SITE INSPECTION PRIORITIZATION

REDWOOD ROAD DUMP SITE

Salt Lake County, Utah
UTD980961502

Utah Department of Environmental Quality
Division of Environmental Response and Remediation
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1.0 INTRODUCTION

Under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Utah Department of Environmental Quality (UDEQ), Division of Environmental Response and Remediation (UDERR), conducted a Site Investigation Prioritization (SIP) of the Redwood Road Dump (RRD) site, to assess potential hazardous waste threats and to determine if additional investigation or action is warranted under CERCLA. The Redwood Road Dump was a primary landfill for Salt Lake City, Utah from 1923 until 1962, when it was finally closed to the public. During this time the landfill was reported to take in household, commercial and industrial wastes. Since 1962 the landfill has been used for the disposal of leaves, grass clippings, tree trimmings, and storm sewer sludge from Salt Lake City Corporation. During the years of operation a manifest system was not in place and no records remain of waste content or quantities dumped at the site. Analytical results from sampling conducted in 1991 reveal hazardous substances in the groundwater, surface water and soil which include heavy metals, BNA's, pesticides, and VOA's. The state Attorney General's office is currently conducting a criminal investigation into the illegal dumping of chromium contaminated soil at the RRD site in December of 1991. This investigation is past its second year and is expected to be completed this year. The Portland Cement Company Superfund Sites 2 and 3 (UTD980718670) are located just across the road to the south of the Redwood Road Dump. No action has been taken to remediate the RRD site to date. The Site Investigation Data Summary Form is located in Appendix A.

2.0 OBJECTIVES

The objective of the Site Investigation Prioritization (SIP) process is to update Site Inspections (SIs) done prior to the implementation of the revised Hazard Ranking System (HRS). This report reviews existing data and identifies whether data gaps exist to determine an appropriate future course of action. A brief site description is included as well as discussions of previous investigations, waste/source characteristics, environmental pathways, and data gaps.

3.0 SITE DESCRIPTION

3.1 Site Location and Description. The Redwood Road Dump site is located at 2000 West Indiana Avenue in Salt Lake City, Utah, as shown in Figure 1. The site extends from 1900 West Street to 2200 West Street, and from 500 South on the north to Indiana Avenue (800 South) on the south (see Figure 10). It is approximately 70 acres in size, and is entirely owned by Salt Lake City Corporation. The site is located in the SE 1/4 of the SE 1/4 of the NE 1/4 of Section 9, Township 1 South, Range 1 West, Salt Lake Base Meridian.

The Redwood Road Dump is bisected by Interstate 215 (I-215) and the City Drain canal, and can be said to have an eastern pile of refuse and a western pile (see Figure 2). Thickness of the refuse was determined in 1977 to vary between one foot and 29 feet in depth, with an average thickness of 11.86 feet[29]. During construction of I-215 in 1988, the refuse and cover material in the Interstate right-of-way was moved to the east pile, increasing the depth of cover and refuse material on the east pile. Drainage from the east pile is into an unnamed ditch on the northeastern portion of the site. The ditch drains to the north and enters Salt Lake City's storm drain system. There is also a buried 42-inch sewer line which runs south-to-north through the site along the eastern edge of the east pile (see Figure 6). This sewer line drains to the north. The City Drain is a storm sewer canal which receives city surface stormwater, industrial wastes and influent from uncontrolled sources upstream[2]. It traverses the Portland Cement Superfund Site before reaching the landfill and is located on-site just west of I-215 and runs parallel to it. Other site features include a railroad track with a drainage ditch which runs along the southern end of the site. The drainage ditch is on the south side of the railroad track and discharges into the City Drain within the confines of the site. A security fence was installed around most of the site in June of 1995, although the southern end of the landfill is still unfenced. Two means of access are available; one from the north through a locked gate, and one from the south through an open road over a railroad track. A camera surveillance system monitors access through the north gate. Because access is still possible, the landfill is occasionally the site of illegal dumping[10].

3.2 **Operational History and Waste Characteristics.** The RRD site operated as a refuse dump from 1923 to 1962, when it was closed to public dumping. It was the primary landfill for Salt Lake City from the time it opened until about the mid-1950's when the North Temple Landfill (UTD000463489) was started. The volume of incoming refuse at the RRD probably began to decrease in the mid-50's due to the startup of the North Temple landfill and continued to do so until its closing in 1962. The Redwood Road Dump 70 acre site is calculated to contain approximately 1,340,000 cubic yards of refuse and fill[29]. During its years of operation a manifest system was not in place at the landfill and no records remain of waste content or quantities dumped at the site. In addition, no regulations were in effect to limit possible hazardous waste additions to the landfill. The dump was reported to take in household, commercial and industrial wastes which consisted primarily of dry rubbish and trash with intermixed garbage[5]. In the past the RRD site has experienced numerous sub-surface fires, occasional bad odors; caving, and differential settling due to decomposing refuse[3]. Since 1962, the landfill has been used 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. The site is closed to the public.

Waste characteristics at the site include municipal wastes such as household,

commercial and industrial materials. Petroleum products and a single instance of chemical waste were found in bore holes in the landfill in 1977[5]. The current criminal investigation by the Attorney General's office involves approximately an half acre of chromium contaminated soil dumped at the site illegally.

4.0 PREVIOUS INVESTIGATIONS

Investigations at the Redwood Road Dump site have included a 1955 Survey of Refuse Disposal Problems by the Utah Department of Health, a 1977 Preliminary Investigation prepared for the Utah Department of Transportation by Dr. David Eckhoff, and a 1987 Preliminary Assessment (PA) prepared for the Utah Department of Health, Bureau of Solid & Hazardous Waste. In 1990 the Utah Bureau of Environmental Response and Remediation prepared a Site Investigation Sampling Plan. A Field Activities Report was then produced in 1991 by the same Bureau following sampling activities, and in 1992 an Analytical Results Report was written by the Utah Department of Environmental Quality. An On-site Activities Report written in 1993 was the most recent previous investigation and was done by Morrison Knudsen Corporation for the EPA. The neighboring Portland Cement Company Sites 2 & 3 Superfund Site is involved in remedial design (RD) work following two Records of Decision (ROD) issued in July 1990 and March of 1992. Additional information on these investigations is on file at the Utah Division of Environmental Response and Remediation. Currently, the state Attorney General's office is performing a criminal investigation into the illegal dumping of chromium contaminated soil at the RRD site. The investigation is over two years old and is expected to be completed this year. In connection with this investigation, the Department of Solid and Hazardous Waste conducted a small sampling program of the suspect soil at the Redwood Road Dump in 1992.

A **Survey of Refuse Disposal Problems** was conducted by the Utah State Department of Health in March of 1955 to address the selection of a new area for the disposal of garbage and dry waste in Salt Lake City, Utah (see Figure 9). The population within the corporate limits of Salt Lake City was estimated at that time to be approximately 200,000. The Redwood Road Dump was city-owned and operated and collected dry rubbish and trash with ten municipal trucks plus commercial refuse collectors and private individuals. Garbage was intermixed with the dry wastes. Disposal procedure at that time consisted of pushing refuse off the edge of the dump by two city-owned tractors. As the face of the dump progressed, the tractors spread dirt on the top surface of the dump. Burning was not permitted on the face of the dump but was allowed for tree stumps and brush in a separate area of the landfill. The Redwood Road Dump site was one of five sites recommended in the survey to be a potential sanitary landfill site. It is not known if the RRD was selected, but it is doubtful as the city ceased operation of the site as a landfill in 1962.

A report titled **Preliminary Investigations Disposition of Garbage Materials In**

Abandoned Landfill was prepared for the Utah Department of Transportation (UDOT), Salt Lake City, Utah, by Dr. David W. Eckhoff in July of 1977. The proposed path of Interstate 215 was through the Redwood Road Dump Site, and would divide it into eastern and western piles of refuse. Dr. Eckhoff was asked by UDOT to conduct a preliminary investigation to determine the relative hazards, particularly with respect to explosive gas and fires, of performing heavy construction activity in and around the landfill, and to develop an acceptable means of removing existing refuse deposits and placing them within new freeway right-of-way. Of major concern were explosive gases generated by the landfill, odors from decomposing refuse, blowing residue, and the minimization of future problems associated with structural stability and gas generation.

The investigation found that mixed garbage and refuse had been dumped on the site over the years, and extensive burning of the materials had taken place. It was concluded that the decomposition and gas generation potential of the refuse deposits was substantially reduced because of this. Field sampling supported this view. Virtually all potential decomposition of the refuse was deemed to have taken place, with the remaining refuse material appearing to be largely inert organics - both decomposition residue such as ash from burning, and mixed-in cover material. An area of the dump where smoke was observed issuing from cracks in the ground was believed to be from a slow-burning fire which was consuming large objects such as timbers from demolition wastes. These underground fires on the site, although burning off and on for several years, were concluded to be relatively insignificant and non-hazardous. The PI recommended the existing fires be extinguished by careful excavation and water-spraying. During the later construction of I-215 in 1988, the refuse and cover material in the Interstate right-of-way was moved to the east pile, increasing the depth of cover and refuse material on the east pile[24].

In 1987 a **Preliminary Assessment** (PA, UTD980961502) of the Redwood Road Dump was prepared for the Utah State Department of Health, Bureau of Solid and Hazardous Waste. The PA stated that groundwater was the principle potential hazardous waste pathway for this site. Surface water was not of major concern because of lack of domestic use of the limited surface water and no flowage directly into major water bodies. The possibility of an environmental threat via the air pathway was stated to exist, but the probability of a substantial release was rated as quite low due primarily to the conclusions of the 1977 Preliminary Investigation. The soil exposure pathway was not evaluated as the original HRS did not calculate soil as a direct contact pathway. The PA concluded the landfill may contain hazardous wastes and a site inspection was recommended.

In 1990 a **Site Investigation Sampling Plan** was prepared by the Utah Department of Health's Bureau of Environmental Response and Remediation. Samples to be collected included 4 ground water samples, 3 surface water samples, 8 soil samples, 3 sediment samples, and included quality assurance samples. The Environmental Protection Agency's (EPA) Field Investigation Team (FIT) would install four monitoring wells. Three existing monitor wells from nearby Portland Cement Company's Superfund Sites 2 & 3 would also

be used to sample ground water. The sampling plan's objectives were to assess the on-site exposure hazards, and to determine if the ground water, surface water and soil were being contaminated by hazardous materials in the landfill.

