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Department of
Environmental Quality

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DIVISION OF ENVIRONMENTAL
RESPONSE AND REMEDIATION

Brent H. Everett
Director

ERRC-204-14

January 16, 2015

Ryan Dunham
Site Assessment Manager
EPA Region 8 (8EPR-AR)
1595 Wynkoop Street
Denver, Colorado 80202-1129

Dear Mr. Dunham:

Enclosed for your review is the *Expanded Site Investigation Work Plan* (Work Plan) for the **Redwood Road Dump s**ite (CERCLIS ID# UTD980961502) located in Salt Lake City, Utah.

After reviewing the Work Plan, please inform us of any comments or changes that need to be incorporated in the final version of the document. If you have any questions concerning the contents of the Work Plan, please contact Neil Taylor at (801) 536-4102.

Sincerely,

Dale T. Urban, P.G.
Site Assessment Section Manager
Division of Environmental Response and Remediation

DTU/NBT/ab

cc: Royal DeLegge MPA, EHS, Director, Salt Lake County Environmental Health

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EXPANDED SITE INVESTIGATION WORK PLAN

Redwood Road Dump
Salt Lake County, Utah
UTD980961502

Prepared by: Neil Taylor
Utah Department of Environmental Quality
Division of Environmental Response and Remediation

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Approved: _____ Date: 11/14/15
Neil Taylor, UDEQ Project Manager

Approved: _____ Date: 1/14/15
Dale T. Urban, UDEQ Site Assessment Section Manager

Approved: _____ Date: _____
Ryan Dunham, Site Assessment Manager,
EPA Region 8

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1.0 INTRODUCTION

Under authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and in accordance with applicable provisions of the National Contingency Plan, the Utah Department of Environmental Quality, Division of Environmental Response and Remediation (DERR) has prepared this Work Plan as part of an Expanded Site Investigation (ESI) at the **Redwood Road Dump UTD980961502,** (referred to as "Site") in Salt Lake City, Salt Lake County, Utah. This ESI was prepared under a cooperative agreement between DERR and the U.S. Environmental Protection Agency, Region 8 (EPA). The sampling described in this ESI Work Plan will evaluate potential sediment and surface water contamination as well as delineate possible exposure pathways and targets.

2.0 OBJECTIVES

This Work Plan will provide a framework for data collection and sampling activities near the Site to assess if historical activities caused a release of hazardous substances that pose a potential threat to human health and the environment. The results from the ESI will be used to evaluate if significant releases occurred or exist to warrant "listing" the Site on the EPA's National Priorities List or cleanup of the Site under some other program or authority. Environmental samples will be collected from off-site locations to determine the presence of contamination from past activities in the area.

The objectives of this ESI are to:

- Determine the presence of contamination in selected media;
- Assess the potential contamination characteristics;
- Assess the potential routes for contaminant migration;
- Assess the suspected exposure pathways;
- Identify potential targets that may be impacted by the migration of on-site contamination via the suspected exposure pathways; and
- Determine if continued assessment under CERCLA is warranted.

3.0 BACKGROUND INFORMATION

3.1 SITE LOCATION

The Site extends west from 1900 West Street to 2200 West Street, and south from 500 South Street to Indiana Avenue (800 South) in Salt Lake City, Utah (Figures 1 and 2). The Site is approximately 70 acres in size and is owned by Salt Lake City Corporation (DERR, 1995). The Site is located in the Southeast l/4 of the Southeast 1/4 of the Northeast 1/4 of Section 9, Township 1 South, Range 1 West, Salt Lake Base Meridian (USGS, 1962). The Site is bisected by Interstate 215 (I-215) and includes an eastern and western refuse pile. The Salt Lake City Road Maintenance and Automobile Impound Lot is located directly north (across 500 South Street) of the western portion of the Site.

3.2 SITE HISTORY

The Site was the primary landfill for Salt Lake City from 1923 to 1962, when it was closed to public dumping. The Site is estimated to contain approximately 1,340,000 cubic yards of refuse and fill (Eckoff, 1997). A manifest system was not in place at the landfill during its operation and no records remain of waste content or quantities dumped at the Site (UBSHW, 1987). The eastern portion of the Site was used from 1962 to 1995 by Salt Lake City Corporation's Parks and Recreation Department and Public Services Department for the disposal of leaves, grass clippings, tree trimmings and storm sewer sludge (DERR, 1995). I-215 was constructed through the center of the Site in 1988 creating an eastern and western refuse pile. It is believed that waste characteristics at the Site include municipal wastes such as household, commercial, industrial and organic materials.

The northern portion of the western landfill and the sliver of land directly north of the western landfill across 500 South Street are used for Salt Lake City's automobile impound lot. Salt and gravel are stored on the southern portion of the western landfill. Both landfills are perimeter fenced (DERR, 2010a). The landfills are closed to the public with no dumping allowed. A City vehicle washing and refueling facility has been constructed on City property northwest of the eastern landfill. The City chips trees, limbs and leaves on a large asphalted area southeast of the eastern landfill. Access to the landfill outside the asphalted area will remain restricted (Salt Lake City Parks, 2010).

The Portland Cement Superfund site is located directly south of the eastern landfill and Indiana Avenue on approximately 71 acres. Kiln dust from the Portland Cement site contained arsenic, cadmium, chromium, lead, manganese and molybdenum. Groundwater monitoring beneath the

Portland Cement site indicates that the Portland Cement groundwater contaminant plume is limited to shallow groundwater that is contained within the Portland Cement site boundaries (DERR, 2007).

3.3 PREVIOUS INVESTIGATIONS

A Preliminary Assessment (PA) of the Site was prepared by the Utah Department of Health's Bureau of Solid and Hazardous Waste in 1987. A Site Inspection (SI) was conducted in 1991 and a Targeted Brownsfields Assessment (TBA) was conducted in June, 2000 for the western portion of the Site and the Salt Lake City Road Maintenance and Automobile Impound Lot. The 1991 SI and 2000 Targeted Brownfields Assessment have established the following:

- Soil - Concentrations of barium, calcium, chromium, copper, iron, mercury, nickel, sodium, and zinc were detected in surface soils over three times that of the background sample. In particular, lead was detected in the subsurface soils as high as 2,610 mg/kg.

