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UTAH DIVISION OF
SOLID & HAZARDOUS WASTE

SITE MANAGEMENT PLAN FOR

LAYNE CHRISTENSEN COMPANY

4446 West 1730 South
Salt Lake City, Utah

April 27, 2007
2507T.LCC04.UT

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EXECUTIVE SUMMARY

On behalf of the Layne Christensen Company (Layne), SECOR International Incorporated (SECOR) presents this Site Management Plan (SMP) for the former Layne Christensen Facility (site) located at 4446 West 1730 South, Salt Lake City, Utah (Figure 1). This SMP has been prepared in response to a request for a SMP stated in a letter dated March 21, 2007 from the Utah Department of Environmental Quality (UDEQ), Division of Solid and Hazardous Waste (DSHW).

The objective of this SMP is to present a strategy for managing the site-specific potential risks to human health and the environment under future commercial/industrial land use conditions. This plan includes two phases of management; 1) groundwater monitoring and sampling and 2) applying an environmental covenant (EC). Additionally, presented in this plan are the proposed calculated Risk-Based Target Levels (RBTLs) for the chemicals of potential concern (COPCs) based on the results of the Human Health and Ecological Risk Assessment (HHRA), previously approved by the UDEQ-DSHW.

As detailed in this SMP, groundwater monitoring will be conducted until groundwater is clear (not purple), and dissolved concentrations of COPCs have been determined to be stable and below the approved RBTLs. Once this has been achieved, the wells onsite will be properly abandoned. Quarterly groundwater sampling will be conducted for a minimum of 1 year from approval of this SMP.

For long-term management of the site, an EC will be created for the site and will be agreed to by: 1) the UDEQ, 2) the current owners (FAE Holdings 386664R L.L.C.), and 3) the holders of the site (Layne). This covenant will then be recorded with Salt Lake County, Utah. The EC will be prepared and implemented immediately upon UDEQ approval of this SMP, and will remain in place until the UDEQ has determined that the EC is no longer necessary, as per the provisions of the EC. The EC will include, but will not be limited to:

- Land use limitations to ensure that the property remains zoned for industrial use.
- Water rights restrictions to prevent use of the contaminated groundwater, which will be requested from the Utah Department of Natural Resources, Division of Water Rights within 45 days of UDEQ approval of the SMP.
- Construction limitations to limit the exposure of on-site construction and utility workers to the affected groundwater. Construction activities would be supervised by individuals with 40-hour training under OSHA 29 CFR 1910.120. On-site workers would be required to work under a worker Health and Safety Plan using appropriate personal protective equipment for the tasks.
- Right of access to the site for the UDEQ.
- Annual reporting to UDEQ to verify compliance with the EC.

Refer to the approved EC for the complete list and details of agreements and restrictions.

1.0 INTRODUCTION

SECOR International Incorporated (SECOR) presents this Site Management Plan (SMP) on behalf of the Layne Christensen Company (Layne) for the former Layne Christensen Facility (site) located at 4446 West 1730 South, Salt Lake City, Utah (Figure 1). This SMP has been prepared in response to a request for a SMP stated in a letter dated March 21, 2007 from the Utah Department of Environmental Quality (UDEQ), Division of Solid and Hazardous Waste (DSHW). The objective of this SMP is to present a strategy for managing the site-specific potential risks to human health and the environment under future commercial/industrial land use conditions.

1.1 Site Background

The site was recently purchased by FAE Holdings 386664R L.L.C., which operates the facility as For-Shor. The previous owners, Layne, are responsible for, and are actively managing the contamination onsite.

The site is an approximately 7-acre parcel of land with one main building and several smaller buildings. The site has formerly been used for the manufacture of drill bits and drilling equipment and has been used for storage of a number of hazardous materials, wastes, and petroleum products. Several of these chemicals have been stored and used in the manufacturing building, located on the western portion of the site. Within the manufacturing building, the western hydraulic sump and hydraulic lift area were identified as locations of environmental concern during a site assessment. The manufacturing building is currently vacant, however the new owners of the facility will be moving into the building soon.

Previous investigations were conducted to delineate the extent of soil and groundwater contamination at the site, as well as to further assess concentration trends and the hydraulic gradient of the groundwater associated with the manufacturing building.

The following documents summarize activities performed at the site:

- *Limited Phase II Environmental Site Assessment, Layne Christensen Facility,* ATC Associates, Inc. (ATC), dated October 13, 2004.
- *Subsurface Investigation, Layne Christensen Facility,* IHI Environmental (IHI), dated November 17, 2004.
- *Limited Subsurface Investigation, Layne Christensen Facility,* SECOR, dated March 7, 2005.
- *Additional Subsurface Investigation, Layne Christensen Facility,* SECOR, dated May 16, 2005.
- *Soil Excavation Report, Layne Christensen Facility,* SECOR, dated November 3, 2005.
- *Potassium Permanganate Injection Report, Layne Christensen Facility,* SECOR, dated January 16, 2006.
- *Groundwater Monitoring and Sampling Report, Layne Christensen Facility,* SECOR, dated May 2, 2006.
- *Groundwater Monitoring and Sampling Report, Layne Christensen Facility,* SECOR, dated August 4, 2006.