A **1991 Field Activities Report** on the Redwood Road Dump Site was prepared by the Utah Bureau of Environmental Response and Remediation following sampling activities. The collection of samples occurred during the installation of monitoring wells in March, April and May of 1991. Four monitoring wells were installed and two neighboring Portland Cement monitoring wells permitted for sampling use. Sample collection included 7 groundwater samples, 3 surface water samples, 10 soil samples, and 3 sediment samples. An additional trip blank sample was taken and all quality control samples were included. Sample locations are shown in Figure 5. Documentation procedures included the completion of all CLP forms and tags for organic and inorganic analyses. Strict Chain-of-Custody was maintained and proper forms accompanied each shipment. During sampling access to the site was unrestricted and transients and bottle collectors visited the site regularly. In the spring of 1991 most of the site was covered with vegetation. Ducks, egrets and carp were noticed in the City Drain[25].

An **Analytical Results Report,** completed in 1992 by the Utah Department of Environmental Quality, reported no organic contaminants in the groundwater samples. However, concentrations of 13 inorganic elements were found which are 3 times that of background well concentrations. In addition, antimony, beryllium, cobalt, lead, and nickel were detected in downgradient wells, but not in background wells. Antimony, arsenic and selenium were above the MCL's of drinking water standards in some of the wells. All analytical results may be seen in Tables 3 through 6 (see Appendix titled "Tables"). Soil sample analyses indicated the presence of 21 BNA compounds, 5 VOA compounds, 12 pesticide compounds, and 1 PCB compound in the Redwood Road Dump. Inorganic results of the soil samples also revealed concentrations of 10 elements that were over 3 times that of the background sample. Results from surface water samples detected lead at a concentration of 23 ppb in the north ditch and antimony, arsenic, iron, and manganese were detected above their MCL's for drinking water standards. Analytical results from 3 sediment samples indicate concentrations of 11 BNA compounds, 4 pesticide compounds, and 1 VOA compound at the landfill. The majority of the organic contamination is in the north ditch. Ten elements were detected in the upgradient sediment sample of the City Drain that are 3 times the concentration of the downgradient sample.

In 1993 an **Onsite Activities Report** (OAR) was prepared by Morrison Knudsen Corporation for the Region VIII office of the U. S. Environmental Protection Agency (EPA). The report detailed the removal of Investigative Derived Waste (IDW) in 1993 from the Redwood Road Dump site following the installation of four monitoring wells during sampling activities in March of 1991. Drill cuttings, decontamination water and personal protective equipment were containerized in drums as IDW and had resided on-site since 1991. During June of 1993 the drums had been observed in fair to poor

condition, somewhat rusted and possibly leaking. In August of 1993 the three original drums and their contents were repacked into nine drums, labelled, placarded, manifested, loaded, and transported to Texas for incineration or recyling. The RRD site was cleaned of all material related to the removal operation.

The **Portland Cement Superfund Site** lies directly southeast and south of the Redwood Road Dump and is comprised of three separate but adjacent properties known as Site 2, Site 3 and the West Site (see Figure 11). The site has soil, surface water and groundwater contamination as a result of cement kiln dust (CKD) and chromium-bearing refractory bricks being deposited on the site between 1965 and 1983. Leaching from site wastes has caused elevated concentrations of arsenic, chromium and lead in the site soils. Elevated levels of pH, total dissolved solids, arsenic, molybdenum, chromium and lead have been detected in site groundwater, primarily in its shallow interval between 15 and 30 feet below ground surface. Contaminated groundwater from the site may discharge into the Surplus Canal (during low canal levels) and City Drain[33].

Waste CKD material was found along a portion of the City Drain within the Portland Cement Site boundary and are believed to be the result of isolated dumpings of material along the embankment[2]. Total volume of waste CKD along the City Drain embankments appeared to be small. Five different locations of CKD were also found which had eroded off-site and redeposited onto the native soil flats[2]. Two of these sites are located along the fence line marking the northern boundary of Site 3, just to the southeast of the Redwood Road Dump (see Figure 11). The first area, located along the western end of the north fence, in closest proximity to the RRD, measured 54 feet in width, 12 feet in length as measured from the fence, and as much as 1 foot in depth. Sediment in the eastern area of the fence moved 17 feet from the fence and measured 18 feet in width with a 6-8" thickness. Three more areas are located off of Site 2. Four areas of contaminated ponded water were located on and around Site 3[2]. One of these is located between Indiana Avenue and the railroad, just southeast of the RRD. This long and narrow pond parrallels the railroad for about 800 feet, measures a maximum of 23 feet in width with a depth of one foot or less. The 42" sewer line which traverses both the RRD site and the Portland Cement Superfund Site has been shown to influence the groundwater at the Portland Cement Site. The City Drain and Surplus Canal also influence groundwater locally[33].

5.0 WASTE/SOURCE CHARACTERISTICS

5.1 Waste Source Description. There are two waste sources at the Redwood Road Dump site. The first is the landfill pile which contains various quantities of hazardous materials as revealed in the 1991 sampling results. The volume of this source is calculated at approximately 1,338,000 cubic yards (see Appendix A). The landfill is not contained.

The second waste source is approximately one-half acre of chromium contaminated soil which was illegally dumped at the site in December of 1991 (see Figure 10). The source area consists of 3-4 foot high piles of soil, up to 5 feet across, of which there may be 20 piles at the most (see Photo's 1, 2 and 3 in Appendix J). These piles were calculated to be no more than 21,750 square feet in area (see Appendix A). This waste is the subject of an on-going criminal investigation by the Utah Attorney General's office which is expected to be resolved soon. The soil was sampled in 1992 by the Utah Division of Solid and Hazardous Waste. The soil lies at the top of approximately the center of the eastern refuse pile. The soil is not contained.

5.2 **Sample Locations.** One rotary hole and nineteen auger holes were drilled into the landfill during the 1977 Preliminary Investigations by Dr. Eckhoff. Forty-three refuse (soil) samples were taken as well as 43 gas probes at five foot intervals in the drill holes. Drill holes and their locations are shown in Figures 3 and 4. Sample results are shown in Table 1. Gas monitoring measured explosive gas concentration as a function of percentage of volatile solids and as a function of moisture content. The soil samples were analyzed only for percentage of both total and volatile solids, and bio-chemical oxygen demand and moisture content. Drill hole logs and sample results can be found in Appendix B.

Waste source sample collection of the landfill in 1991 included 10 soil samples numbering RD-SO-01 through RD-SO-10. Sample locations are shown in Figure 5. All soil samples were collected using separate decontaminated stainless-steel spoons and were put into the appropriate containers. QA/QC samples were taken and samples were handled and preserved according to QA/QC criteria. Documentation procedures were followed and strict Chain-of-Custody was maintained. Sample RD-SO-02 is the background sample. Samples RD-SO-06 and RD-SO-07 can be considered source samples of "oily waste" taken near the water table from split spoon samples of drill cuttings from monitoring wells MW-2 and MW-4. Sample RD-SO-10 was taken directly above the refuse inside a bottle excavation pit about 3 feet below ground surface. RD-SO-10 can be assumed to be an observed release. Sample results can be found in Tables 5-6.

Four soil samples and one field blank were collected in September of 1992 by the Division of Solid and Hazardous Waste (DS&HW). Table 7 contains the analytical results. The samples were taken from suspected chromium contaminated soil which was dumped illegally at the Redwood Road Dump site. Chain-of-Custody and sample results are included in Appendix D. No sample location map exists in the DS&HW files.

5.3 **Analytical Results.** Seven of the 43 soil-gas samples showed methane concentrations above the lower explosive limit (LEL). Two of the sampling locations showed methane concentrations above 10 percent by volume in the air.

In 12 of the 20 borings, petroleum products were found at or near the water table. One of the drill holes, G-3C, cited the presence of a "chemical waste" at a depth of 8-10 feet. Thickness of the refuse in the landfill was determined to vary between one foot and 29 feet, with the refuse-natural ground interface undulating between elevations of 4216-4224 feet. Appendix B and Table 1 includes all 1977 sample information and analysis at the RRD site.

Tables 5 and 6 summarize the analytical data from the 1991 soil sampling program. All samples were analyzed for Target Compound List analytes including volatiles, base-neutral/acid (BNA) extractables, pesticides and PCB's, and for Task 1 and 2 metals, with the exception of RD-SO-07 and RD-SO-08, which were analyzed for only Target Compound List analytes. Table 5 shows the soil at the landfill contains concentrations of 21 BNA compounds, 5 VOA compounds, 12 pesticide compounds, and 1 PCB compound. There were also many BNA TIC compounds detected which ranged from 77 to 40,000 ppb. Three of the highest BNA TIC's were identified as "2-Pentanone, 4-hydroxy-4-me" and occurred in three of the soil samples, including the background sample at 39,000 ppb. The PCB compound, Aroclor-1260, was detected in RD-SO-09 at 150 ppb. Table 6 indicates a release of at least 10 metals to the soil has occurred at the Redwood Road Dump site. Concentrations of barium, calcium, chromium, copper, iron, lead, mercury, nickel, sodium, and zinc were detected over 3 times that of the background sample.

Table 7 presents sample analyses results for 5 samples taken for the State of Utah Attorney General's criminal investigation. 4 soil samples of suspected chromium contaminated soil were taken in September of 1992, in addition to a field blank sample. A hazardous level of total chromium exists at 3300 ppm in one of the samples as it is above the Superfund Chemical Data Matrix (SCDM) benchmark of 2900 ppm for the soil pathway. This benchmark is a reference dose given in mg/kg. Total lead levels also exist at 1600 and 1000 ppm in these samples. These values are high when considered against a mean average of 128 ppm for 18 background samples taken from various sites around the valley (see Appendix E).

5.4 Data Gaps. Upon evaluation of the Waste/Source characterization, no significant data gaps were noted.

5.5 Conclusions. There are concentrations of BNA compounds, volatile and semivolatile organic compounds, pesticides and PCB's in the Redwood Road Dump. Heavy metal concentrations which include barium, calcium, chromium, copper, iron, lead, mercury, nickel, sodium, and zinc, are over 3 times that of background. Antimony, cadmium and selenium were also detected at the RRD site. An observed release of metal contaminants into the soil is indicated at the site.

The second waste source, illegally dumped contaminated soil, contains hazardous levels of chromium and levels of lead over 3 times area background.