  Concentrations of benzo (a) pyrene (5,000 µg/kg) and dibenz (a, h) anthracene (1,000 µg/kg) were identified in subsurface soils above Superfund Chemical Data Matrix (SCDM) benchmarks (SCDM, 2014). The SCDM Cancer Risk Screening Concentration (CRSC) for both compounds is 20 µg/kg.

- Groundwater - The presence of arsenic (1,290 µg/L), antimony (34.2 µg/L), selenium (14.8 µg/L) and pentachlorophenol (3 µg/L) have been found in Site groundwater above SCDM benchmarks. Arsenic contamination above the 10 µg/L groundwater Maximum Contaminant Level (MCL) is widespread. However, no public or private drinking water wells have been identified downgradient of the Site.

- Surface water – The City Drain Canal bisects the Site. Water from the canal eventually enters the Great Salt Lake at Farmington Bay Wildlife Refuge approximately 10 miles downstream of the Site. Approximately 50 miles of wetland frontage occur within the 15-mile target distance limit (USDI, 1990).

  The SCDM surface water environmental pathway benchmark for acute exposure is the Criterion Maximum Concentration (CMC) and the benchmark for chronic exposure is the Criterion Chronic Concentration (CCC). The environmental toxicity of metals in surface water depends upon water hardness. As the water hardness of the City Drain has not been determined, the default CMC and CCC values for a total water hardness of 100 mg/L are provided. City Drain Canal surface water lead concentrations rise from a non-detectable background concentration to a high of 59.2 µg/L downstream of the Site. This

concentration does not exceed the surface water CMC of 65 µg/L, but significantly exceeds the surface water CCC of 2.5 µg/L. However, although elevated levels of lead have been detected in subsurface Site soils, elevated levels of lead have not been detected in Site groundwater. Arsenic levels in surface water increase from a background concentration of 61 µg/L to 82.8 µg/L downstream of the Site. This is below the 340 µg/L CMC and the 150 µg/L CCC (SCDM, 2014; DERR. 2001).

3.4 PHYSICAL CONDITIONS

3.4.1 HYDROGEOLOGY

Precipitation that falls as rain or snow in the mountain ranges flows down the range fronts and recharges the deep aquifer within the Salt Lake Valley. The shallow water table aquifer is generally recharged by downward infiltration from precipitation, canals, irrigated lands and streams as well as by upward leakage from the underlying confined aquifer (Waddell, et al, 1987). Surficial basin fill deposits within the Salt Lake Valley generally consist of a series of Quaternary lacustrine, alluvial fan, sand dune, mud-rock flow, ash falls, glacial and flood plain sediments. Groundwater occurs within these valley fill deposits as a complex series of aquifers (Waddell, et al, 1987). The deeper aquifer lies in Quaternary deposits of clay, silt, sand, and gravels that are hydraulically interconnected with individual beds of sand and gravel ranging in thickness from less than one foot to tens of feet. The maximum thickness of the principal aquifer is greater than 1,000 feet in the northern portion of the valley. Most deep wells in the Salt Lake Valley are completed in sediments at depths of less than 1,200 feet (Waddell, et al, 1987).

Municipal wells within four miles of the Site are completed at depths of 1,100 feet and less (DERR, 1992). There are no wells currently in use on-site (DERR, 2010a). Drilling logs from the four monitoring wells installed at the Site in 1991, in addition to the well logs from the neighboring Portland Cement site (UTD980718670) reveal a lithology of clay, silt and sand beneath the landfill (DERR, 1995). A soil survey of the Salt Lake area identified the soils at the Site as dumps (Du), Salt Air Silty Clay Loam (Sa), Loamy Borrow Pits (Lo), Sandy Terrace Escarpments (Sc), and Decker Fine Sandy Loam (De) (DERR, 1992).

Groundwater flow in the shallow aquifer although complex, due to the interaction with local surface water and underground utility pathways, is generally to the northwest. A 42-inch sanitary sewer is buried at an average depth of 17 feet below grade on the eastern border of the Site. The bedding material of the sewer line appears to be removing groundwater from the shallow aquifer and routing it to the City Drain. Groundwater flow under the eastern landfill also appears to be toward the City Drain (DERR, 1992).

3.4.2 HYDROLOGY

The Salt Lake Valley is located in the Great Basin drainage system, which is a closed system with no outlets. The Jordan River and its tributaries form the main drainage for the valley. The Jordan River is a Class 3B stream and discharges into the Great Salt Lake (UAC, 2012). The Surplus Canal and the City Drain are located in close proximity to the Site. The City Drain is located west of I-215 and just east of the western landfill. The Surplus Canal is a losing stream and likely receives no contribution from contaminated groundwater (USEPA, 1998). The "North Ditch" described in earlier reports was a depression that drained the City property northeast of the eastern landfill. This depression has been filled in and runoff is now piped to a storm drain that flows to the City Drain. The City Drain is the primary groundwater discharge point. The City Drain joins the Sewer Canal approximately six miles to the north of the Site. The Sewer Canal eventually discharges into the Great Salt Lake. The Surplus Canal is located approximately 1,000 feet to the west of the Site. The discharge points for the Jordan River, the Surplus Canal and the Sewer Canal into the Great Salt Lake are characterized by freshwater marshes. The discharge points are within the confines of the Farmington Bay Waterfowl Management Area (DERR, 1992).

3.4.3 GEOLOGY

The Wasatch Front is underlain by the active Wasatch Fault system. This system is a major geologic structure that extends generally north and south for a distance of some 210 miles. Vertical movement along this fault system exceeds three miles. The Wasatch Front is subdivided into several valleys (Waddell, et al, 1987).