In April 2005, SECOR advanced ten boreholes and completed them as groundwater monitoring wells around and downgradient from the sump and hydraulic lift area. Tetrachloroethene (PCE) was identified in the soil near the western hydraulic sump and hydraulic lift above Environmental Protection Agency (EPA) Region 9 Preliminary Remediation Goals (PRGs) at a depth of 9 feet below ground surface (bgs). Small concentrations of trichloroethene (TCE) were also observed in the soil at this location. There were no other significant volatile organic compound (VOC) concentrations observed in the soil, either in other borehole locations or at other depths.

SECOR began groundwater monitoring in April 2005. In June and August 2005, SECOR drained and removed the western hydraulic sump and hydraulic lift, and excavated contaminated soil around these areas. The final extent of both excavations covered an area of approximately 350 square feet (Figure 2) to a depth of approximately 10 feet bgs. After each excavation, the cavity was backfilled with clean road base sands imported from a local supplier and then compacted. As part of the June 2005 soil backfilling activities, approximately 150 pounds of Hydrogen Release Compound® (HRC®), a polylactate ester that releases lactate when it is hydrated, was mixed into the bottom of the excavation (approximately 10 feet bgs). As the lactate from the HRC® is metabolized by naturally occurring microorganisms, hydrogen and reducing conditions are created, facilitating reductive dechlorination.

In December 2005, approximately 5,400 gallons of a 4.5% aqueous solution of potassium permanganate ($KMnO_4$) was injected into 30 points over a 50-foot by 30-foot grid covering the contamination source area and groundwater plume. The injection was performed to remediate the contamination in the groundwater. The $KMnO_4$ solution is a strong purple color, and as long as it remains in the groundwater, the water will show a purple color. As the $KMnO_4$ reacts with the contaminants, and dissipates over time, the groundwater will become clear again. As of the last groundwater sampling event in July 2006, only two of the wells sampled had a remaining purple color.

1.2 Risk Assessment Summary

The *Human Health Risk Assessment: Revised to Address DEQ Comments* (HHRA) was completed and submitted to the UDEQ on February 5, 2007 (SECOR, 2007). The Chemicals of Potential Concern (COPCs) evaluated included several halogenated and petroleum compounds in soil and groundwater. Summary statistics and concentrations detected for COPCs in soil and groundwater are evaluated and tabulated in the HHRA.

For the purpose of the HHRA, future on-site commercial/industrial workers were evaluated. Because the soil analytical data detected VOC impact in the shallow soils at the site, on-site construction workers and on-site utility workers were also evaluated. For future on-site commercial/industrial workers, the inhalation of VOCs in indoor air was evaluated using the Johnson and Ettinger model. In addition, future on-site commercial/industrial worker inhalation of VOCs in ambient air was evaluated. The pathways evaluated for the future on-site utility workers and construction workers are as follows:

- soil ingestion,
- dermal contact to soil,

- inhalation of VOCs in ambient air,
- dermal contact to groundwater while working in a trench, and
- inhalation of VOCs volatilized from groundwater while working in a trench.

No ingestion of groundwater was expected. The HHRA results showed that future on-site commercial/industrial workers, utility workers, and construction workers will not incur unacceptable health risks from exposure to impacted soils and groundwater at the site.

Additionally, research associated with the Ecological Risk Assessment showed that there are recent records of occurrence for the long-billed curlew and historical records of occurrence for the American white pelican within ½ mile of the site. However, because the site surface and properties of concern is covered predominantly with asphalt, gravel and lawn, here is no indication that chemicals of potential ecological concern (CPECs) have migrated beyond the site boundaries. The soil contamination has been excavated and the affected groundwater is limited to the site building footprint. No complete and potentially significant exposure pathways are identified for either terrestrial or aquatic receptors. No further evaluation was conducted in the HHRA.

2.0 RISK-BASED TARGET LEVELS

Although the revised HHRA (SECOR, 2007) did not identify unacceptable excess cancer risk (ECR) or hazard quotient (HQ)/hazard index (HI) for future on-site receptors, for the purposes of the SMP, risk-based target levels (RBTLs) were derived for the primary risk-driving COPC(s) detected in groundwater at the site. This is based on the scientific understanding that if risk-driving COPCs are cleaned up to their target levels, concentrations of other chemicals that contribute insignificantly to the overall risks will also be lowered to below their health-based values (USEPA, 1991a).

For COPCs in groundwater, the most significant cumulative reasonable maximum exposure (RME) carcinogenic risks identified in the HHRA (SECOR, 2007) are associated with the ECR to the on-site utility workers (3.3E-07) (note that groundwater-related RME ECRs to on-site industrial workers and construction workers are 9E-08 and 3E-08, respectively). The groundwater-related RME ECR to utility workers is driven by the dermal contact to trench water pathway and is associated 100% with PCE. The most significant HQ/HI is also associated with PCE and dermal contact to trench water pathway by utility workers, but it is orders of magnitude less than 1 (2E-04). As such, no RBTL was derived for PCE based on noncarcinogenic effects.

Therefore, the primary carcinogenic risk-driving COPC is limited to PCE to on-site utility workers via dermal contact to trench water (health risks from the outdoor air inhalation of COPCs volatilized from the underlying groundwater and inhalation of COPCs volatilized from water in open trenches were insignificant compared to the dermal contact to trench water pathway).

Therefore, the RBTL for PCE in groundwater is estimated to be 32 μg/L using the following equation:

$$\mathrm{RBTL}_{gw} = \frac{C_{gw} \times \mathrm{TR}}{\mathrm{Risk}}$$

Where:

C_{gw} = Reasonable maximum exposure (RME) concentration of PCE in groundwater (95UCL), 10.7 micrograms per liter (μg/L);

TR = Target ECR, 1E-06;

Risk = Cumulative RME ECR from exposure to PCE in groundwater, 3.3E-07; and

RBTL_{gw} = Risk-based target level for PCE in groundwater, is estimated to be 32 μg/L.