6.0 GROUNDWATER PATHWAY

6.1 Hydrogeology. The regional groundwater system consists of one aquifer with a shallow, unconfined portion underlain by a deeper, primary portion. The upper 50 to 70 feet of sediments form the shallow part of the aquifer, also known as a water table aquifer. The two portions are separated by a more confined layer of predominantly clay, with interfingered silt and fine sand layers, which vary in thickness and width[6,27]. Drill logs of the four monitor wells installed in 1991 reveal a lithology of predominantly clays, with silty sands, silts, and fine sands in the topmost 50 feet at the Redwood Road Dump site (see Appendix C). 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[6]. The maximum thickness of the principal aquifer is greater than 1,000 feet in the northern part of the valley[27]. Most deep wells in the Salt Lake Valley are completed in sediments at depths of less than 1,200 feet. The municipal wells within 4 miles of the RRD site are completed at depths of 1100 feet and under.

The shallow portion of the aquifer is recharged mainly by an upward flow of water from the deeper portion of the aquifer, and secondly by downward infiltration of surface water and precipitation. The deeper portion of the aquifer is recharged by infiltration of rain water and snow melt on the flanks of the surrounding mountains[6]. The general direction of groundwater flow for the region is from the mountain fronts toward the Jordan River and then northwest toward Great Salt Lake. The shallow portion of the aquifer may discharge into surface coarses such as the Jordan River[6,27]. The shallow aquifer has seldom been used as a drinking water source because it yields water slowly, is generally of poor chemical quality (calcareous and saline-alkali), and higher quality sources are readily available[27].

Groundwater levels and physical parameters were measured at various times and are located in Table 2. Groundwater flow directions from these elevations indicate that flow is generally towards the northwest, except where groundwater may be influenced by the sewer line, the highway, or the City Drain. Figure 6 is a groundwater contour map developed from the groundwater elevations measured in 1991. As can be seen in Figure 6, the 42-inch sewer line, I-215, and the City Drain influence the water levels and flow of the shallow groundwater at the RRD site. Hydrologic studies at the Portland Cement Superfund Site indicate groundwater hydraulics are complex[2]. Groundwater flow in a shallow interval, 15 to 25 feet below ground surface, is controlled by the City Drain, Surplus Canal

and a north-south trending sanitary sewer conduit[33]. Water in the City Drain and Surplus Canal flows to the northwest. Documented groundwater flow at the shallow interval has been into and away from the Surplus Canal depending on its water level, which can be controlled by the local flood control district. Groundwater flow directions in a deep interval, between 45 and 55 feet below ground surface, are difficult to determine based on existing data. The potentiometric surface of the deep interval appears to be mounded under the City Drain, with groundwater north of the City Drain flowing northwest and groundwater south of the City Drain flowing southwest[33]. Drainage promoted by the sewer pipe bedding, a gravel base, reduced water levels and prevented groundwater migration to the Surplus Canal from Site 2[2].

6.2 **Targets.** Groundwater is the only source of drinking water within 4 miles of the site. There are at least 27,798 residents drinking groundwater within this area (see Appendices F & H). Ten municipal wells currently supply drinking water within 4 miles of the site. These wells are completed to depths ranging from 464 to 1088 feet bgs. The nearest municipal well is located 1.21 miles south from the site, goes to a depth of 800 feet and serves a population of 2,900 residents. Municipal groundwater use information was gathered from four separate municipal sources in the Salt Lake Valley.

A listing of all water wells within a 3-mile radius of the Portland Cement Superfund Site was compiled in 1989 from two sources provided by the Utah Department of Natural Resources, Water Rights Division[2]. Wells were drilled for the purpose of diverting groundwater for domestic, municipal, irrigation, stock watering and other usage. All domestic wells were drilled to a total depth greater than 90 feet. The nearest well to the Redwood Road Dump site is situated approximately 100 feet north of the Union Pacific railroad mainline and approximately 300 feet west of the Surplus Canal, in the NE¼, NW¼, NE¼, of Sec. 9, T1S, R1W. The well was drilled in 1920 to an unknown depth and is used for domestic and irrigation purposes and yields approximately 7 gpm[2] (see Appendix F).

6.3 **Sample Locations.** Seven groundwater samples were taken at the site (see Figure 5). Each of the four installed monitoring wells were sampled, in addition to two of the Portland Cement Site monitoring wells. The seventh sample was a duplicate. Groundwater samples were collected using the correct operating procedures, documentation procedures were followed and strict Chain-of-Custody was maintained[25]. RD-MW-07 is the background sample taken upgradient of the site, although RD-MW-06 is also an upgradient sample. Sample RD-MW-05 is a duplicate of RD-MW-02. Before sampling, the depth to the groundwater was measured and at least 3 casings volumes of groundwater were purged from each of the wells. The monitoring wells were sampled in the following order: RD-MW-07, RD-MW-06, RD-MW-03, RD-MW-01, RD-MW-02 and 05, and RD-

MW-04. RD-SW-04, a quality control trip blank water sample, was also taken to assess the contamination level of all samples.

6.4 Analytical Results. Tables 3 and 4 summarize the analytical results for the groundwater samples. All samples were analyzed for Target Compound List analytes including volatiles, base-neutral/acid extractables, pesticides and PCBs, and for Task 1 and 2 metals. The organic data is presented in Table 3. There were no pesticide or volatile compounds detected in the groundwater samples. Four semivolatile compounds were detected in small amounts and include fluoranthene, N-nitrosodiphenylamine, phenanthrene, and pyrene. There are no organic concentrations above the Maximum Contaminant Level (MCL) of drinking water standards in the samples. Table 4 lists the inorganic analyses and indicates there has been an observed release to the shallow portion of the aquifer of 10 heavy metals. The elements aluminum, arsenic, barium, chromium, copper, iron, manganese, potassium, sodium, and vanadium occur in downgradient wells at 3 times the concentrations of the background (upgradient) wells. Antimony, cobalt, lead, and nickel were also present in the downgradient wells at over 3 times the background, which were below detection limits. Arsenic was detected at 314, 248 and 179 ppb in three of the four downgradient wells as compared to 19 ppb in the background well. The MCL for arsenic in drinking water is 50 ppb. RD-MW-05 contained 34.2 ppb antimony which is above the MCL for drinking water standards of antimony at 6 ppb. A Secondary Maxiumum Contaminant Level (SMCL) of iron in drinking water is 300 ppb. Iron was detected above this at 2570, 1260 and 659 ppb's in three of the downgradient wells. Manganese has a SMCL of 50 ppb in drinking water. It was detected at 775, 538, and 350 in three of the downgradient wells, although the background well, RD-MW-07 was also high with a level of 222 ppb.

6.5 Data Gaps. The trip blank sample, RD-SW-04, is untypical in its inorganic analytical results and closely matches the groundwater sample, RD-MW-04, for over one-half of the metals analyzed. Field or lab error is suspected. More samples may be needed to distinguish if the RRD groundwater contamination originated from the Portland Cement Superfund Site.

6.6 Conclusions. An observed release of contaminants to the shallow aquifer exists at the Redwood Road Dump site. Contaminants include aluminum, arsenic, barium, chromium, copper, iron, manganese, potassium, sodium, and vanadium. Antimony, cobalt, lead, and nickel were also present in sampling of downgradient wells at over 3 times the background concentrations of the upgradient wells, which were below detection limits. In addition, antimony and arsenic were detected at levels greater than the Maximum Contaminant Level for drinking water. Arsenic is the analyte of greatest concern and it is also one of the hazardous constituents from the Portland Cement Superfund Site. More groundwater samples may be needed to distinguish if the Redwood Road Dump groundwater contamination

originated from the landfill or the Portland Cement Superfund Site.

7.0 SURFACE WATER PATHWAY

7.1 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 3C stream and discharges into the Great Salt Lake[2]. The Jordan River, the Surplus Canal and the City Drain are located in close proximity to the site (see Figure 9). The Jordan River is approximately 7,000 feet to the east of the site and discharges into the Great Salt Lake 11 miles downstream. The Surplus Canal is located about 1,000 feet to the west of the site and also empties into the Great Salt Lake six miles downstream (see Figure 10). The City Drain cuts through the western portion of the site and joins the Sewer Canal approximately six miles away. The Sewer Canal discharges into the Great Salt Lake 13 miles downstream. 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. The City Drain and Surplus Canal are local discharge points for groundwater[2].

The soils in the site area are predominantly clay, with silty sands, silts, and sands as shown by monitor well drill logs (see Appendix C). A soil survey of the Salt Lake area shows the site consists primarily of Salt Air Silty Clay Loam which is found on lake plains near the Great Salt Lake[19]. The soil profile is calcareous and strongly saline-alkali. Surface runoff is very slow. The unnamed north ditch lies on the northeast portion of the site and joins the Salt Lake City storm drain system[28].

7.2 Targets. There are no surface drinking water sources within the 15 mile target distance limit of the site. Surface waters are not used for fishing within 15 downstream miles. A wetland environment exists both on the site and within six miles downstream of the site to the Great Salt Lake (Figures 7 and 9). Approximately 50 miles of wetland frontage occur within the target distance limit. Several duck hunting clubs are located within these wetland areas. Egrets have been observed in the City Drain on-site[10].

7.3 Sample Locations. Three surface water samples were collected at the RRD site, as well as three sediment samples (see Figure 5). A quality control trip blank water sample was also taken to assess the contamination level of all samples. Upgradient and downgradient water samples were collected from the City Drain and a water sample was taken from the unnamed north ditch. The surface water samples were collected directly into the appropriate sample containers. The downgradient surface water sample in the City Drain was collected first, followed

by the upgradient City Drain surface water sample which also served as the background sample. The north ditch surface water sample was collected last. There were ducks and small white egrets on the City Drain and carp were also noted in the drain at sampling time[25]. The sediment samples were taken in the same general location as the surface water samples. The sediment samples were collected as grab samples with separate decontaminated stainless steel spoons and put into the appropriate sample containers.

7.4 Analytical Results. One VOA compound, tetrachloroethane, was detected at 7 ppb in the upgradient surface water (SW) sample of the City Drain. A single BNA compound, bis (2-Ethylhexyl) phthalate, was detected in the north ditch surface water sample. There were no pesticide or PCB compounds detected in the surface water samples. Lead was detected in the north ditch SW sample at 23.6 ppb. Antimony was detected just above the detection limit in the downgradient surface water sample and was undetected in the background and north ditch samples. Antimony was detected above the MCL of drinking water standards at 25 ppb from RD-SW-02. The antimony MCL for drinking water is 6 ppb. Arsenic was also detected in both City Drain samples above the MCL of drinking water standards at 53.4 and 59.2 ppb. The arsenic MCL for drinking water is 50 ppb.

