater treatment facility is restricted by security fences and locked gates. After-hours access to the golf course also is restricted. Access to the solid waste transfer station is unrestricted, but personnel are asked to check in with facility staff before entering the facility.

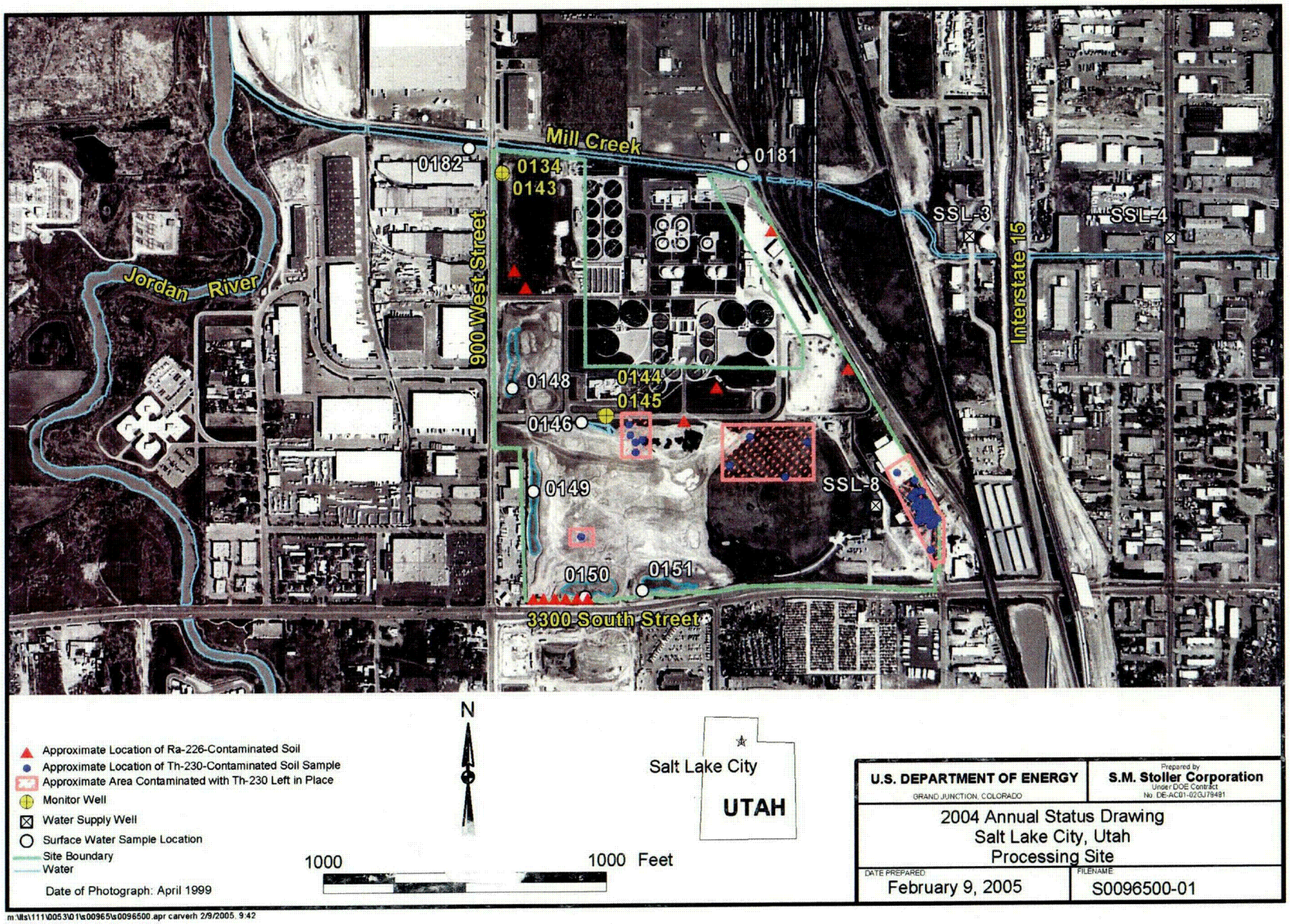

Figure 1. Salt Lake City, Utah, Processing Site

3.2 Monitor Wells

DOE owns and maintains four ground water monitor wells remaining at the Salt Lake City Processing Site. The wells are located in pairs. In each pair, one well is completed in the shallow unconfined aquifer and the other is completed in the deeper confined aquifer. One pair of wells are flush-mounted (MW–0144 and MW–0145) and centrally located on the site in a grass-covered area south of the Administration Building (Figure 1). The second pair of wells (MW–0134 and MW–0143), downgradient of the first pair, is located in the northwest corner of the site. Both pairs of wells are downgradient of locations where soils contaminated with residual radioactive material remain (Figure 1). All wells were secure and in excellent condition.

4.0 Ground Water Monitoring

Ground water quality monitoring is required in the shallow unconfined aquifer annually for a minimum of 5 years (through 2004). Uranium and molybdenum were selected as the constituents of potential concern (COPC) because they are two of the most mobile constituents in mill tailings. Ground water level monitoring also is required annually in both the shallow unconfined aquifer and the deeper confined aquifer for a minimum of 5 years (also through 2004) to confirm that an upward