3.0 SITE MANAGEMENT APPROACH

The strategy for managing this site includes two phases; 1) groundwater monitoring and sampling and 2) applying an environmental covenant (EC). Groundwater monitoring and sampling will be conducted until it has been shown that dissolved concentrations of COPCs are below the RBTLs and are stable to decreasing, as well as the water being free from the presence of $KMnO_4$ (purple color in the water is gone). For long-term management of the site, an EC will be created for the site and will be agreed to by: 1) the UDEQ, 2) the current owners (FAE Holdings 386664R L.L.C.), and 3) the holders of the site (Layne). This covenant will then be recorded with Salt Lake County, Utah. The EC will be prepared and implemented immediately upon UDEQ approval of this SMP, and will remain in place until the UDEQ has determined that the EC is no longer necessary (likely indefinitely).

3.1 Groundwater Monitoring Program

Groundwater monitoring and sampling will be conducted until groundwater is clear (not purple), and dissolved concentrations of COPCs have been determined to be stable and below the approved RBTLs. Once this has been achieved, the wells on-site will be properly abandoned. Quarterly groundwater sampling will be conducted for a minimum of 1 year from approval of this SMP. The following sections provide groundwater sampling, analysis, waste management, and reporting procedures that will be followed during implementation of the groundwater monitoring program.

3.1.1 *Monitoring and Sampling Frequency*

Analytical results from all six previous groundwater sampling events (both pre- and post-remediation activities) have been below the RBTL concentration for PCE in groundwater of 32 μg/L (Table 1). Therefore, SECOR proposes 1 year of quarterly groundwater monitoring and sampling to verify that the sampled groundwater is clear and that COPC concentrations have remained stable and below the RBTL.

If the water displays a purple color for any of the initial four sampling events, the groundwater monitoring and sampling will be extended quarterly until four consecutive quarters of clear water are obtained. Once the groundwater is clear and the dissolved COPC concentration is below the RBTL, groundwater monitoring will be scheduled on a semi-annual basis until two consecutive sampling events show the that COPC concentrations in the groundwater have remained stable and below the RBTL.

Based on previous sampling results, it is likely the water currently beneath the site is clear and concentrations of COPCs have remained below RBTLs. Based on this, groundwater sampling is anticipated to conclude following the fourth quarterly sampling event of the 2007/2008 groundwater sampling program.

3.1.2 Monitoring and Sampling Locations and Procedures

There are currently 10 permanent 1.5-inch diameter groundwater monitoring wells onsite (MW-1 through MW-10). For each sampling event, wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7 and MW-9 will be sampled. Additionally, one quality assurance and control sample will be collected as a duplicate sample from a well during each sampling event. Wells MW-8 and MW-10 will not be sampled as they are up gradient and have not shown any contamination in previous sampling events.

In all wells to be sampled, prior to collecting groundwater samples, the depth to water will be measured to the nearest 0.01 feet using a battery-powered water-level indicator. For each well to be sampled, new disposable tubing will placed in the monitoring well to approximately 1 foot off the bottom of the well. A peristaltic pump and a flow-through cell will be used to collect field measurements including dissolved oxygen, oxidation-reduction potential, temperature, electrical conductivity, and pH. The groundwater samples will be collected once stable field measurements of these parameters (pH, temperature, and/or conductivity,) have been achieved for three consecutive samples of purged groundwater: pH + 0.2 units, temperature $\pm$ 1° C, conductivity ±10 percent. Wells that are purged dry will be sampled after recharging.

Groundwater samples from each well will be pumped directly into laboratory-supplied sample containers. The sample containers will be capped, labeled, and placed on ice for transport to the laboratory.

The UDEQ will be notified at least 7 days prior to each sampling event to facilitate possible site visits.

3.1.3 Analytical Parameters and Methods

SECOR will transport groundwater and quality assurance samples to Utah-certified American West Analytical Laboratories of Salt Lake City, Utah for analysis of halogenated VOCs (VOX) using EPA Method 8260B. Groundwater from all wells sampled will also be analyzed for total chromium and manganese (EPA Method 6010) and hexavalent chromium (EPA Method 7196A) *until* the water is clear for four consecutive quarters. After it has been determined that the groundwater beneath the site no longer contains residual $KMnO_4$ solution (signified by clear water), groundwater samples will only be analyzed for VOX. Chain-of-custody protocols initiated in the field will be continued in the laboratory through the analysis of the samples.

3.1.4 Quality Assurance/Quality Control

For each sampling event, one duplicate sample will be submitted for analysis along with the collected groundwater samples. Laboratory QA/QC procedures will include: method blanks, surrogate spike compounds, laboratory control samples, and matrix spike/matrix spike duplicates.

3.1.5 Waste Management

Purge and decontamination water accumulated during the groundwater sampling events will be containerized in a UDOT-approved 55-gallon drum. The drums will be transported off site by

E.T. Technologies, Inc. of Salt Lake City, Utah for disposal of the drummed water following each event. Water will be profiled annually for disposal at an approved facility.

Based on the previous usage of chlorinated solvents at the facility, the purged groundwater is considered a listed (P002) hazardous waste and will be handled as such. The waste drums will be disposed within 90 days.