Table 5 indicates 11 BNA, 6 pesticide and 2 VOA compounds were detected in the sediment samples. The majority of these contaminants were detected in the north ditch, indicating they came from the landfill. The downgradient sediment sample of the City Drain contained the semivolatile compound bis (2-Ethylhexyl) phthalate and a trace of the pesticide heptachlor. The upgradient, background sediment sample of the City Drain also contained bis (2-Ethylhexyl) phthalate as well as pyrene and carbon disulfide. Thirteen inorganic elements found in the upgradient sediment sample of the City Drain are 3 times the downgradient sample's concentration. The 13 elements in this background sample include aluminum, antimony, arsenic, barium, chromium, cobalt, copper, iron, lead, potassium, sodium, vanadium, and zinc. These contaminants cannot be directly attributable to the RRD site and likely came from off-site. The unnamed north ditch sample contained 9 inorganics that were more than 3 times the downgradient City Drain sample. These elements included aluminum, barium, chromium, cobalt, copper, iron, lead, potassium, and zinc.

7.5 Data Gaps. The trip blank sample, RD-SW-04, is untypical in its inorganic analytical results and closely matches the groundwater sample, RD-MW-04, for over one-half of the metals analyzed. Field or lab error is suspected. The upgradient and downgradient City Drain surface water samples which contain high arsenic are not representative of the RRD site since contamination cannot be directly attributed to the RRD site. The upgradient City Drain sediment sample, which was taken to establish background, proves to be the most contaminated

sediment sample and may prove that contamination is coming from the Portland Cement Superfund Site. More sediment sample(s) and surface water sample(s) need to be taken which would establish background for these media at the Redwood Road Dump site and distinguish between any contamination at the RRD and Portland Cement Superfund Sites.

7.6 Conclusions. BNA, pesticide and VOA compounds were detected in the sediment samples. The majority of these contaminants were detected in the north ditch, indicating they came from the landfill. A single BNA compound and lead were detected in the north ditch surface water sample. The unnamed north ditch sample contained 9 inorganics that were more than 3 times the downgradient City Drain sample. These elements included aluminum, barium, chromium, cobalt, copper, iron, lead, potassium, and zinc. These inorganics may be considered an observed release of contaminanted leachate from the landfill.

There were no pesticide or PCB compounds detected in the surface water samples. Antimony was detected above the MCL of drinking water standards in the downgradient City Drain surface water sample. The antimony MCL for drinking water is 6 ppb. The organic and inorganic compounds detected in the upgradient surface water and sediment samples of the City Drain cannot be directly attributable to the RRD site. The upgradient City Drain sediment sample, which was taken to establish background, proves to be the most contaminated sediment sample and may prove that contamination is coming from the Portland Cement Superfund Site. The City Drain can collect contaminants from numerous off-site localities upstream, including the Portland Cement Company Sites 2 & 3 Superfund Site. More sediment sample(s) and surface water sample(s) need to be taken which would establish background for these media at the Redwood Road Dump site and distinguish between any contamination at the RRD and Portland Cement Superfund Sites.

8.0 SOIL EXPOSURE PATHWAY

8.1 Physical Conditions. The geology and soil conditions at the Redwood Road Dump site is determined by its location in the Salt Lake Valley which lies between the Wasatch Mountains to the east and the Oquirrh Mountains to the west. Basin-fill deposits were eroded from these adjacent mountain ranges and deposited in the Salt Lake and local valleys. The general stratigraphy of the area is characterized by several hundred feet of unconsolidated to poorly consolidated alluvial and lacustrine deposits. These interbedded and highly lenticular sands, silty sands, silts, and clays of the Salt Lake Formation are estimated to be more than 500 feet thick. Mountain streams carried most of the sediment into the basins and ancient Lake Bonneville. The fine-grained sediments were deposited in the deeper portions of ancient Lake Bonneville. The coarser-grained sediments

were deposited along the margins of ancient Lake Bonneville as its level fluctuated and eventually receded to its present level as the Great Salt Lake[27]. Drill logs of the four monitor wells installed in 1991 in addition to well logs from neighboring Portland Cement Site (UTD980718670) reveal a lithology of predominantly clays, with silty sands, silts, and sands beneath the RRD site. A soil survey of the Salt Lake area identified the soils at the RRD site as dumps (*Du*), Salt Air Silty Clay Loam (*Sa*), Loamy Borrow Pits (*Lo*), Sandy Terrace Escarpments (*Sc*), and Decker Fine Sandy Loam (*De*)[19]. After dumps (*Du* soil type), a miscellaneous land type made up of refuse material, the main soil type at the RRDS is Salt Air Silty Clay Loam, which is found on lake plains near the Great Salt Lake and provides a suitable habitat for ducks and geese. Its soil profile is calcareous and strongly saline-alkali. Runoff is very slow[19].

8.2 Soil Targets. There is no on-site population or residences at the Redwood Road Dump. There is a population of 6,456 within 1 mile of the site (Appendix H). There is about one worker present daily on site in the southeast corner of the landfill[10]. There are 65 workers within 200 feet of the site at its northeast corner[18]. A security fence was installed around portions of the site in June of 1995, although the southern end of the landfill is still unfenced. Two means of access are available; one is from the north through a gate which is locked at night, and one from the south through an open road over a railroad track. A camera surveillance system monitors access through the north gate. Portions of the site are accessible.

8.3 Soil Sample Locations. One rotary hole and nineteen auger holes were drilled into the landfill during the 1977 Preliminary Investigations by Dr. Eckhoff. Forty-three refuse (soil) samples were taken at five foot intervals in the drill holes. Drill holes and their locations are shown in Figures 3 and 4. Sample results are shown in Table 1. The soil samples were analyzed only for percentage of both total and volatile solids, and bio-chemical oxygen demand and moisture content. Drill hole logs and sample results can be found in Appendix B.

Soil sample collection of the landfill in 1991 included 10 soil samples numbering RD-SO-01 through RD-SO-10. Sample locations are shown in Figure 5. All soil samples were collected using separate decontaminated stainless-steel spoons and were put into the appropriate containers. QA/QC samples were taken and samples were handled and preserved according to QA/QC criteria. Documentation procedures were followed and strict Chain-of-Custody was maintained. Sample RD-SO-02 is the background sample. Samples RD-SO-06 and RD-SO-07 can be considered source samples of "oily waste" taken near the water table from monitoring wells MW-2 and MW-4. Sample RD-SO-10 was taken directly above the refuse inside a bottle excavation pit about 3 feet below ground surface. RD-SO-10 can be assumed to be an observed release. Sample results can be found in Tables 5 and 6.

Four soil samples and one field blank were collected in September of 1992 by the Division of Solid and Hazardous Waste (DS&HW). Table 7 contains the analytical results. The samples were taken from suspected chromium contaminated soil which was dumped illegally at the Redwood Road Dump site. Chain-of-Custody and sample results are included in Appendix D. No sample location map exists in the DS&HW files.

8.4 Analytical Results. In 12 of the 20 borings, petroleum products were found at or near the water table. One of the drill holes, G-3C, cited the presence of a "chemical waste" at a depth of 8-10 feet. Thickness of the refuse in the landfill was determined to vary between one foot and 29 feet, with the refuse-natural ground interface undulating between elevations of 4216-4224 feet. Table 1 and Appendix B includes the 1977 sample information and analysis at the RRD site.

Tables 5 and 6 summarize the analytical data from the 1991 soil sampling program. All samples were analyzed for Target Compound List analytes including volatiles, base-neutral/acid (BNA) extractables, pesticides and PCB's, and for Task 1 and 2 metals, with the exception of RD-SO-07 and RD-SO-08, which were analyzed for only Target Compound List analytes. Table 5 shows the soil at the landfill contains concentrations of 21 BNA compounds, 5 VOA compounds, 12 pesticide compounds, and 1 PCB compound. There were also many BNA TIC compounds detected which ranged from 77 to 40,000 ppb. Three of the highest BNA TIC's were identified as "2-Pentanone, 4-hydroxy-4-me" and occurred in three of the soil samples, including the background sample at 39,000 ppb. The PCB compound, aroclor-1260, was detected in RD-SO-09 at 150 ppb. Table 6 indicates a release of at least 10 metals to the soil has occurred at the Redwood Road Dump site. Concentrations of barium, calcium, chromium, copper, iron, lead, mercury, nickel, sodium, and zinc were detected over 3 times that of the background sample.

Table 7 presents sample analyses results for 5 samples taken for the State of Utah Attorney General's criminal investigation. 4 soil samples of suspected chromium contaminated soil were taken in September of 1992, in addition to a field blank sample. A hazardous level of total chromium exists at 3300 ppm in one of the samples as it is above the Superfund Chemical Data Matrix (SCDM) benchmark of 2900 ppm for the soil pathway. This benchmark is a reference dose given in mg/kg. Total lead levels also exist at 1600 and 1000 ppm in these samples. These values are high when considered against a mean average of 128 ppm for 18 background samples taken from various sites around the valley (see Appendix E).

8.5 Data Gaps. Ten soil samples may be insufficient coverage for the 70 acre site. No samples were obtained from the bottom of the refuse pile, or into the natural soil surface. More sampling is indicated to detect the extent of contamination

leaching into the soil from the landfill. Bore holes would help determine organic and inorganic content of the landfill.

8.6 Conclusions. There are concentrations of BNA compounds, volatile and semivolatile organic compounds, pesticides and PCB's in the Redwood Road Dump. Heavy metal concentrations which include barium, calcium, chromium, copper, iron, lead, mercury, nickel, sodium, and zinc, are over 3 times that of background. Antimony, cadmium and selenium were also detected at the RRD site. An observed release is indicated at the site. The second waste source, illegally dumped contaminated soil, contains hazardous levels of chromium and levels of lead over three times that of background levels in the Salt Lake area.

Ten soil samples may be insufficient coverage for the 70 acre site. No samples were obtained from the bottom of the refuse pile, or into the natural soil surface. More sampling is indicated to detect the extent of contaminants leaching into the soil from the landfill. Bore holes would help determine organic and inorganic content of the landfill.

9.0 AIR EXPOSURE PATHWAY

9.1 Meteorology/Physical Conditions. The Salt Lake Valley is characterized as being semi-arid[1]. 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 58.00 inches. The estimated pan evaporation is 83.91 inches per year. The winds are predominantly from the south and southeast and have a mean speed of four to five miles per hour. The second most common wind direction is from the north and northwest[2].