The Site is located within the Jordan River Valley of the Great Basin Section of the Basin and Range Physiographic Province. The Jordan River Valley is bounded by the Wasatch Mountains to the east, the Oquirrh Mountains to the west, the Traverse Mountain Range to the south, and the Great Salt Lake to the north. Basin-fill deposits were eroded from the Wasatch and Oquirrh Mountains and deposited in the Salt Lake Valley. The general stratigraphy of the area is characterized by several hundred to several thousand feet of unconsolidated and semi-consolidated basin fill deposits. Mountain streams and historical lakes carried most of the sediment into the basin and ancient Lake Bonneville. The fine-grained sediments were deposited in deeper portions of Lake Bonneville. The coarser-grained sediments were deposited along the margins of ancient Lake Bonneville near the mountains as its level eventually receded to its present level as the Great Salt Lake (Waddell, et al, 1987).

3.4.4 METEROLOGY

The Salt Lake Valley is characterized as being semiarid. The normal maximum temperature ranges from 37.0° F in January to 93.7° F in July. The normal minimum temperature ranges from 19.7° F in January to 61.8° F in July. The average annual rainfall is 15.31 inches per year with a normal monthly high of 2.21 inches in April and a normal monthly low of 0.72 inches in July. The average annual snowfall is 58.0 inches. The estimated pan evaporation is a 3.91 inches per year (USGS, 2009). The winds are predominantly from the south and southeast and have a mean speed of four to five miles per hour (Ashcroft et al., 1992).

3.5 PRELIMINARY PATHWAY ANALYSIS

Potential exposure pathways and potential data gaps are presented in the Conceptual Site Model (Figure 3), and are discussed in more detail in the following sections.

3.5.1 WASTE SOURCE CHARACTERIZATION

Both west and east landfills contain municipal trash and unknown quantities of hazardous materials. Both petroleum and chemical wastes were found in soil borings that were part of a 1977 UDOT landfill waste investigation. The volume of the landfills is calculated at approximately 1,340,000 cubic yards (Eckoff, 1977). The landfills are not properly contained to minimize leaching of materials into the shallow groundwater.

Chromium and lead contaminated soils were illegally placed on the central part of the eastern landfill some time during December of 1991 by Tool Design Engineering and Manufacturing facility personnel (DSHW, 2010). Chromium concentrations in samples collected from the soil ranged from 1,240 mg/kg to 3,300 mg/kg. Lead concentrations ranged from 1,000 mg/kg to 1,800 mg/kg. The contaminated soils were removed in 1997 (Terracon, 1997).

3.5.2 SOIL EXPOSURE PATHWAY ANALYSIS

Site soils contain above background concentrations of 21 base/neutral acid (BNA) organic compounds, five volatile organic compounds (VOAs), 12 pesticide compounds, and one polychlorinated biphenyl (PCB) compound. None were found in concentrations exceeding SCDM benchmarks. The PCB Aroclor-1260, was detected in one sample at 150 ppb. Concentrations of barium, calcium, chromium, copper, iron, lead, mercury, nickel, sodium and zinc were detected over three times background. None were above SCDM benchmarks. However, lead has no established SCDM benchmark. Lead was detected at 2,610 mg/kg in the northern corner of the

western landfill (DERR, 2001). Arsenic was reported in all soil samples collected from the western landfill. The highest reported concentration was 43.9 mg/kg (DERR, 2001).

Soil samples were collected during installation of the direct push groundwater samples and from selected trench locations across the Site. Soil samples were collected directly at the soil/water interface. Lead was reported in samples at concentrations from 1,760-1,930 mg/kg. Polynuclear aromatic hydrocarbon compounds were detected in a trench cut along the central portion of the east bench. Soil samples collected from the base of a 10 foot trench cut revealed benzo (a) pyrene at 5,000 µg/kg and dibenz (a,h) anthracene at 1,000 µg/kg (DERR, 2001). The SCDM CRSC for both compounds is 20 µg/kg (SCDM, 2014). The CRSC for benzo (a) pyrene was exceeded in five samples collected from the western portion of the landfill ranging from a high of 5,000 µg/kg to a low of 34 µg/kg. No VOCs, semivolatile organic compounds (SVOCs) or PCBs/Pesticides were detected in any other samples above SCDM benchmarks.

Eleven BNA, six pesticide and two VOC compounds were detected in sediment samples. The majority of these contaminants were detected in the now nonexistent North Ditch, indicating they most probably originated from the landfill. The North Ditch sediment sample contained three metal concentrations that were more than three times the concentrations found in the upgradient City Drain sediment sample. These metals include lead (68.2 mg/kg), magnesium (33,000 mg/kg) and zinc (222 mg/kg) (DERR, 1992). There is no on-site population or residences at the Redwood Road Dump. There are no schools or day cares located within 200 feet of the Site (DERR 2010a).

3.5.3 GROUNDWATER EXPOSURE PATHWAY ANALYSIS

Sampling results from the June 2000 TBA revealed pentachlorophenol in one groundwater sample at an estimated concentration of 3 µg/L. The drinking water MCL for this compound is 1 µg/L. No other organics were detected in the groundwater above SCDM benchmarks (DERR, 2001; SCDM, 2014).

Arsenic was detected in many groundwater samples above the MCL of 10 µg/L. Arsenic was detected at two locations north of the western landfill at 1,290 µg/L and 1,000 µg/L. Dissolved arsenic was reported in groundwater collected from the middle of the eastern landfill at an estimated concentration of 1,170 µg/L. Other groundwater samples ranged from 2.4 µg/L to 236 µg/L. No other dissolved metals were detected in the groundwater above SCDM benchmarks (DERR, 2001; SCDM, 2014).

Seventeen municipal wells from three cities are located within the four-mile target distance range. All wells are located east or south of the Site and hydraulically upgradient (DDW, 2010a; DDW,

2010b). All three city water systems are blended with multiple groundwater and surface water sources. Approximately 4,102 underground points of diversion are located within four miles of the Site. The uses for the large majority are for "domestic" or irrigation purposes and most are upgradient of the Site. All downgradient wells within three miles of the Site are from 200 to 400 feet deep artesian wells drawing from the deeper, confined aquifer. All downgradient wells are privately owned and are not used for drinking water (DWR, 2010).