3.1.6 Reporting

A groundwater monitoring and sampling report will be submitted to UDEQ-DSHW following each groundwater monitoring and sampling event. The report will be issued to the UDEQ-DSHW within 60 days of receipt of the laboratory analytical results. The letter report will include a summary of the monitoring procedures and results, laboratory analytical reports, QA/QC documentation, chain-of-custody forms, and waste manifests.

3.1.7 Abandoning Groundwater Monitoring Wells

Upon successful completion of the groundwater monitoring program, and approval of the UDEQ, all site related groundwater monitoring wells will be abandoned in general accordance with the Utah Administrative Rules for Water Well Drillers, R655-4-11. Well monuments will be removed and the surface will be patched with similar materials as the surrounding areas.

3.2 Environmental Covenant

For long-term management of the site, an EC will be created for the site intended to control and limit potential exposure to the contaminated soil and groundwater. It will be agreed to by: 1) the UDEQ, 2) the current owners (FAE Holdings 386664R L.L.C.), and 3) the holders (Layne) of the site. This covenant will then be recorded with Salt Lake County, Utah. The EC will be prepared and implemented immediately upon UDEQ approval of this SMP, and will remain in place until the UDEQ has determined that the EC is no longer necessary, as per the provisions of the EC. Several key components of the EC are discussed in detail below.

3.2.1 Activity and Use Limitations

As detailed in the EC, and summarized below, several steps will be taken to ensure that: 1) the land remains zoned and used for commercial/industrial purposes only, 2) groundwater beneath the site is not used for drinking water or irrigation purposes, and 3) construction activities would be supervised by individuals with 40-hour training under OSHA 29 CFR 1910.120, and follow a site-specific Health and Safety Plan (HASP). The owners of the site will be required to inform on-site management of these restrictions, and in turn, on-site management will be required to make sure all workers in the vicinity of the site are also aware of, and abide by, the restrictions.

3.2.1.1 Land Use Limitations

The future land use of this site will consist of commercial/industrial uses only, which is consistent with the commercial/industrial worker and on-site utility and construction worker exposure scenarios as described in the *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation, Parts A and B*. Land use limitations will be imposed by filing the EC with the Salt Lake County Recorder's Office. The EC will limit the use of the property to "light manufacturing" purposes under the current property zoning description. The deed will require the notarized signatures of the property owners, and will be filed at the Salt Lake County Recorder's Office located at 2100 South State Street in Salt Lake City, Utah.

3.2.1.2 Water Rights Restrictions

Groundwater from the shallow aquifer located beneath the property is non-potable and will not be used for drinking water or irrigation purposes. Water rights restrictions will be implemented to prevent the use of contaminated groundwater. Based on the agreement outlined in the EC, a letter requesting water rights restrictions will be prepared for submittal to the Utah Department of Natural Resources, Division of Water Rights (DWR).

As UDEQ develops the capabilities, the restriction will be plotted on the DWR's map to alert their staff of groundwater use limitations in the area.

3.2.1.3 Construction Limitations

To limit exposure to the COPCs in site soil and groundwater during construction activities, construction activities would be supervised by individuals with 40-hour training under OSHA 29 CFR 1910.120. On-site workers would be required to work under site-specific HASP. The HASP would address all potential physical and chemical site hazards and include requirements for personal protective equipment, including gloves, rubber boots, long-sleeved shirts, and long pants to limit dermal contact with affected soil and groundwater.

As Bluestakes utility clearance service develops the capability, the construction limitations will be plotted on their map to alert utility locators of construction limitations in the area.

3.2.2 Right of Access

The UDEQ and Layne will be allowed access to the site for implementation and enforcement of the EC.

3.2.3 Reporting

Each year the facility owners will provide a written report to UDEQ, and Layne, verifying that the activity and use limitations remain in place and are being complied with. This report will include details of regarding compliance of land use limitations, groundwater usage restrictions and construction limitations.

4.0 SUMMARY

This SMP presents the strategy for managing the site-specific potential risks to human health and the environment under future commercial/industrial land use conditions. This plan includes two phases of management; 1) groundwater monitoring and sampling to demonstrate that groundwater is clear (not purple) and that dissolved concentrations of COPCs are stable and below the approved RBTLs, and 2) applying an EC to the site to control and limit potential future exposure to the contaminated soil and groundwater. Upon approval of this SMP, quarterly groundwater monitoring and sampling will begin. Additionally, upon approval of this SMP, the EC will be prepared and recorded with Salt Lake County, Utah.

Furthermore, presented in this plan is the proposed calculated RBTL for PCE, the primary carcinogenic risk-driving COPC. The RBTL for PCE in groundwater is estimated to be 32 μg/L. Since all previous analytical results for the groundwater sampled at this site have been below 32 μg/L, groundwater monitoring and sampling is anticipated to conclude after four quarterly sampling events have been completed. Upon completion of the groundwater monitoring and sampling portion of this SMP, and approval of the UDEQ, all monitoring wells on-site will be abandoned. The EC will remain in place until the UDEQ deems it is no longer necessary, as per the provisions of the EC.

5.0 REFERENCES

SECOR, 2007. *Human Health Risk Assessment: Revised to Address DEQ Comments*, February 5, 2007.

USEPA. 1991a. "Risk Assessment Guidance for Superfund (RAGS): Volume I -- Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals)". Interim Final. December 1991.