hydraulic gradient continues to exist, thus preventing the contaminated ground water in the shallow aquifer from migrating to the lower uncontaminated aquifer. Were the hydraulic gradient to reverse, ground water quality monitoring also would be conducted in the deeper aquifer as well. Following this 5-year period, in accordance with the GCAP and LTMP, the need for continued monitoring would be evaluated. Section 7.0 presents this evaluation.

Water level dataloggers in the shallow wells were downloaded (continuous measurements) and static water levels were obtained (single point measurements) in the deep wells. In each well pair, the water level was higher in the deep wells than in the shallow wells (Figure 2). This condition demonstrates the continued upward hydraulic gradient, monitored and recorded over the past 5 years, that prevents contaminated ground water from flowing from the shallow aquifer into the deeper uncontaminated aquifer. Therefore, no ground water quality monitoring was performed in the deeper aquifer.

In 2004, ground water samples were collected from the two shallow monitor wells (MW–0134 and MW–0144). Uranium concentrations in both wells continue to be substantially below the MCL of 0.044 mg/L, as shown on Figure 3. The molybdenum concentration in MW–0134 also continues to be well below the MCL of 0.10 mg/L; however, the concentration in MW–0144 has exceeded the MCL in the past (on two of six occasions) most recently in 2003 when a concentration of 0.215 mg/L was reported (Figure 4). A concentration of 0.075 mg/L was reported this year; a factor of three less than the previous year.