9.2 Air Targets. There is no on-site population or residences at the Redwood Road Dump. There is a population of 52,183 within 4 miles of the site (Appendix H). There is about one worker present daily on site in the southeast corner of the landfill[10]. There are 65 workers within 200 feet of the site at its northeast corner[18]. A security fence was installed around portions of the site in June of 1995, although the southern end of the landfill is still unfenced. Two means of access are available; one is from the north through a gate which is locked at night, and one from the south through an open road over a railroad track. A camera surveillance system monitors access through the north gate. Portions of the site are accessible.

9.3 Air Sample Locations. One rotary hole and nineteen auger holes were drilled into the landfill during the 1977 Preliminary Investigations by Dr. Eckhoff. Forty-

three gas probes at five foot intervals were measured in the drill holes. Drill holes and their locations are shown in Figures 3 and 4. Sample results are shown in Table 1. Gas monitoring measured explosive gas concentration both as a function of percentage of volatile solids and as a function of moisture content. Drill hole logs and sample results can be found in Appendix B.

9.4 Air Analytical Results. Seven of the 43 gas samples showed methane concentrations above the lower explosive limit (LEL). Two of the sampling locations showed methane concentrations above 10 percent by volume in the air. Thickness of the refuse in the landfill was determined to vary between one foot and 29 feet, with the refuse-natural ground interface undulating between elevations of 4216-4224 feet.

9.5 Data Gaps. There is no analytical data on current existing conditions of the air pathway at the site. The collection of this data may not be needed to complete the site characterization. However, the Portland Cement Company Sites 2 & 3 Superfund sites lie just across the road from the RRDS, and the dump sits downwind of the dominant wind direction from Portland Cement.

9.6 Conclusions. It is not known if the air exposure pathway constitutes a current pathway of concern to the distribution of hazardous substances at the Redwood Road Dump site. Twenty-eight years ago, in 1977, methane gas was shown to be present on site at levels above the lower explosive limit (LEL). However, it was concluded at that time that the decomposition and gas generation potential of the landfill had been substantially reduced because extensive burning of the materials had taken place. There is no current analytical data on existing conditions of the air pathway at the site. The collection of this data may not be needed to complete the site characterization. However, the Portland Cement Company Sites 2 & 3 Superfund sites lie just across the road from the RRDS, and the dump sits downwind of the dominant wind direction from Portland Cement.

10.0 SUMMARY AND CONCLUSIONS:

There are concentrations of BNA compounds, volatile and semivolatile organic compounds, pesticides and PCB's in the Redwood Road Dump. Heavy metal concentrations are present in the soil which include barium, calcium, chromium, copper, iron, lead, mercury, nickel, sodium, and zinc, at over 3 times that of background concentration. An observed release of metal contaminants into the soil is indicated at the site.

An observed release of contaminants to the shallow aquifer also exists at the Redwood Road Dump site. Contaminants include aluminum, antimony, arsenic, barium, chromium, cobalt, copper, iron, lead, manganese, nickel, potassium, sodium, and vanadium, which are over 3 times the concentrations of the background upgradient wells. In addition, antimony and arsenic were

detected at levels greater than the Maximum Contaminant Level for drinking water. Arsenic is the analyte of greatest concern and it is also one of the hazardous constituents from the Portland Cement Superfund Site. More groundwater samples may be needed to distinguish if the Redwood Road Dump groundwater contamination originated from the landfill or the Portland Cement Superfund Site.

BNA, pesticide and VOA compounds were detected in the sediment samples. The majority of these contaminants were detected in the north ditch, indicating they came from the landfill. A single BNA compound and lead were detected in the north ditch surface water sample. The north ditch sample contained 9 inorganics that were more than 3 times the downgradient City Drain sample. These elements included aluminum, barium, chromium, cobalt, copper, iron, lead, potassium, and zinc. These inorganics may be considered an observed release of contaminanted leachate from the landfill.

Antimony was detected above the MCL of drinking water standards in the downgradient City Drain surface water sample. The antimony MCL for drinking water is 6 ppb. The organic and inorganic compounds detected in the upgradient surface water and sediment samples of the City Drain cannot be directly attributable to the RRD site. The upgradient City Drain sediment sample, which was taken to establish background, proves to be the most contaminated sediment sample and may prove that contamination is coming from the Portland Cement Superfund Site. The City Drain can collect contaminants from numerous off-site localities upstream, including the Portland Cement Company Sites 2 & 3 Superfund Site. More sediment sample(s) and surface water sample(s) need to be taken which would establish background for these media at the Redwood Road Dump site and distinguish between any contamination at the RRD and Portland Cement Superfund Sites.

It is not known if the air exposure pathway constitutes a current pathway of concern to the distribution of hazardous substances at the Redwood Road Dump site. Twenty-eight years ago, in 1977, methane gas was shown to be present on site at levels above the lower explosive limit (LEL). However, it was concluded at that time that the decomposition and gas generation potential of the landfill had been substantially reduced because extensive burning of the materials had taken place. There is no current analytical data on existing conditions of the air pathway at the site. The collection of this data may not be needed to complete the site characterization. However, the Portland Cement Company Sites 2 & 3 Superfund sites lie just across the road from the RRDS, and the dump sits downwind of the dominant wind direction from Portland Cement.

Ten soil samples may be insufficient coverage for the 70 acre site. No samples were obtained from the bottom of the refuse pile, or into the natural soil surface. More sampling is indicated to detect the extent of contamination leaching into the soil from the landfill. Bore holes would help determine organic and inorganic content of the landfill.

The second waste source, illegally dumped contaminated soil, contains hazardous levels of chromium and levels of lead over three times that of background levels in the Salt Lake area.

The Redwood Road Dump presents hazards to those working and living near it, as well as to a number of transients and bottle collectors who have frequented the area in the past and still have access to the site. Although the site is vegetated and surface runoff is slow, the accumulated refuse, soil, and shallow groundwater contain hazardous substances and these present a threat to human health and the environment. The neighboring Portland Cement Company Superfund Site also contains known contaminants. Effort must be made at the Redwood Road Dump to distinguish which hazards originated where.

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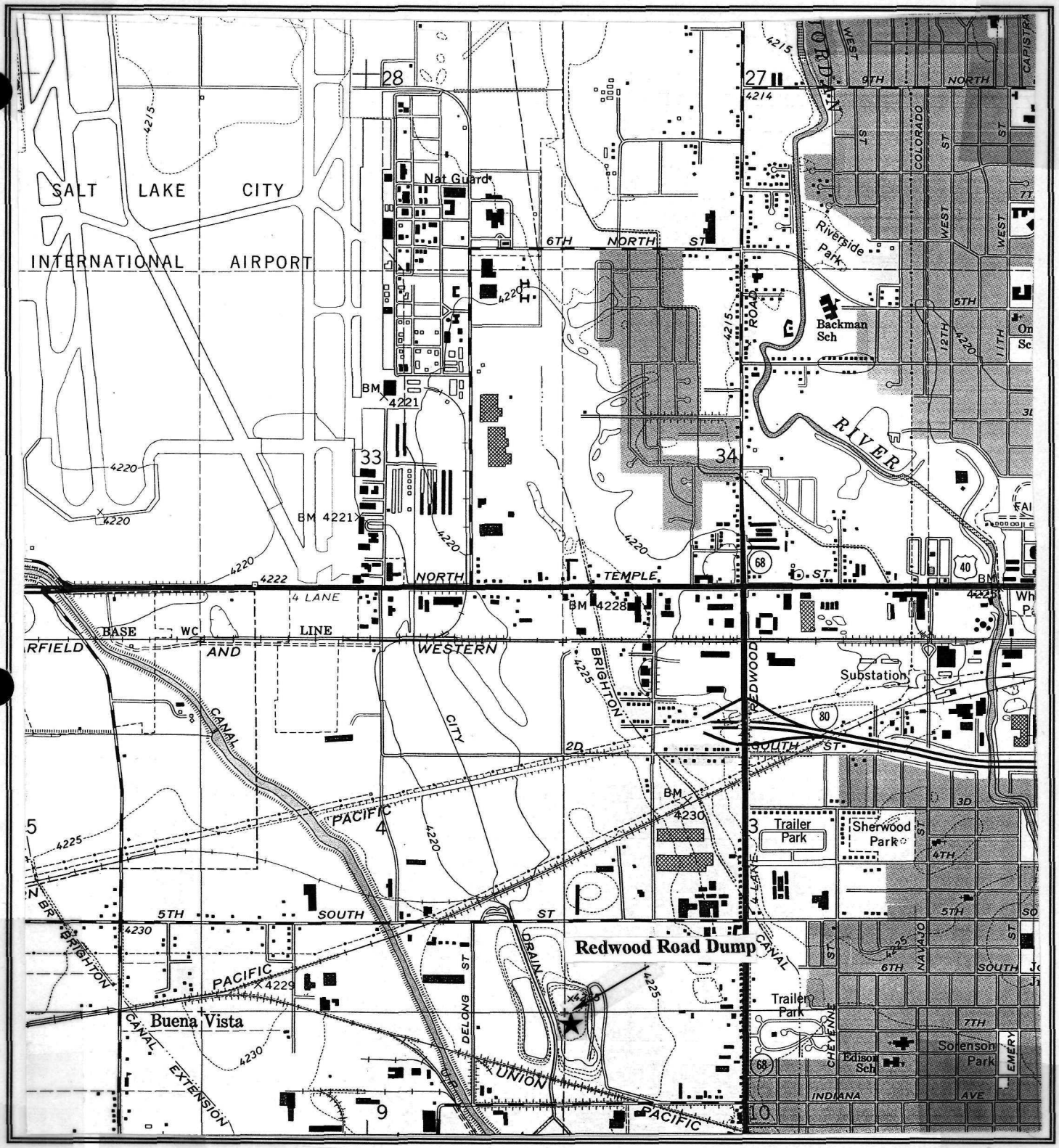
FIGURES

LIST OF FIGURES



UTAH

QUADRANGLE LOCATION

I-215 is not shown

N

USGS Topo Base, Salt Lake City, North, Utah
7.5 Minute Series, 1963

Utah Department of Environmental Quality
Division of Environmental Response and Remediation