3.5.4 SURFACE WATER PATHWAY ANALYSIS

There are no surface drinking water sources within the 15-mile target distance limit from the Site. Surface waters are not used for fishing within 15-downstream miles. A wetland environment exists at the Great Salt Lake which is approximately 10 miles downstream of the Site. Approximately 50 miles of wetland frontage occur within the 15-mile target distance limit (USDI, 1990). Several duck hunting clubs are located within these wetland areas (DWLR, 2010).

In the 2000 TBA, lead was not detected in the upgradient sample and detected at 56.1 µg/L in the downgradient sample. The CMC for lead is 65 µg/L and the CCC for lead is 2.5 µg/L. No other metal was reported above SCDM benchmarks. Arsenic was also detected in the upgradient City Drain sample at 61 µg/L and in the downgradient sample at 82.8 µg/L (CMC = 340 µg/L, CCC = 150 µg/L).

3.5.5 AIR EXPOSURE PATHWAY ANALYSIS

There is no on-site population or residences at the Redwood Road Dump. There are no schools or day cares located within 200 feet of the Site. There is a population of 130,095 within the four-mile Target Distance Limit (DERR, 2010b). Both western and eastern landfills are fenced. Two means of access are available to the eastern landfill; one is from the north through a gate which is locked at night, and one is from the south through a road barrier.

4.0 DATA QUALITY OBJECTIVES

The EPA Data Quality Objective (DEQ) Process is a seven-step planning approach used to prepare plans for environmental data collection activities. It provides a systematic approach for defining the criteria that data collection design should satisfy. Surface water exposure is the pathway of highest potential concern for the Site. Air and groundwater pathways are of lesser concern.

STEP ONE – THE PROBLEM STATEMENT

Lead in surface water, has been detected at a level significantly exceeding SCDM screening levels. Arsenic has also been detected in surface water at about half the SCDM benchmark. No surface water or sediment samples have been collected from downgradient surface waters to determine potential threats to downgradient sensitive environments. Total water hardness has not been determined to permit accurate determination of SCDM hardness based on environmental benchmarks.

STEP TWO – IDENTIFYING THE DECISIONS

Are Site contaminants present in surface water or sediments at levels that could pose a threat to downgradient sensitive environments?

STEP THREE – IDENTIFYING THE DECISION INPUTS

Field and laboratory analytical results from surface water and sediment upgradient and downgradient samples will form the basis for making subsequent decisions. Surface water total hardness analytical results will be used to calculate SCDM hardness based environmental benchmarks. Analytical results from surface water will be compared to SCDM environmental benchmarks. Analytical results from sediment samples will be compared to background concentrations to determine if an "observed release" of contaminants is present.

STEP FOUR – DEFINE THE STUDY BOUNDARIES

Surface water and sediment samples will be collected upgradient of the Site and downgradient of the Site at locations before and after the City Drain merges with several downgradient canals before entering sensitive environments at the Great Salt Lake. Co-located sediment samples will also be collected.

STEP FIVE – DEVELOPING DECISION RULES

In general, sample results will be compared to background samples and to SCDM benchmarks to determine if potential environmental threats exist. Contaminant concentrations in upgradient and downgradient samples will be used to further identify the extent of contamination.

STEP SIX – DEFINING TOLERANCE LIMITS ON DECISION ERRORS STEP

Judgmental sampling will be used to bias samples toward more potentially contaminated areas. Statistical sampling will not be used and the tolerance limits on decision errors will not be

calculated. All analytical data will be reviewed, verified and validated to ensure data are acceptable for the intended use.

STEP SEVEN – OPTIMIZING THE SAMPLE DESIGN

Sample locations may be adjusted based on utility clearances or other field factors. Site maps, updated with the results from previous sample studies, will be used to determine the number and location of potential source sample locations. The surface water sample used for determining total water hardness will be collected at a location that accurately represents the quality of water flowing from the Site into sensitive environments.

5.0 FIELD PROCEDURES

5.1 CONCEPT OF OPERATIONS

5.1.1 SCHEDULE

Sampling for this ESI is tentatively scheduled for spring or summer 2015 and is contingent upon the EPA's approval of this Work Plan. Field activities are expected to last one to two days depending on conditions at the Site. Coordination with the landowners, lessees, laboratories, and local health authority is on-going and concurrent with this Work Plan. All logistical functions will be arranged by the Project Manager in advance of sampling.

5.1.2 SAFETY

On-site personnel will avoid direct dermal contact, inhalation, and ingestion of potentially contaminated materials. Sampling will be conducted in Level D personal protective equipment unless the Site Health and Safety Officer, upon evaluation of Site conditions, deems an upgrade necessary. A detailed Health and Safety Plan (HASP) has been prepared and will be reviewed with field personnel prior to the beginning of any fieldwork (Appendix A). A Tailgate Safety Meeting form will be provided and reviewed by all personnel prior to start of activities each field day.

In the event of an accident, the nearest hospital is the LDS Hospital (801-408-1100) located at 325 East 400 North (8th Avenue), Salt Lake City, Utah. A map of the route to the hospital from the Site has been included with the HASP in Appendix A.

5.1.3 SITE ACCESS AND LOGISTICS

Site access will be arranged by the Project Manager. The landowners/lessees will be asked to sign a "Consent For Access to Property" form (Appendix B) prior to sampling. Any additional logistical functions will be arranged by the Project Manager.