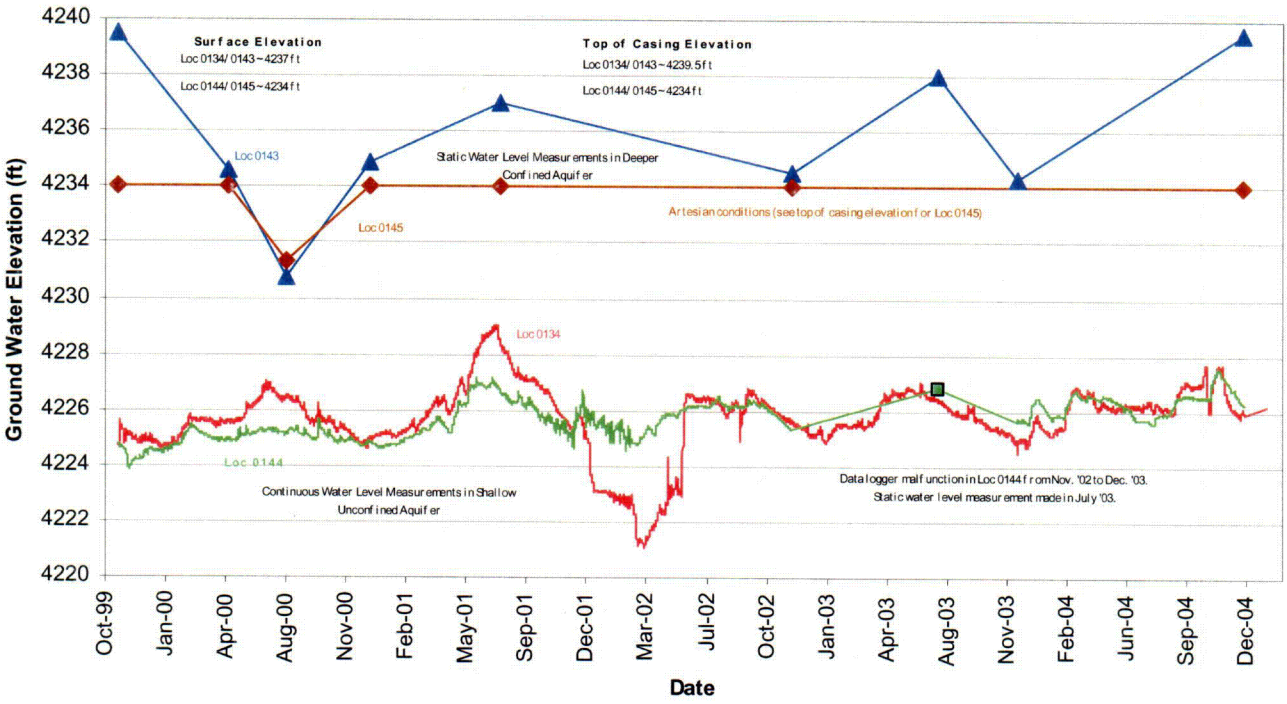

Figure 2. Ground Water Level Measurements at the Salt Lake City Processing Site

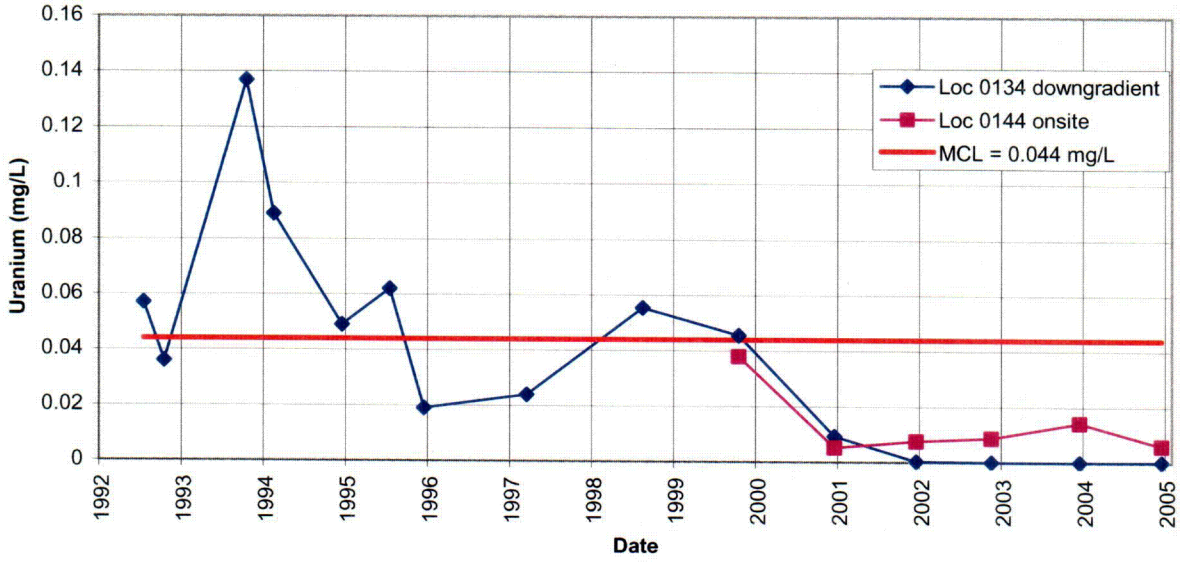

Figure 3. Shallow Aquifer Uranium Concentrations at the Salt Lake City Processing Site