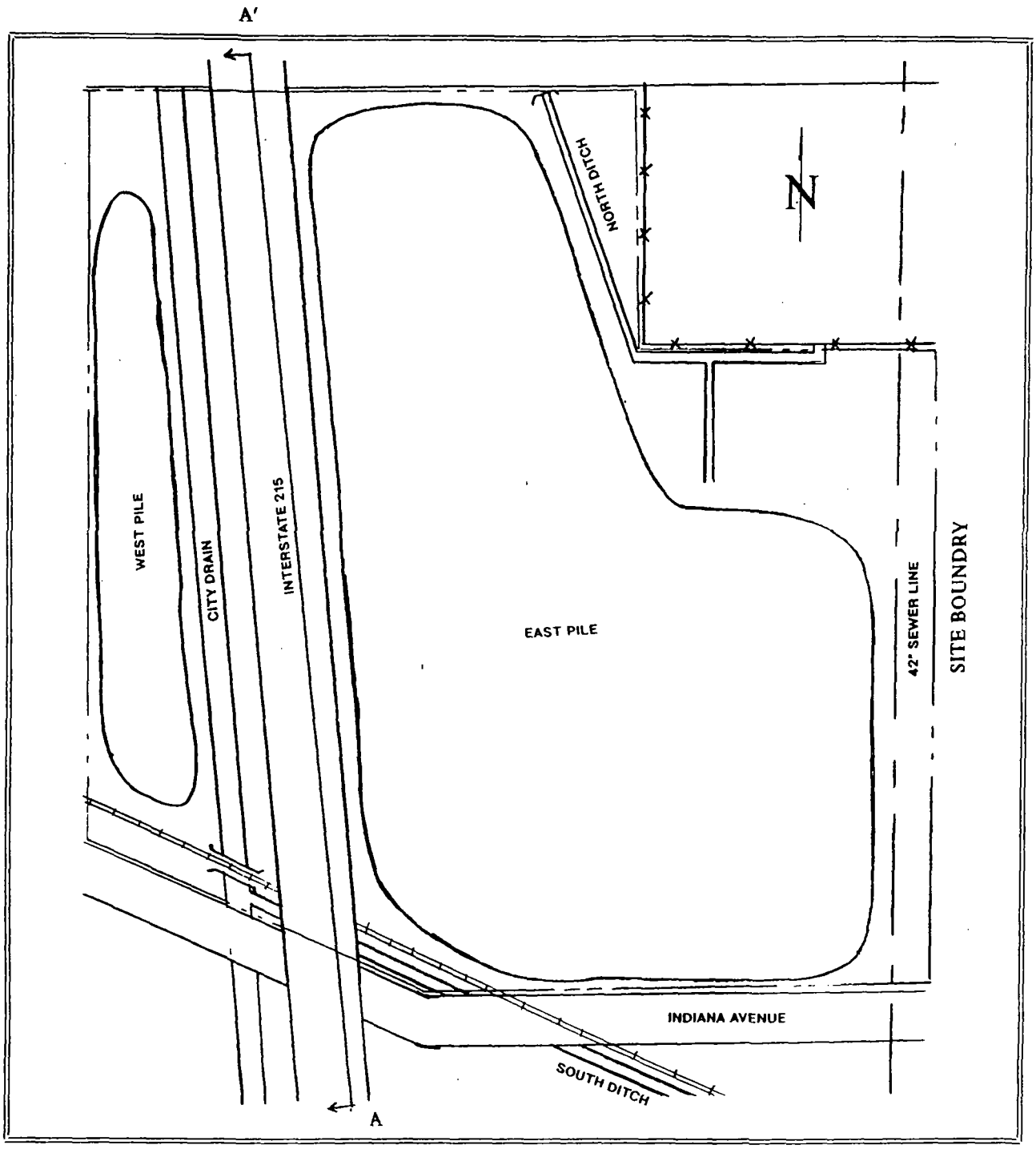
Figure 1

Site Location Map

Redwood Road Dump

Salt Lake County, Utah

By: E. Yeomans **Date: 9/07/95** **Scale: 1:24,000**



KEY:

- RAILROAD
- FENCE

N

UTAH DEPT. OF HEALTH Bureau of Solid and Hazardous Waste		
SITE SKETCH Figure 2 REDWOOD ROAD DUMP SALT LAKE COUNTY, UTAH		
by SJP	date 3/26/90	SCALE NOT TO SCALE

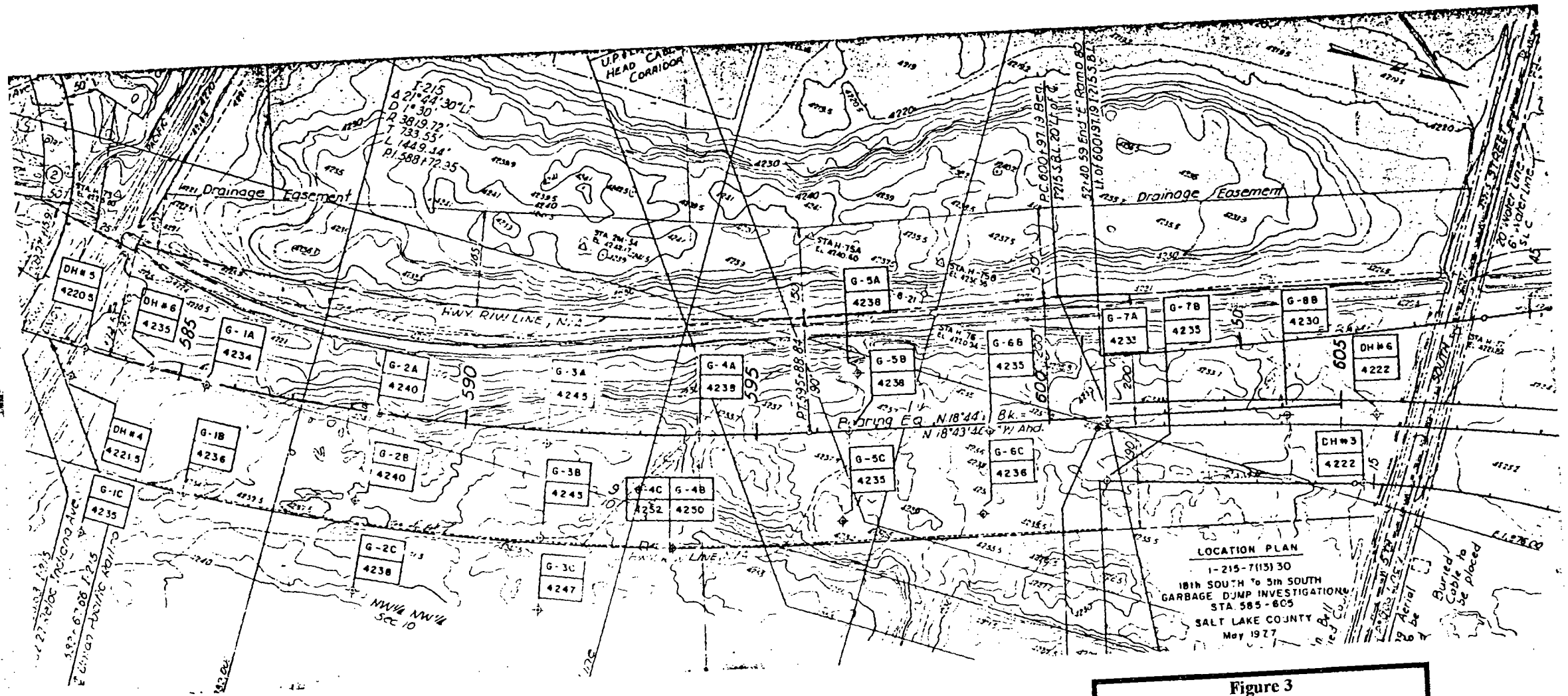
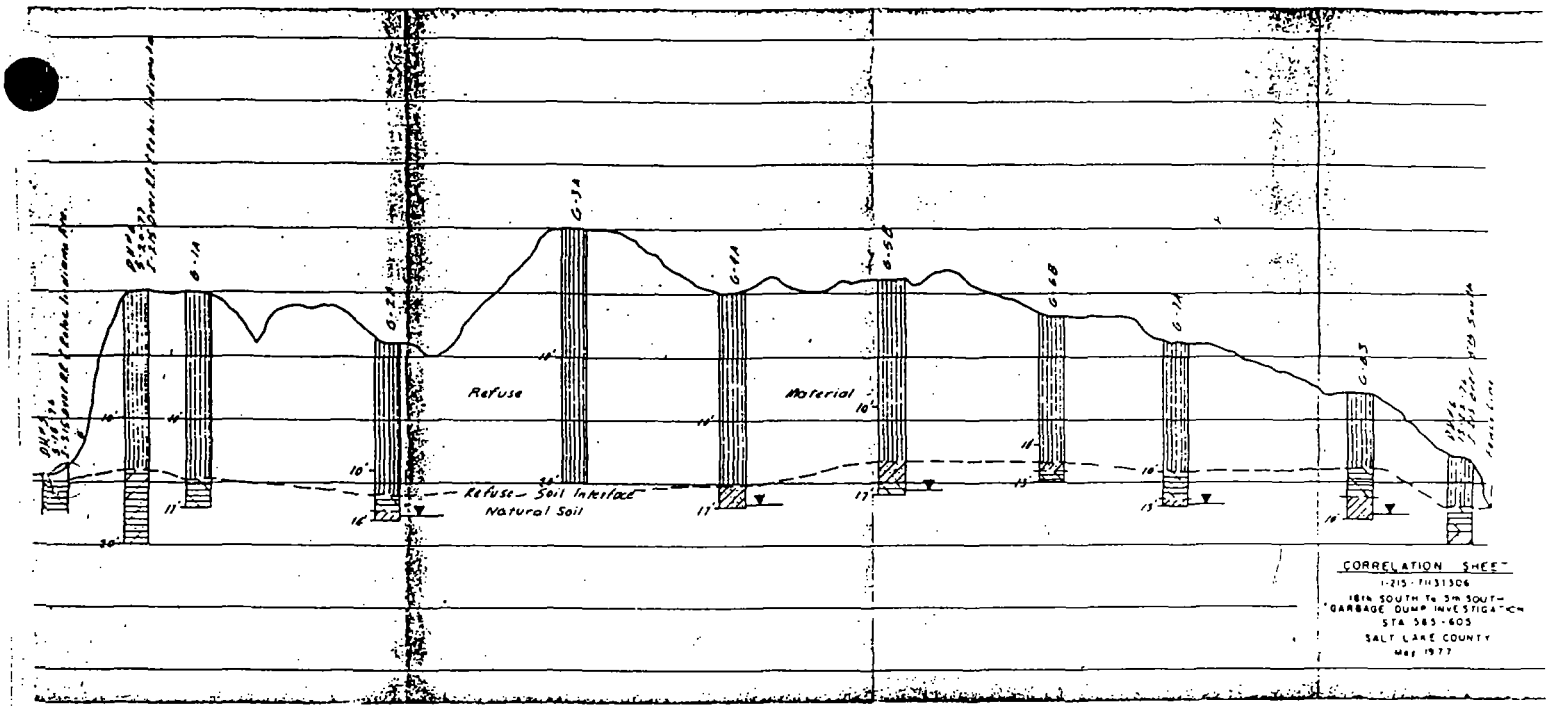