5.2 SAMPLE LOCATIONS

Surface water and sediment samples will be collected from the locations identified in Tables 1 and 2 and Figure 4. Samples will be collected to fill data gaps in the Conceptual Site Model given in Figure 3 and to augment the existing data. Figure 4 identifies sampling locations for surface water, and sediment. Surface water and sediment samples are located to identify the level of contaminants immediately upgradient and downgradient of the Site and to identify contaminant contributions by other streams entering the 15-mile downstream pathway and delivered to Great Salt Lake sensitive environments. Sample locations may be adjusted in the field because of utilities or other Site conditions that make the proposed sampling points inaccessible. Deviations from this Work Plan will be documented in the field notes by the Project Manager and noted in the ESI Analytical Results Report.

5.2.1 SOIL SAMPLES

Previous investigations have adequately characterized soil contaminants on and near the Site. No additional soil samples will be collected as a part of this investigation.

5.2.2 GROUNDWATER SAMPLES

Previous investigations have adequately characterized groundwater contaminants on and near the Site. No additional groundwater samples will be collected as a part of this investigation.

5.2.3 SURFACE WATER AND SEDIMENT SAMPLES

Surface water and sediment samples will be collected in the locations identified in Tables 1 and 2 and Figure 4 to identify the extent to which the Site contributes to surface water contamination in the City Drain canal and to determine contaminant concentration downgradient as surface water flows to the Great Salt Lake and sensitive ecosystems.

5.3 SAMPLING METHODS

The locations of the samples have been selected based on previous Site sample results and the location of human and environmental targets. A description of the proposed samples is included in Tables 1 and 2. The Tables provide the following information;

- Table 1 lists sample locations and rationale.
- Table 2 is a sample analysis checklist that denotes the laboratory parameters for the analysis of each sample.

Sampling will proceed according to methods outlined in the DERR CERCLA Quality Assurance Project Plan (QAPP) of September 2014 and other relevant EPA guidance documents. All sampling events will be documented in a field log book including data such as: date, time, sample number, geographic coordinates, sediment grain size and sediment percent organic content. A photograph will be taken of each sample location. Field conditions may necessitate a deviation of sampling methods from those presented in the Work Plan. Such deviations will be noted in the field notes and reported in the ESI Analytical Results Report. All samples will be collected using the appropriate number and type of sampling containers as specified by EPA Contract Laboratory Program (CLP) guidance. All sample collection will proceed following strict chain-of-custody procedures.

5.3.1 SOIL

Collection of soil samples is not anticipated.

5.3.2 GROUNDWATER

Collection of groundwater samples is not anticipated.

5.3.3 SURFACE WATER AND SEDIMENT

All safety protocols are detailed in the Health and Safety Plan (Appendix A). Downstream locations will be sampled first to prevent fugitive sediments from flowing downstream and impacting sample results. Water samples will be collected before sediment at each sample location, taking care not to disturb the underlying sediments. Surface water samples will be collected by placing a one-liter polyethylene sample container, or if necessary, a dipper directly into the surface water body. Water will be poured from the dipper into the sample container. If used, the dipper will be field decontaminated after use by washing the dipper in tap water and

Alconox followed by a rinse in tap water and a final rinse in deionized water. A dipper rinse water sample will be collected to determine the efficacy of decontamination procedures. Sediment samples will be collected using dedicated stainless steel spoons. The sediment will be placed directly into a 250-mL glass jar. Water will be decanted from the jar. Spoons will be decontaminated at DEQ for reuse in other Site sampling efforts by washing in tap water and Alconox and rinsing in deionized water.

5.4 INVESTIGATION DERIVED WASTE

The generation of investigation derived waste (IDW) is not anticipated. Should any IDW be collected, it will be disposed of in accordance with state and federal regulations and guidelines. Disposable sampling equipment will be removed from the Site and disposed of as a non-hazardous waste. Excess sample quantities will be returned to the original location.

5.5 ANALYTICAL PARAMETERS

Eight water samples will be collected for total metals analysis. These sample will be preserved with nitric acid (HNO_3). A water sample will also be collected for total water hardness analysis expressed in mg/L calcium carbonate ($CaCO_3$). This sample will be collected from the Sewer Canal at the point the canal crosses the North Salt Lake Center Street. The total water hardness sample will be passed through a 0.45-micron filter, using a pressurized bailer or peristaltic pump, and preserved with hydrochloric acid to a pH of less than 2. Surface water and sediment samples will also be preserved by cooling with ice to 4° Celsius. Samples to be analyzed for total metals will be shipped to a CLP laboratory and analyzed under Routine Analytical Services (RAS). The sample to be analyzed for total hardness will be shipped to a laboratory identified by EPA. All samples will be analyzed according to EPA approved methods.

6.0 FIELD QUALITY CONTROL AND ASSURANCE PROCEDURES

Samples will be handled and preserved as per the criteria of the DERR QAPP of September 2014. Appropriate background, field and laboratory duplicate samples will be collected.

7.0 CHAIN-OF-CUSTODY

Chain-of-Custody forms will be prepared with the EPA approved "Scribe" software. Samples will be handled and delivered to the CLP laboratory in accordance with the chain-of-custody protocol as prescribed in the DERR QAPP of September 2014.

8.0 DATA REVIEW, VALIDATION AND REPORTING

EPA will perform the data validation for the analytical procedures. After the receipt of the validated data from the EPA, a draft Expanded Site Investigation Analytical Results Report will be prepared and submitted to EPA Region 8 for review. At the completion of sampling, a Field Activities Summary Report will be drafted within 14 days of sampling completion, outlining and documenting the procedures following the sampling event. This report will be included in the Expanded Site Inspection Analytical Results Report which will be prepared following receipt of data from the contact contract laboratory, and submitted to EPA for review and comment.