6.0 LIMITATIONS

This report was prepared in accordance with the scope of work outlined in SECOR's contract and with generally accepted professional engineering and environmental consulting practices existing at the time this report was prepared and applicable to the location of the site. It was prepared for the exclusive use of Layne Christensen Company, for the express purpose stated above. Any re-use of this report for a different purpose or by others not identified above shall be at the user's sole risk without liability to SECOR. To the extent that this report is based on information provided to SECOR by third parties, SECOR may have made efforts to verify this third party information, but SECOR cannot guarantee the completeness or accuracy of this information. The opinions expressed and data collected are based on the conditions of the site existing at the time of the field investigation. No other warranties, expressed or implied are made by SECOR.

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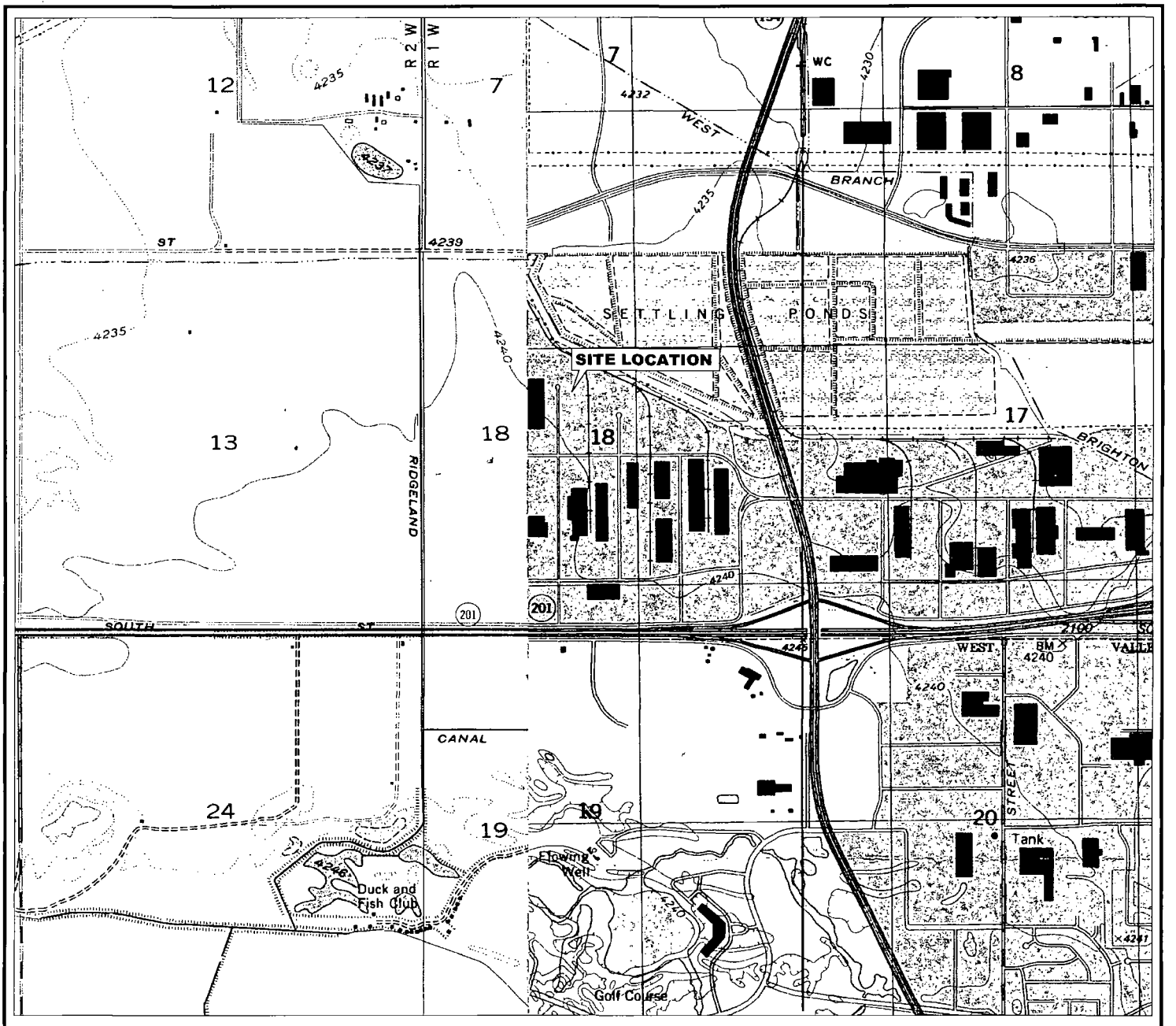
FIGURES AND TABLES