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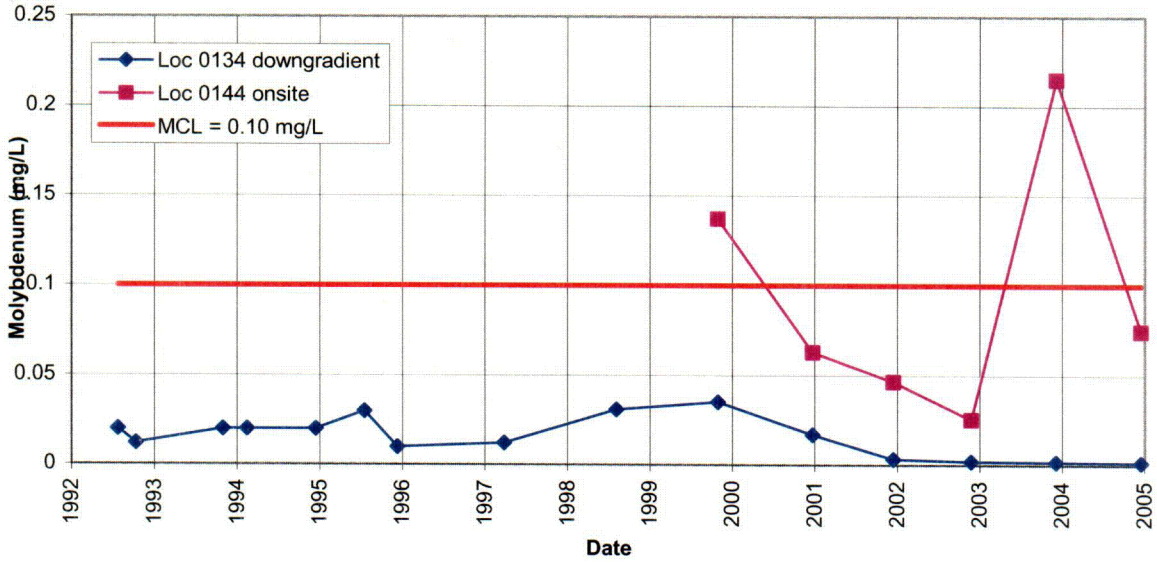

Figure 4. Shallow Aquifer Molybdenum Concentrations at the Salt Lake City Processing Site

5.0 Surface Water Monitoring

The shallow aquifer is periodically pumped by CVWRF from two dewatering wells for construction and maintenance purposes and is run through the treatment plant and ultimately discharged to Mill Creek. Although treatment does not include metals removal, the low concentrations of COPCs in ground water and the subsequent dilution, which occurs during the process, precludes any unacceptable risk at the discharge point in Mill Creek. However, as a precaution, DOE has monitored surface water both upstream and downstream of the plant's discharge point in order to evaluate the effect of the treated ground water on Mill Creek's water quality. The shallow aquifer also has surface expressions at four golf course ponds and a drainage ditch onsite. Surface water sampling also is performed at these five locations.

Seven surface water samples were collected in 2004: four from the currently existing golf course ponds (SW–0148 through SW–0151); one from a golf course drainage ditch (SW–0146); and two from Mill Creek—upstream (SW–0181) and downstream (SW–0182) of the CVWRF treated water discharge point. Uranium concentrations are below the MCL of 0.044 mg/L at all locations, with the highest concentration of 0.0186 mg/L at SW–0146 (Figure 5). Molybdenum concentrations also are below the MCL, with the highest concentration of 0.0541 mg/L also occurring at SW–0146 (Figure 6).