9.0 REFERENCES

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TABLES

Table 1

Sample Collection Summary
Redwood Road Landfill

Field Sample No.	Matrix	Containers[1]	Location	Rationale	QA/QC
RD-SW-01	Surface water	1-Liter Polyethylene Bottles	Indiana Ave I-215	Identify background contaminant levels	Background
RD-SW-02	Surface water	1-Liter Polyethylene Bottles	500 South and I-215	Identify immediate downgradient contaminant levels	
RD-SW-03	Surface water	1-Liter Polyethylene Bottles	Dauntless Ave (1000 North) and I-215	Identify contaminant levels before entrance of drainage detention basin	Lab Duplicate[2]
RD-SW-04	Surface water	1-Liter Polyethylene Bottles	1700 North and I-215	Identify contaminant levels after entrance of drainage detention basin and before entrance of a branch of the Jordan River	
RD-SW-05	Surface water	1-Liter Polyethylene Bottles	City Drain after merge with Jordan River Branch I-215 and Rose Park Lane	Identify contaminant levels after merging with a branch of the Jordan River	
RD-SW-06	Surface water	1-Liter Polyethylene Bottles	North Salt Lake Center Street at the Sewer Canal	Identify contaminant levels after merging with the Sewage Canal	
RD-SW-07	Surface water	1-Liter Polyethylene Bottles	North Salt Lake Center Street at the Sewer Canal	Identify contaminant levels after merging with Sewage Canal	Field Duplicate[3]
RD-SW-08	Surface water	1-Liter Polyethylene Bottles	Decontamination rinse sample	Determine the efficacy of decontamination procedures.	
RD-SW-09	Surface water	1-Liter Polyethylene Bottles	North Salt Lake Center Street at the Sewer Canal	Identify hardness of water after the City Drain merges with the Sewage Canal. This water flows into the Great Salt Lake.	
RD-SE-01	Sediment	250-mL Glass Jars	Indiana Ave I-215	Identify background contaminant levels	Background
RD-SE-02	Sediment	250-mL Glass Jars	500 South and I-215	Identify immediate downgradient contaminant levels	Lab Duplicate[2]
RD-SE-03	Sediment	250-mL Glass Jars	Dauntless Ave (1000 North) and I-215	Identify contaminant levels before entrance of drainage detention basin	
RD-SE-04	Sediment	250-mL Glass Jars	1700 North and I-215	Identify contaminant levels after entrance of drainage detention basin and before entrance of a branch of the Jordan River	
RD-SE-05	Sediment	250-mL Glass Jars	City Drain after merge with Jordan River Branch I-215 and Rose Park Lane	Identify contaminant levels after merging with a branch of the Jordan River	
RD-SE-06	Sediment	250-mL Glass Jars	North Salt Lake Center Street at the Sewer Canal	Identify contaminant levels after merging with the Sewage Canal	

[1] Sediment samples require one 250-mL glass Jar for each analysis.
[1] Surface water samples require 1 liter polyethylene bottles preserved with nitric acid for total metals analysis and 1 liter polyethylene bottles filtered and preserved with hydrochloric acid for hardness.
[2] MS/MSD requires double volume for total metals
[3] Blind Duplicate for water will be labeled on the Chain of Custody as RD-SW-07

Table 2
Sample Analyses Checklist

SITE NAME: Redwood Road Landfill
SITE ID NUMBER: UTD980961502
LOCATION: 2000 West 200 South
PROJECT LEADER: Neil Taylor
CITY: Salt Lake City, Utah
SAMPLING DATE: Fall, 2012

Sample Location	Sample Type	Field Parameters					Laboratory Analyses															Preserve			QA/QC						Other	
		Temp	pH	Cond	DO	Other	Volatiles	Semi-Vols	Pesticides	Tot. Metals	Cyanide	Sulfide	Ammonia	NO3 - NO2	Anions	Asbestos	Hardness in mg/L $CaCO_3$	BTEXN	TPH	O&G	Explosives	HNO_3 (Total Metals)	HCL	ICE	Field Dup	Lab Dup	Decon Check Sample	Split	Spike	Blank	Opportunity	Background
RD-SW-01	Surface water									X												X		X								X
RD-SW-02	Surface water									X												X		X								
RD-SW-03	Surface water									X												X		X		X						
RD-SW-04	Surface water									X												X		X								
RD-SW-05	Surface water									X												X		X								
RD-SW-06	Surface water									X												X		X								
RD-SW-07	Surface water									X												X		X	X							
RD-SW-08	Surface water									X												X		X			X					
RD-SW-09	Surface water																X						X	X								
RD-SE-01	Sediment									X														X								X
RD-SE-02	Sediment									X														X		X						
RD-SE-03	Sediment									X														X								
RD-SE-04	Sediment									X														X								
RD-SE-05	Sediment									X														X								
RD-SE-06	Sediment									X														X								

FIGURES

Site Boundary

Landfills

0.25 0.125 0 0.25 Miles

N
W E
S

Utah Department of Environmental Quality
Division of Environmental Response and Remediation

Figure 1
Site Location Map
Redwood Road Dump Site

Salt Lake County, Utah

by: Neil B. Taylor

Date: 04/08/2010

Sewer

Landfills

City Drain

NorthDrain

400 200 0 400 Feet

N

W E

S

Utah Department of Environmental Quality
Division of Environmental Response and Remediation