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UTAH

1 1/2 0 1

SCALE IN MILE

1000 0 1000 2000 3000 4000 5000 6000 7000

SCALE IN FEET

REFERENCE: USGS 7.5 MINUTE QUADRANGLE: MAGNA, UT; 1952 AND SALT LAKE CITY SOUTH, UT; 1999

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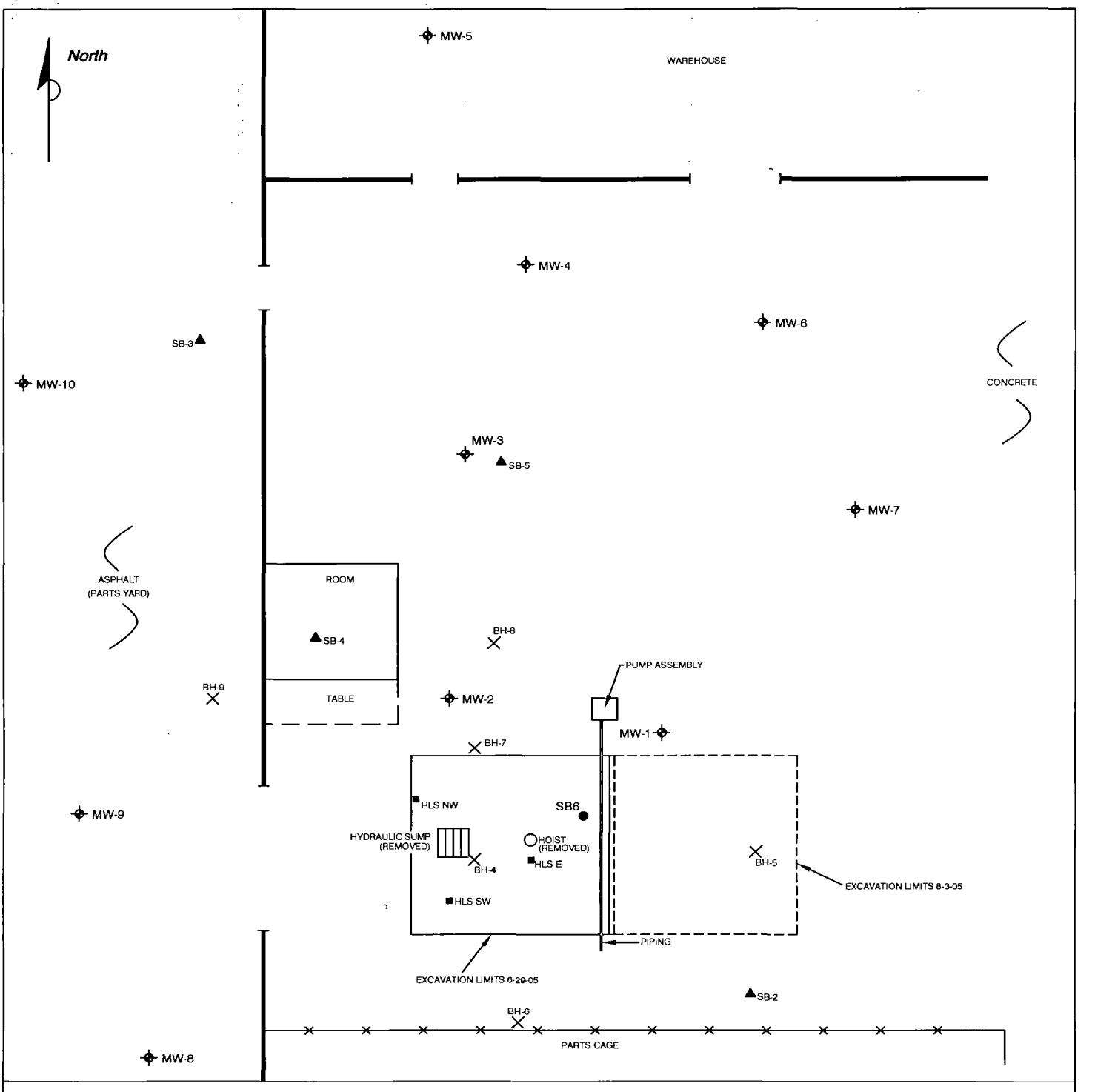
FOR:			FIGURE:
LAYNE CHRISTENSEN FACILITY 4446 W. 1730 S. SALT LAKE CITY, UTAH		**SITE LOCATION MAP**	1
JOB NUMBER: 26OT.LCC02.UT	DRAWN BY: CFS	CHECKED BY:	APPROVED BY: LAC	DATE: 07/27/06

FILEPATH: Q:\CADD-26\026 OTHER CAD\LAYNE CHRISTENSEN\LCC02-FIF3-072706.DWG MODIFIED BY CSENNETT ON APR 24, 2007 - 12:20



LEGEND

MW-1	= MONITORING WELL LOCATION
BH-9	= IHI BOREHOLE (LOCATIONS APPROXIMATE)
HLS SE	= ATC BOREHOLE (LOCATIONS APPROXIMATE)
SB-4	= SECOR BOREHOLE

0 10 20

APPROX. SCALE (FEET)

DRAWN BY: CFS CHECKED: APPROVED: LAC DATE: 12/19/05 JOB No.: 26OT.LCC02.UT CAD FILE: LCC02-F1F5-011006	PREPARED BY: SECOR 308 E. 4500 S., SUITE 100 MURRAY, UTAH	PREPARED FOR: LAYNE CHRISTENSEN FACILITY 4446 W. 1730 S. SALT LAKE CITY, UTAH	FIGURE 2 SITE PLAN

TABLE 1
Groundwater Analytical Results
Layne Christensen Facility
4446 West 1730 South
Salt Lake City, Utah