Figure 3
1977 Preliminary Investigations
Redwood Road Dump
Salt Lake County, Utah



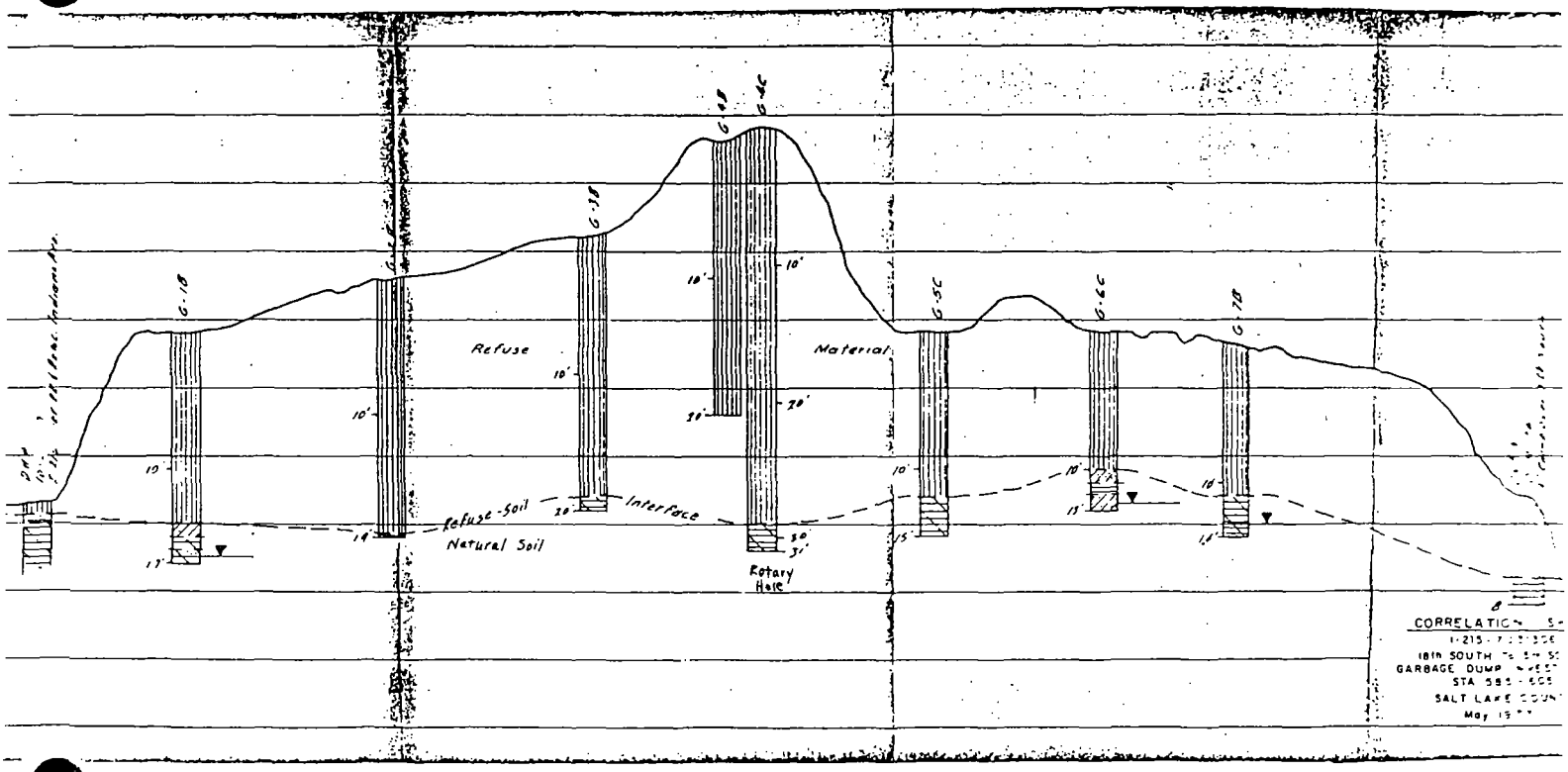
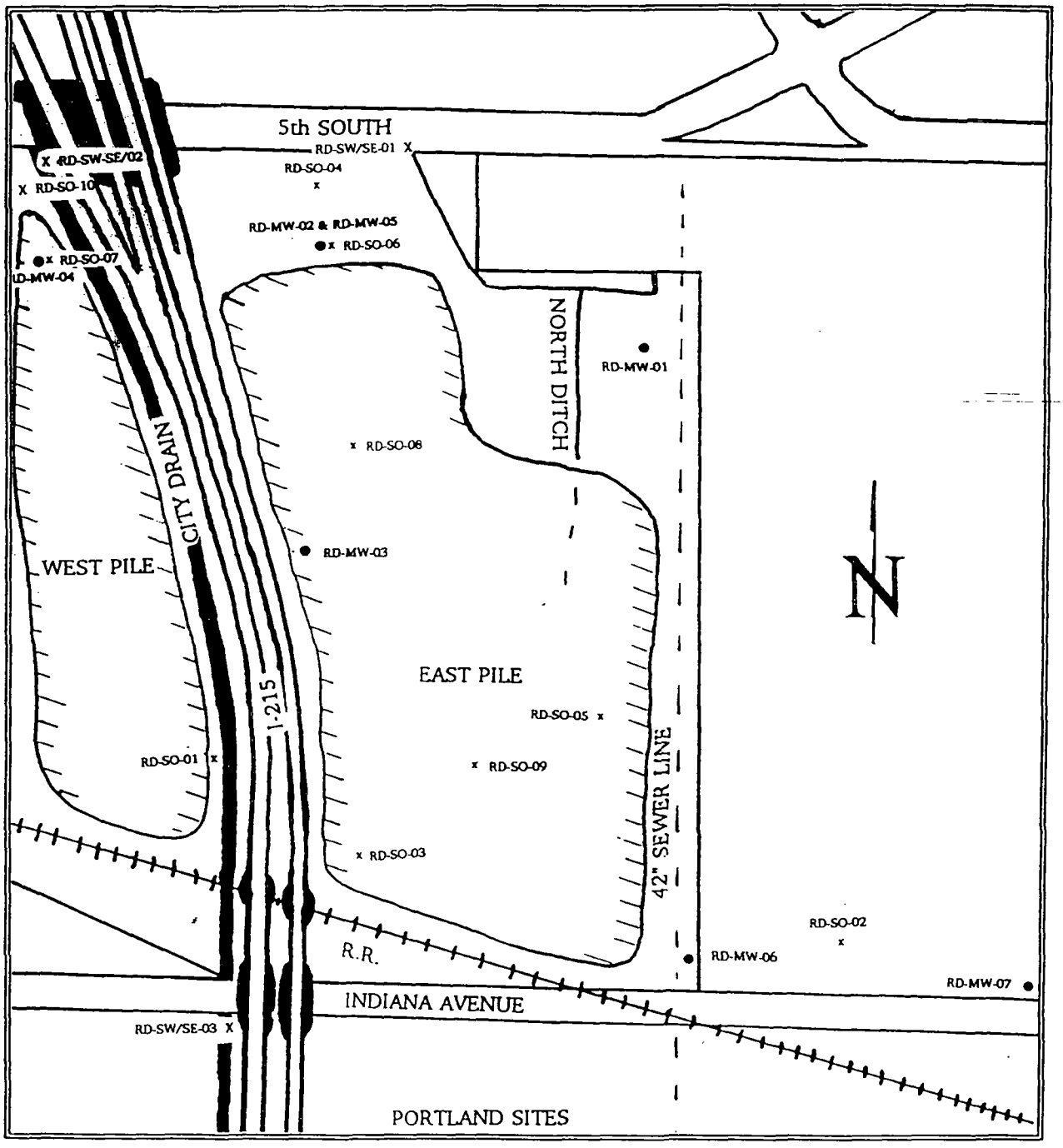


Figure 4
1977 Preliminary Investigations
Redwood Road Dump Cross-Sections
Salt Lake County, Utah



- Monitor Well Location

x Sample Location

UTAH DEPARTMENT OF HEALTH

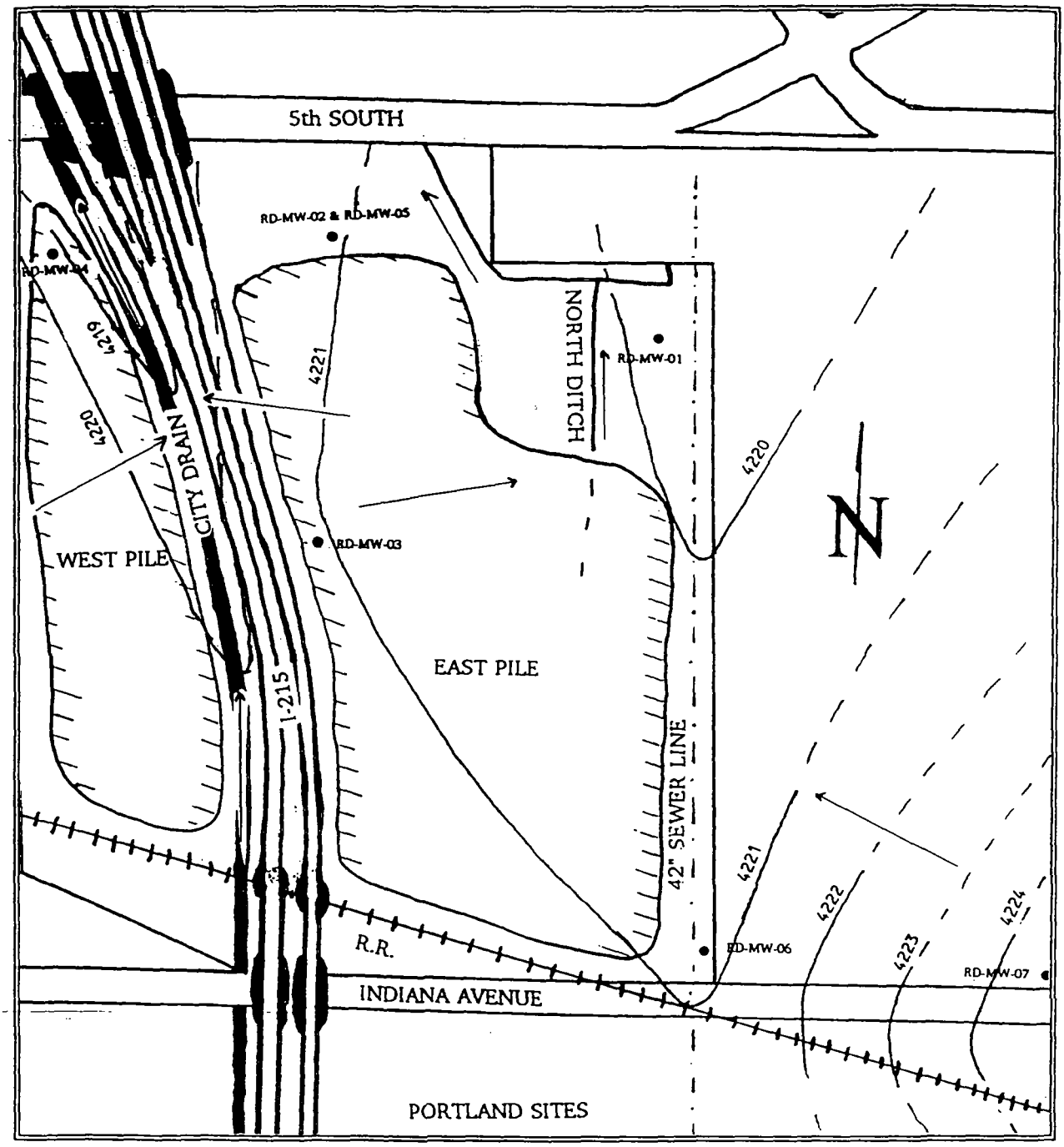
BUREAU OF ENVIRONMENTAL RESPONSE AND REMEDIATION