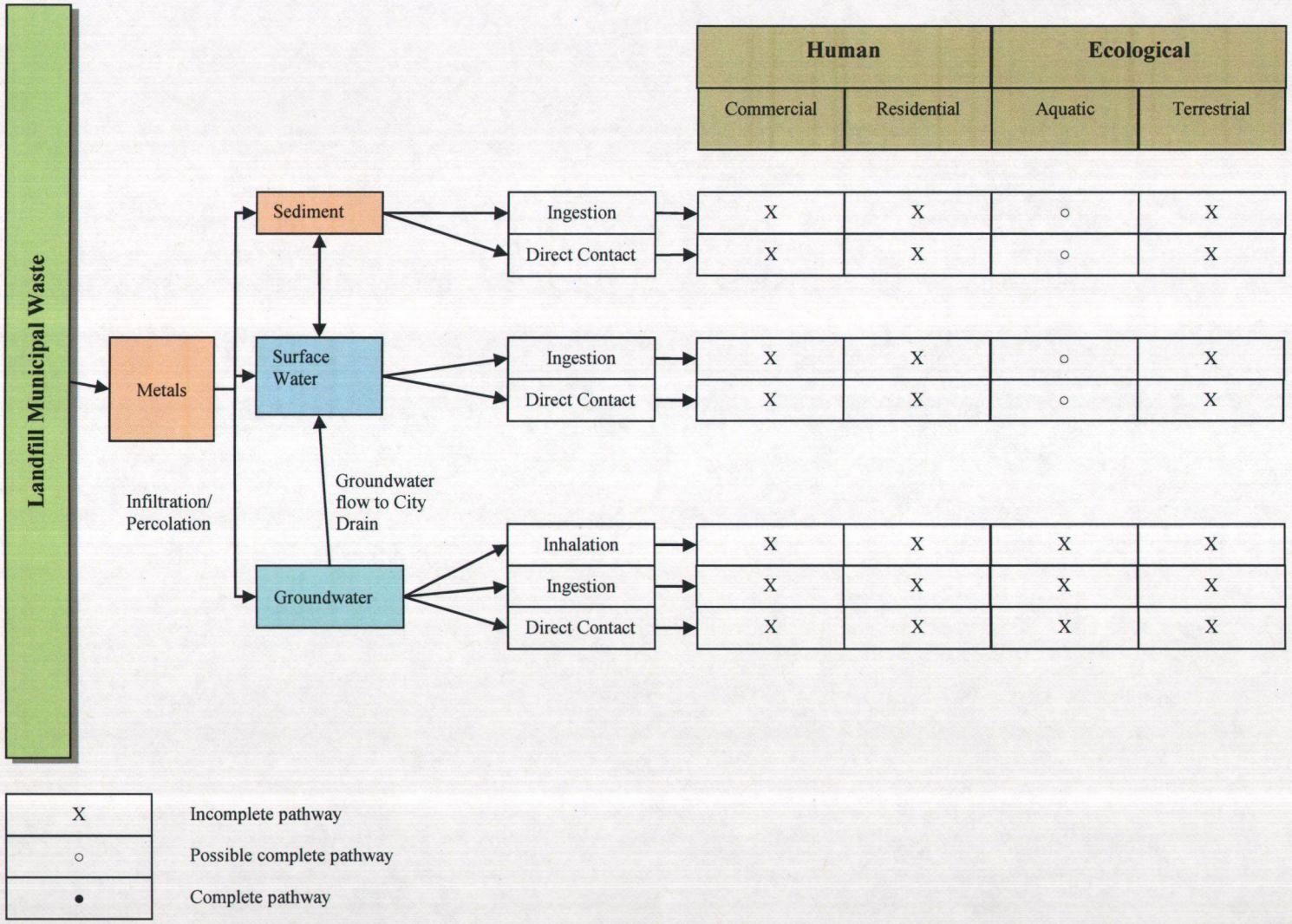
Figure 2
Site Map
Redwood Road Dump Site

Salt Lake County, Utah

by: Neil B. Taylor

Date: 04/08/2010

Figure 3 - Redwood Road Dump Conceptual Site Model



SW/SE Samples

Site Drainage

Lakes

Streams

Landfills

0.75 0.375 0 0.75 Miles

N

W E

S

Utah Department of Environmental Quality
Division of Environmental Response and Remediation

Figure 4
Surface Water/Sediment Sample Location Map
Redwood Road Dump

Salt Lake County, Utah

by: Neil B. Taylor

Date: 06/22/2012

APPENDIX A
HEALTH AND SAFETY PLAN

Site Health & Safety Plan

Redwood Road Dump
2000 West Indiana Avenue
Salt Lake City, Utah
Spring 2014

A. Site Hazard Evaluation

The contamination most likely to be encountered at the site would be from contaminated surface water and sediment from site runoff. No other known environmental hazards exist at the site. The primary exposure pathways are ingestion of contaminated water and sediment by hand to mouth. No special site entry procedures will be necessary.

B. Site Investigation Team - Responsibility

Neil Taylor	Project Manager
Kim Vieweg	Site Health & Safety Officer

C. Personal Protection Equipment (PPE)

Based on the minimum exposure expectation at the Site, level D PPE will be worn by workers at all times. Modifications of the protection level are not expected, however, level C PPE should be available for use at the site if deemed necessary. This determination will be made by the Site Safety Officer. Hip boots and a life vest will be worn whenever collecting sediment or surface water samples near canals. A body harness and safety line will be used to tie off the sampler where canal banks are steep. Work should not be performed during or after rain or snow that could make canal banks slippery.

D. Surveillance and Monitoring Equipment

On-site air monitoring will not be required based on characteristics and concentrations of likely exposure. An upgrade to Level C PPE will be conducted, if necessary.

E. Disposal of Investigation Derived Material

Decontamination solutions and used PPE will be properly stored and disposed of.

F. Emergency Information

Police, Fire, Medical and other Emergencies:	**911**
Regional (or closest) Hospital (route map attached)	801-408-1100
Local City/County Health Department:	801-580-6681
Poison Control Center:	1-800-456-7707
Blue Stake Location Service:	1-800-662-4111