Sample Location	Date	Groundwater Concentration (µg/L)								(mg/L)				Sample Water Color
		1,1,1-Tri-chloroethane (TCA)	1,1-Dichloro-ethane (DCA)	1,1-Dichloro-ethene (DCE)	cis-1,2-Di-chloro-ethene	Tetra-chloroethene (PCE)	Trichloro-ethene (TCE)	Bromo-form	TPH-DRO	Total Organic Carbon	Manganese	Total Chromium	Hexavalent Chromium	
HLS NW[1]	09/24/04	3.7	2.3	<2.0	<2.0	15	<2.0	<2.0	<20	NA	NA	NA	NA	NR
BH-4 GW[2]	11/04/04	<2.0	<2.0	<2.0	<2.0	17	<2.0	<2.0	NA	NA	NA	NA	NA	NR
BH-5 GW[2]	11/04/04	<2.0	<2.0	<2.0	<2.0	14	<2.0	<2.0	NA	NA	NA	NA	NA	NR
BH-6 GW[2]	11/04/04	<2.0	<2.0	<2.0	<2.0	7.6	<2.0	<2.0	NA	NA	NA	NA	NA	NR
BH-7 GW[2]	11/04/04	<2.0	<2.0	<2.0	<2.0	5.1	<2.0	<2.0	NA	NA	NA	NA	NA	NR
BH-8 GW[2]	11/04/04	<2.0	<2.0	<2.0	<2.0	9.4	<2.0	<2.0	NA	NA	NA	NA	NA	NR
BH-9 GW[2]	11/04/04	<2.0	<2.0	<2.0	<2.0	3.5	<2.0	<2.0	NA	NA	NA	NA	NA	NR
SB-1-GW	01/25/05	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA	NA	NA	NA	NR
SB-2-GW	01/25/05	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA	NA	NA	NA	NR
SB-3-GW	01/25/05	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA	NA	NA	NA	NR
SB-4-GW	01/25/05	<2.0	<2.0	3.4	<2.0	2.3	<2.0	<2.0	NA	NA	NA	NA	NA	NR
SB-5-GW	01/25/05	3.6	4.6	2.1	<2.0	9.3	<2.0	<2.0	NA	NA	NA	NA	NA	NR
MW-1	04/14/05	<2.0	<2.0	<2.0	<2.0	14	<2.0	<2.0	NA	NA	NA	NA	NA	clear
	04/29/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/07/05	3.0	<2.0	<2.0	<2.0	11	<2.0	<2.0	<500	NA	NA	NA	NA	clear
	12/09/05	2.2	2.1	<2.0	11	22	3.9	<2.0	<500	8.0	0.040	<0.010	<0.050	clear
	03/20/06[a]	8.1	3.5	<2.0	<2.0	<2.0	<2.0	<2.0	<500	NA	69	**0.56**	1.0	dark purple
	06/30/06	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<700	NA	15	**0.11**	0.17	pale purple
MW-2	04/14/05	<2.0	<2.0	<2.0	<2.0	6.9	<2.0	<2.0	NA	NA	NA	NA	NA	clear
	04/29/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/07/05	3.2	<2.0	<2.0	NS	9.0	<2.0	<2.0	<500	NA	NA	NA	NA	clear
	12/09/05	<2.0	<2.0	<2.0	<2.0	2.7	<2.0	<2.0	<500	NA	0.044	<0.010	<0.050	clear
	03/20/06	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	600	NA	0.92	0.025	<0.050	clear
	07/05/06	2.5	<2.0	<2.0	<2.0	2.0	<2.0	<2.0	<700	NA	0.44	<0.010	<0.050	clear
MW-3	04/14/05	<2.0	<2.0	2.3	<2.0	5.0	<2.0	5.3	NA	NA	NA	NA	NA	clear
	04/29/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/07/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	12/09/05	<2.0	<2.0	2.8	<2.0	6.8	<2.0	<2.0	NA	NA	0.019	<0.010	<0.050	clear
	03/21/06	<2.0	<2.0	2.2	<2.0	2.6	<2.0	<2.0	NA	NA	0.12	<0.010	<0.050	clear
	06/30/06	<2.0	<2.0	<2.0	<2.0	2.3	<2.0	<2.0	NA	NA	0.12	<0.010	<0.050	clear
Proposed RBTL		--	--	--	--	32	--	--	--	--	--	--	--	
Federal MCLs		200	none	7	70	5	5	none	none	none	none	0.1	none	
Federal MCLGs		200	none	7	70	0	0	none	none	none	none	0.1	none	
EPA Region 9 PRGs (for tap water)		3,200	810	340	61	0.1	0.028	8.5	none	none	0.88	none	0.11	
Utah LUST RBCA Tier 1 SL		none	none	none	none	none	none	none	10,000	none	none	none	none	

TABLE 1
Groundwater Analytical Results
Layne Christensen Facility
4446 West 1730 South
Salt Lake City, Utah