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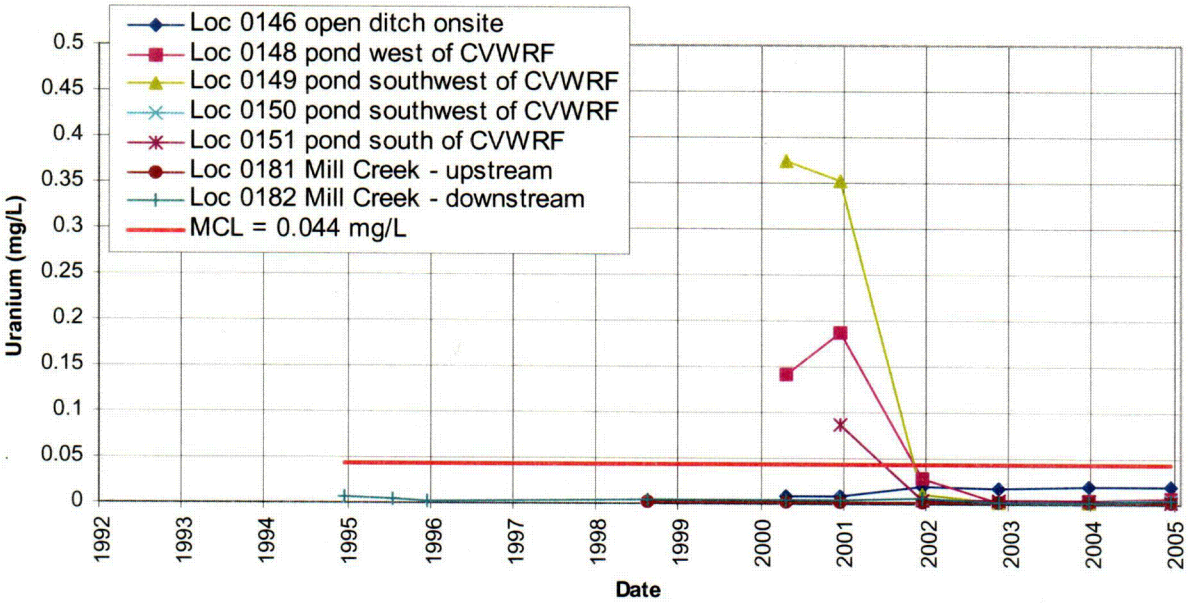

Figure 5. Surface Water Uranium Concentrations at the Salt Lake City Processing Site

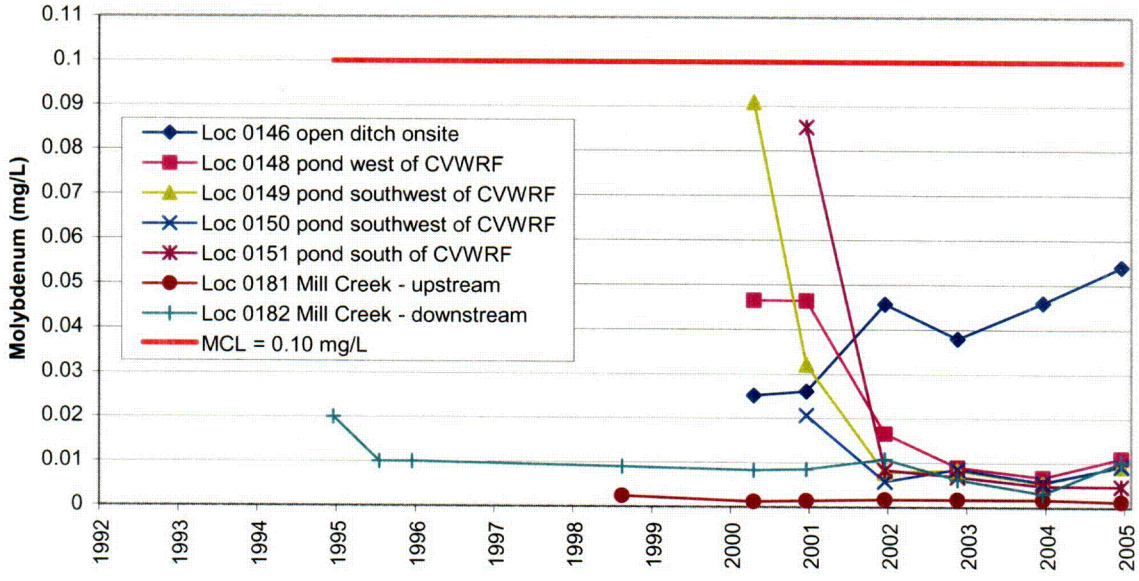

Figure 6. Surface Water Molybdenum Concentrations at the Salt Lake City Processing Site

COC

6.0 Effectiveness of the Ground Water Compliance Strategy

The ground water compliance strategy for the site is no remediation and application of supplemental standards based on limited use ground water resulting from ambient arsenic contamination unrelated to the site. Ground water from the shallow aquifer is not a current or potential source of drinking water, and there was no evidence of unauthorized ground water use in 2004. Ground water and surface water quality monitoring results were reported below MCLs for COPCs (uranium and molybdenum) at all locations sampled in 2004. Ground water level measurements confirm that an upward hydraulic gradient continues to exist, which prevents COPCs in the shallow unconfined aquifer from migrating downward into the deeper uncontaminated confined aquifer that contains potable water. Therefore, the application of supplemental standards as a compliance strategy remains effective by ensuring that the shallow aquifer is not used for drinking water and that the deeper aquifer continues to be unaffected by the shallow aquifer.