Driving Directions to LDS Hospital

A **2000 Indiana Ave**
Salt Lake City, UT 84104

1. Head **east** on **Indiana Ave** toward **Bending River Rd W**

0.4 mi

2. Turn left onto **S 1700 W/S Redwood Rd**
Continue to follow S 1700 W

1.4 mi

3. Turn right onto **W North Temple**

2.7 mi

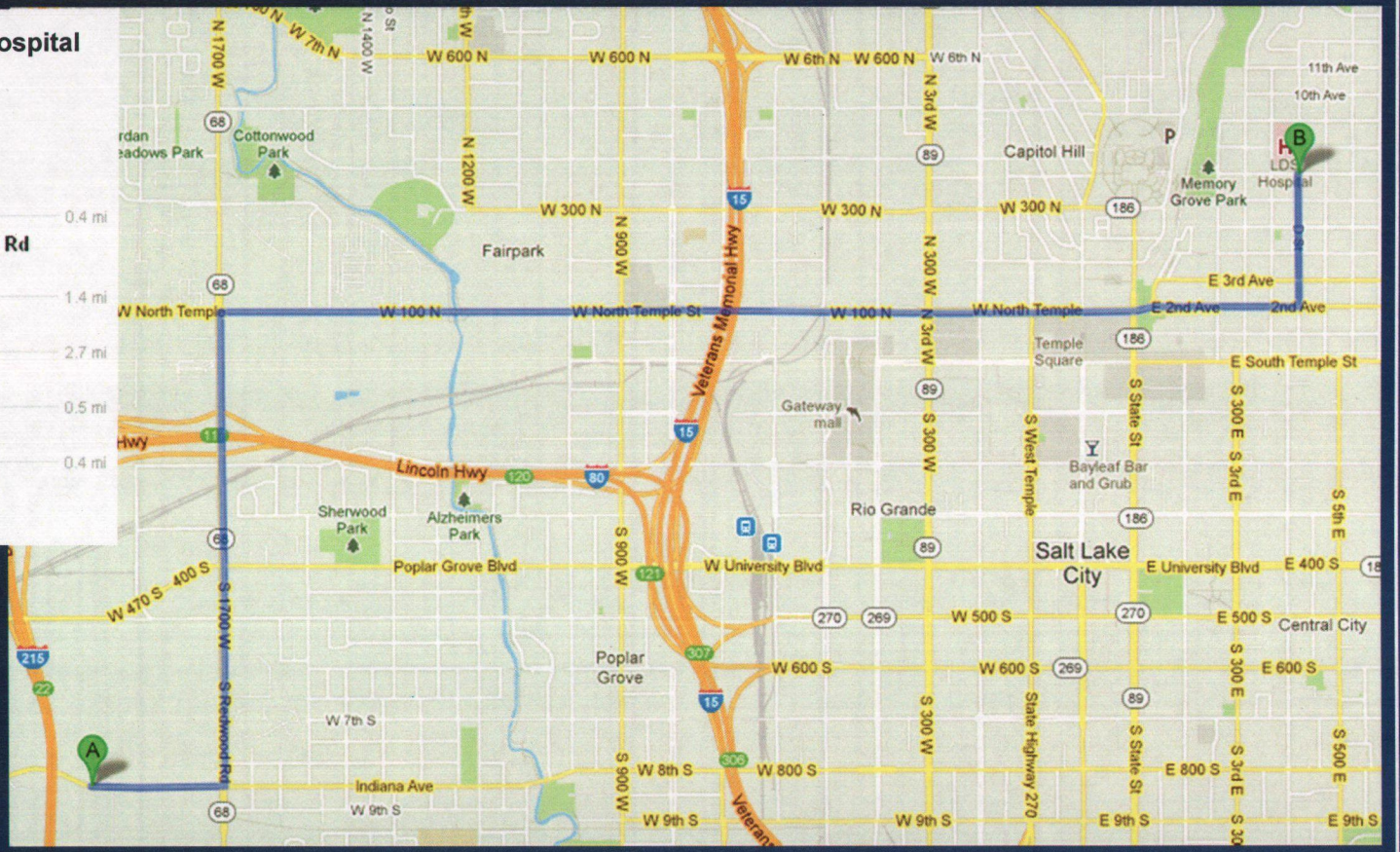
4. Continue onto **E 2nd Ave**

0.5 mi

5. Turn left onto **D St**

0.4 mi

B **D St**



Utah Department of Environmental Quality
Division of Environmental Response and Remediation

Figure 1
Redwood Road Dump Hospital Route

APPENDIX B
CONSENT FOR ACCESS TO PROPERTY FORM

CONSENT FOR ACCESS TO PROPERTY

Redwood Road Dump, CERCLIS ID# UTD980961502
Salt Lake City, Utah

Name of Owner:

Address of Owner:

Address of Property Subject to Access:

A. I, the authorized representative of the owner of the property described above ("Owner"), consent to officers, employees, contractors, subcontractors, and other authorized representatives of the United States Environmental Protection Agency ("EPA") and the Utah Department of Environmental Quality ("UDEQ") entering and having continued access to the above referenced ("Property") for the following purposes:

1. Conducting field inspections and investigations;

2. Taking samples of water or sediment on the Property;

3. Other such actions as may be necessary to protect human health and the environment.

B. Owner understands that these actions by EPA and UDEQ are undertaken pursuant to their response and enforcement responsibilities under the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") 42 U.S.C. § 9601, et seq. Notwithstanding any provision of this Consent for Access, the UDEQ and EPA retain all of their access authorities and rights, as well as all of their rights to require land/water use restrictions, including enforcement authorities related thereto, under CERCLA, RCRA and any other applicable federal or State statute or regulation. EPA, UDEQ, and Owner recognize that granting access does not constitute an admission of liability under CERCLA, RCRA, and any other applicable federal or State statute or regulation. EPA, UDEQ, and Owner retain all rights and defenses under CERCLA, RCRA, and any other applicable federal or State statute or regulation. Liability for damage caused by negligence is governed by applicable law. Nothing in this Consent for Access constitutes a waiver of sovereign immunity.

C. The undersigned certifies that he/she is fully authorized to grant the access provided herein on behalf of Owner and to execute and legally bind Owner to this document.

Section 19-6-304 of the Utah Code Ann. provides that, upon request as indicated below, the Owner may have a split sample if possible and may obtain an analysis of the sample available. To these ends, please mark your preference below:

[ ] I wish to obtain splits of all samples collected on the Property and a receipt describing each sample taken. I understand that I must provide the necessary sample containers to obtain these splits. The responsibility of choosing an analytical laboratory and the cost of analysis of the splits is solely mine.

[ ] When available to DERR, Owner wishes to obtain a copy of the final analytical results report and laboratory data concerning the samples taken from the Property. Indicate address where results should be sent to: _____.

Name of Owner

By: _____ Date: _____
Name _____
Title _____