Sample Location	Date	Groundwater Concentration (µg/L)								(mg/L)				Sample Water Color
		1,1,1-Tri-chloroethane (TCA)	1,1-Dichloro-ethane (DCA)	1,1-Dichloro-ethene (DCE)	cis-1,2-Di-chloro-ethene	Tetra-chloroethene (PCE)	Trichloro-ethene (TCE)	Bromo-form	TPH-DRO	Total Organic Carbon	Manganese	Total Chromium	Hexavalent Chromium	
MW-4	04/14/05	<2.0	<2.0	3.3	<2.0	4.0	<2.0	<2.0	NA	NA	NA	NA	NA	clear
	04/29/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/07/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	12/08/05	<2.0	<2.0	3.6	<2.0	4.9	<2.0	<2.0	NA	NA	0.0097	<0.010	<0.050	clear
	03/21/06	<2.0	<2.0	<2.0	<2.0	2.1	<2.0	<2.0	NA	NA	0.21	0.010	<0.050	clear
	06/30/06	<2.0	<2.0	<2.0	<2.0	2.3	<2.0	<2.0	NA	NA	0.28	<0.010	<0.050	clear
MW-5	04/13/05	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA	NA	NA	NA	clear
	04/29/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/07/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	12/08/05	<2.0	<2.0	<2.0	<2.0	2.8	<2.0	<2.0	NA	NA	<0.0050	<0.010	<0.050	clear
	03/21/06	<2.0	<2.0	<2.0	<2.0	2.4	<2.0	<2.0	NA	NA	0.069	<0.010	<0.050	clear[b]
	07/05/06	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA	0.032	<0.010	<0.050	clear
MW-6	04/14/05	<2.0	3.2	<2.0	<2.0	10	<2.0	5.5	NA	NA	NA	NA	NA	clear
	04/29/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/07/05	3.7	2.2	3.3	<2.0	9.8	<2.0	<2.0	<500	NA	NA	NA	NA	clear
	12/09/05	2.3	3.6	<2.0	<2.0	12	<2.0	<2.0	<500	NA	0.0076	<0.010	<0.050	clear
	03/20/06	NA	NA	NA	NA	NA	NA	NA	NA	NA	67	**0.53**	0.75	dark purple
	06/30/06	2.3	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<700	NA	42	**0.38**	0.67	purple
MW-7	04/13/05	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA	NA	NA	NA	clear
	04/29/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/07/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	12/08/05	<2.0	<2.0	<2.0	<2.0	2.4	<2.0	<2.0	NA	NA	0.010	<0.010	<0.050	clear
	03/21/06[a]	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA	120	**0.48**	0.74	dark purple
	06/30/06	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA	0.096	0.022	<0.050	clear
MW-8	04/14/05	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA	NA	NA	NA	clear
	04/29/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/07/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	12/08/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	03/20/06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	06/30/06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Proposed RBTL		--	--	--	--	32	--	--	--	--	--	--	--	
Federal MCLs		200	none	7	70	5	5	none	none	none	none	0.1	none	
Federal MCLGs		200	none	7	70	0	0	none	none	none	none	0.1	none	
EPA Region 9 PRGs (for tap water)		3,200	810	340	61	0.1	0.028	8.5	none	none	0.88	none	0.11	
Utah LUST RBCA Tier 1 SL		none	none	none	none	none	none	none	10,000	none	none	none	none	

TABLE 1
Groundwater Analytical Results
Layne Christensen Facility
4446 West 1730 South
Salt Lake City, Utah

Sample Location	Date	Groundwater Concentration (µg/L)								(mg/L)				Sample Water Color
		1,1,1-Tri-chloroethane (TCA)	1,1-Dichloro-ethane (DCA)	1,1-Dichloro-ethene (DCE)	cis-1,2-Di-chloro-ethene	Tetra-chloroethene (PCE)	Trichloro-ethene (TCE)	Bromo-form	TPH-DRO	Total Organic Carbon	Manganese	Total Chromium	Hexavalent Chromium	
MW-9	04/14/05	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA	NA	NA	NA	clear
	04/29/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/07/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	12/08/05	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA	<0.0050	<0.010	<0.050	clear
	03/20/06	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA	0.019	<0.010	<0.050	clear
	06/30/06	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA	<0.0050	<0.010	<0.050	clear
MW-10	04/14/05	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA	NA	NA	NA	clear
	04/29/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/07/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	12/08/05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	03/20/06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	06/30/06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
E-2*	08/04/05	<2.0	<2.0	<2.0	<2.0	23	<2.0	<2.0	7,000	NA	NA	NA	NA	clear
SB6-G**	10/07/05	5.8	2.2	4.0	<2.0	10	<2.0	<2.0	<500	NA	NA	NA	NA	clear
Proposed RBTL		--	--	--	--	**32**	--	--	--	--	--	--	--	
Federal MCLs		**200**	**none**	**7**	**70**	**5**	**5**	**none**	**none**	**none**	**none**	**0.1**	**none**	
Federal MCLGs		**200**	**none**	**7**	**70**	**0**	**0**	**none**	**none**	**none**	**none**	**0.1**	**none**	
EPA Region 9 PRGs (for tap water)		**3,200**	**810**	**340**	**61**	**0.1**	**0.028**	**8.5**	***none***	**none**	**0.88**	**none**	**0.11**	
Utah LUST RBCA Tier 1 SL		**none**	**none**	**none**	**none**	**none**	**none**	**none**	**10,000**	**none**	**none**	**none**	**none**	

Explanation of Abbreviations

µg/L = micrograms per liter
mg/L = milligrams per liter
TPH-DRO = diesel-range total petroleum hydrocarbons
< = analyte not detected above the practical quantitation limit
NA = not analyzed
NR = not reported
NS = not sampled
RBTL = Proposed Risk Based Target Level

-- Risk based target level not calculated fot these contaminants. PCE is the driver.
MCLs = Maximum Contaminant Levels
MCLGs = Maximum Contaminant Level Goals
EPA = Environmental Protection Agency
PRGs = Preliminary Remediation Goals
LUST = leaking underground storage tank
RBCA = Risk-Based Corrective Action
SL = screening levels

[a] = results shown are for analyses which were rerun on 4-4-06 in order to decrease reporting limits. Sample MW-1 was analyzed 1 day past 14 day holding time.
[b] = initial water color was pale purple
* = E-2 was a grab sample taken from the bottom (10 feet below ground surface) of the August 3, 2005 excavation
** = SB6-G was a groundwater grab sample taken directly from the borehole SB-6

Notes

[1] = This sample was collected by ATC Associates, Inc.
[2] = These samples were collected by IHI Environmental
The remaining samples were collected by SECOR International, Incorporated
bold = indicates analyses reported above proposed RBTL, or (for metal) above regulatory levels.