7.0 Evaluation of the Ground and Surface Water Monitoring Program

In accordance with the GCAP and LTMP for the site, an evaluation of the monitoring program is to be performed following a minimum 5-year period of monitoring to determine whether to continue, discontinue, or modify monitoring conducted at the site.

The criteria for discontinuing the monitoring at the site, as directed in the GCAP, are:

1. No reversal of the ground water hydraulic gradient;

2. A decrease in uranium and molybdenum concentrations in the ground water; and

3. No unacceptable risks related to pumping of ground water by CVWRF or the storm drain sump.

Monitoring conducted in 2004 (results presented in Sections 4.0 and 5.0) completes the minimum 5-year period of monitoring. The evaluation consisted of a review of historical data collected from all ground water and surface water monitoring locations, followed by performing trend analysis and an evaluation of the risk assessment performed.

Monitoring is generally not a requirement when supplemental standards are applicable to an aquifer beneath a site, and that the limited monitoring stipulated by the LTMP for the Salt Lake City (SLC) Processing Site is performed as a best management practice.

Concentrations of uranium in ground water have been below the MCL of 0.044 mg/L in all monitor wells since December 2000 – five consecutive years of monitoring (Figure 3). In 1999, the last time the MCL for uranium in ground water was exceeded, the concentration reported was only slightly above the MCL (0.046 mg/L in MW–0134). The highest historical concentration of uranium reported in ground water was 0.137 mg/L in 1993 from downgradient well MW–0134. Prior to 2000, uranium concentrations in this well had fluctuated above and below the MCL, perhaps indicating residual affects of soil remediation conducted at the site between 1984 and

1987. Surface water also displayed some elevated uranium prior to 2001, but has since been below the MCL (Figure 5). In addition, since 2002 surface water has only slightly exceeded background concentrations for uranium (<0.0001 mg/L to 0.004 mg/L, according to the GCAP) in the shallow aquifer on one occasion (0.006 mg/L at location 0148). Elevated concentrations of uranium in surface water were detected during the 2000 sampling event at concentrations higher than historical concentrations of uranium detected in ground water. These elevated surface water uranium concentrations do not appear to be related to ground water discharge because groundwater concentrations during the 2000 sampling event were much lower. The reason for the higher surface water concentrations of uranium during these earlier sampling events is unknown; again, perhaps they are related to residual affects of newly constructed ponds following soil remediation conducted at the site. Nevertheless, health risk calculations indicate that exposure to even the highest observed uranium concentration in surface water (0.374 mg/L in 2000 from SW–0149) would result in acceptable risks assuming incidental exposure to surface water (LTMP, Attachment E). Therefore, current site use remains protective.

Molybdenum in ground water was elevated above the MCL of 0.1 mg/L in one well (MW–0144) as recently as 2003 when a concentration of 0.215 mg/L was reported, although the concentration dropped by a factor of three in 2004 (Figure 4). Concentrations have shown some fluctuations in MW–0144 in the past, exceeding the MCL on two of six occasions. However, this is not unusual for an alluvial aquifer, particularly with the drought conditions that have existed for the past 5-years. Molybdenum in surface water remains low, although, concentrations in location SW–146 (open ditch on the golf course) continue to trend higher, but remain below the MCL (0.054 mg/L in 2004).

The two deeper aquifer monitor wells (MW–143 and MW–145) were sampled in 1999 for both uranium and molybdenum; concentrations were reported at the method detection limit for both constituents, which are several orders of magnitude below the respective MCLs.

Soils left in place at the site do not appear to be adversely affecting ground water. Uranium and molybdenum are two of the most mobile constituents in mill tailings. The fact that concentrations have not increased in ground water is an indication that there is little leaching of soils taking place.

Summary

The background information included in the site GCAP indicates that the concentrations of ambient arsenic contamination in the alluvial aquifer, which are unrelated to the site, ranges from 0.063 to 0.132 mg/L. As a result, the health risks associated with this ambient arsenic contamination would far outweigh those associated with any site-related contamination. Monitoring over the last 5 years was conducted as a best management practice and is not required for a supplemental standards compliance strategy. Nevertheless, the monitoring performed has demonstrated that: 1) concentrations of uranium have been below the MCL since 2000 at all ground water monitoring locations; 2) molybdenum has exceeded the MCL sporadically at only one ground water monitoring location; 3) uranium has been below the MCL at all surface water monitoring locations for the past 4-years; 4) and molybdenum has never exceeded the MCL in any surface water monitoring location. Ground water discharge is not adversely affecting surface water quality and no unacceptable risks are associated with likely surface water use.

Therefore, it is unlikely that any monitoring result would prompt action at the site except, perhaps, if a reversal in the upward hydraulic gradient occurring in the deep aquifer were observed. However, 5 years of continuous water level monitoring has not recorded such a hydraulic gradient reversal, even during drought conditions. More importantly, if a gradient reversal were to occur, the nonsite-related ambient arsenic contamination present in the shallow aquifer would be a more significant threat to the deeper aquifer than any site-related contamination because of the decreased uranium and molybdenum concentrations that would occur within the deeper aquifer as a result of dilution.

8.0 Institutional Controls

During a teleconference on December 16, 2004, Mr. Reed Fisher, manager of CVWRF, confirmed that he is aware of the institutional control requirements associated with the locations where soils contaminated with residual radioactive material remain, and indicated that no activities had occurred on the property in the past year that might encounter the contamination. Mr. Fisher did state that new construction is planned for the area immediately west of the water storage tanks in January 2005. However, these activities will not be in an area known to contain contaminated soil, but will be monitored by the State of Utah as standard practice. Mr. Fisher also confirmed that no unauthorized ground water withdrawal occurred at the site during the past year.

9.0 Recommendations

1. **Issue**: In accordance with the LTMP, constituents of potential concern (uranium and molybdenum) in the shallow aquifer are not to migrate to the deeper aquifer which discharges to local surface waters. The compliance strategy presented in the GCAP is to monitor ground water quality and level data for a period of 5 years (through 2004) to verify that an upward hydraulic gradient continues between the deeper and shallow aquifers, and then evaluate the collected data to develop a recommendation on whether to continue, discontinue, or modify ground water and surface water monitoring requirements.

   Recommendation: Discontinue all monitoring of ground water quality, surface water quality, and ground water level measurements for determining a continued upward hydraulic gradient. This recommendation is the conclusion of an evaluation performed of the data collected over the minimum 5-year period of monitoring stipulated in the GCAP. The reasons for this recommendation are:

   - Regional ambient arsenic contamination, not associated with the Salt Lake City Processing Site, precludes use of the shallow aquifer.
   - The risk assessment shows no unacceptable risk occurs, even when applying the highest historical concentrations reported for both ground water and surface water.

- The upward hydraulic gradient prevents contaminated ground water in the shallow aquifer from reaching the deeper uncontaminated aquifer (under artesian pressure). However, even in the unlikely event the hydraulic gradient were to reverse, the current concentrations of the COPCs are only slightly elevated above background concentrations; therefore, sufficient dilution within the deeper aquifer would occur, resulting in no significant impact.

- Ground water and surface water concentrations are currently below MCLs for COPCs at all monitoring locations.

- Potable water from local municipal water supply systems is readily available.

- Future use of ground water from the shallow aquifer is unlikely based on historical trends and the rapid expansion of commercial and industrial facilities in the area.

These reasons are consistent with the conclusions reached in the GCAP. Discontinuation of water monitoring is dependent on concurrence by NRC and the State of Utah.

2. **Issue**: Effective institutional controls associated with the locations of remaining contaminated soil must be maintained.

   Recommendation: Annually verify the effectiveness of institutional controls by interviewing the manager of CVWRF.