Sample Location Map

Redwood Road Dump Site

Figure 5

By	Date	Scale
TH	6/11/91	Not to Scale



Groundwater Contour (shallow)

4222

Groundwater and Suface Water Flow Direction

Monitor Well Location

42" Sewer Line

(based upon monitor well data and Portland Cement 2 & 3 Sites potentiometric maps)

UTAH DEPARTMENT OF HEALTH

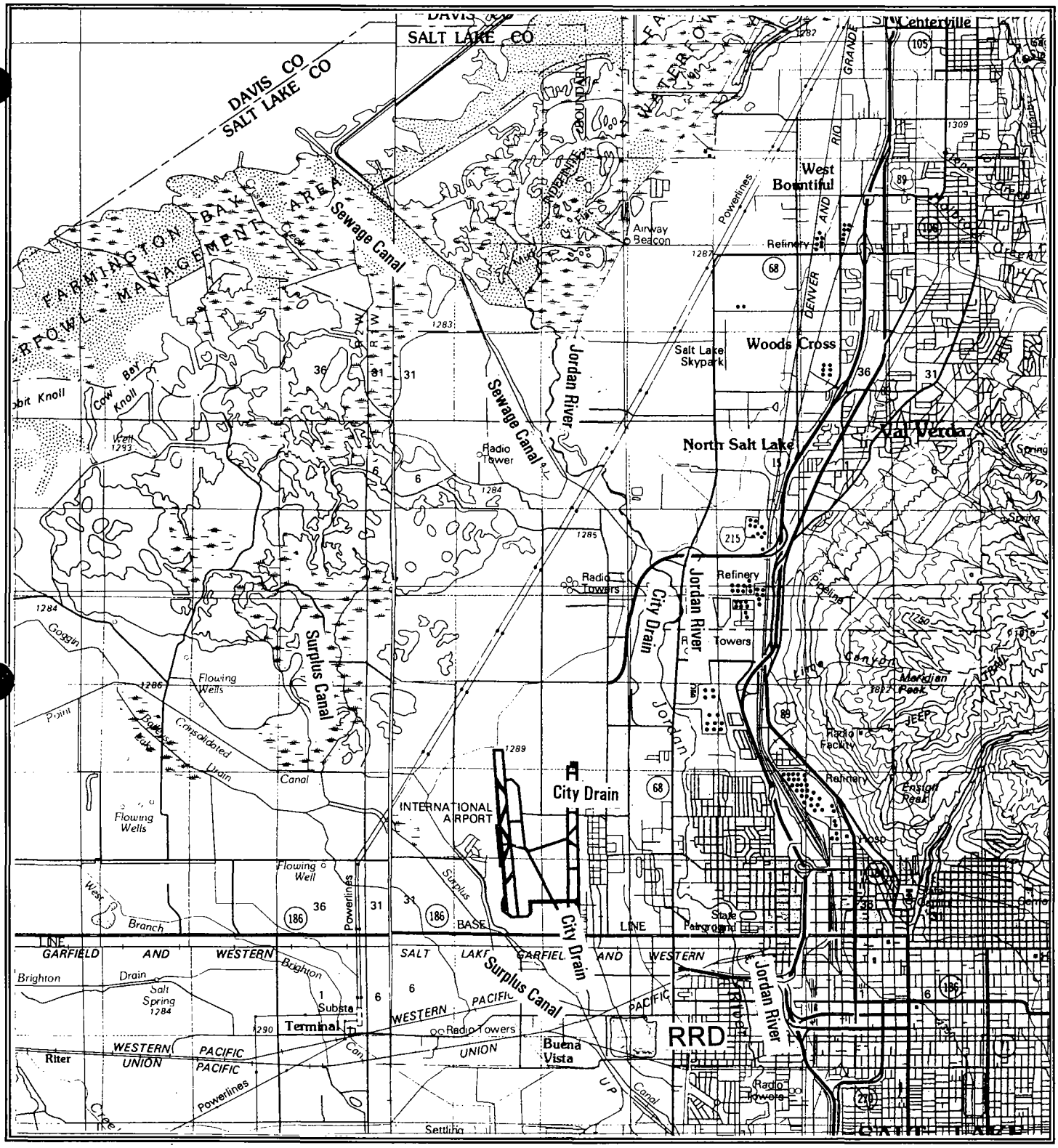
BUREAU OF ENVIRONMENTAL RESPONSE AND REMEDIATION

Groundwater Map

Redwood Road Dump Site

Figure 6

By	Date	Scale
TH	6/11/91	Not to Scale



SURFACE WATER BODIES - 15 Miles Downstream

City Drain

Sewage Canal

Surplus Canal

Jordan River

I-215 is not shown

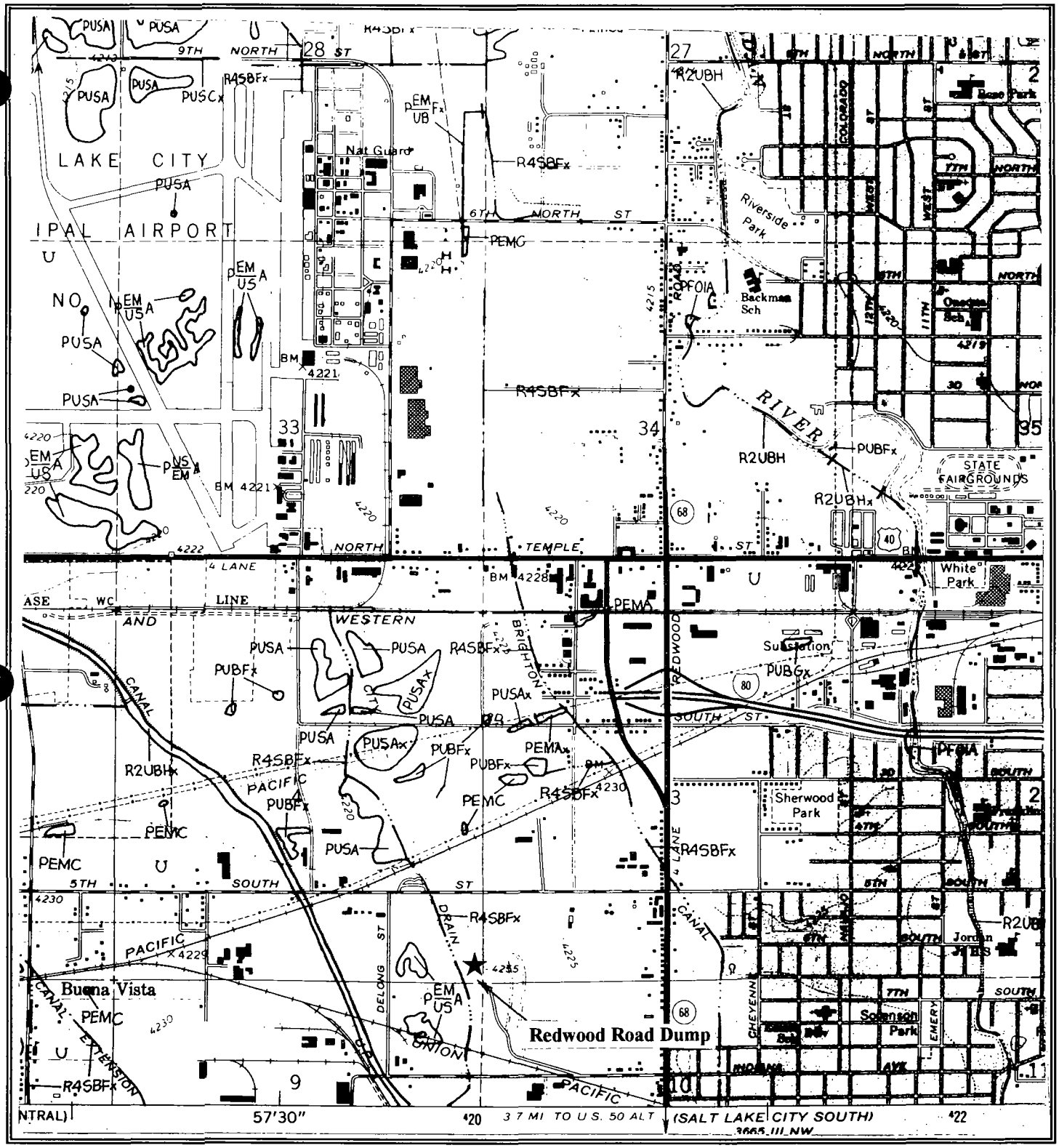
USGS 1:100,000 - scale Metric Topographic Map, 1980, Salt Lake City, UT-WY

Utah Department of Environmental Quality
Division of Environmental Response and Remediation

Figure 7

Redwood Road Dump
Salt Lake County, Utah

By: E. Yeomans **Date: 9-5-95** **Scale: 1:100,000**



R4SBFx	Riverine, Intermittent, Streambed, Semipermanent, Excavated
PEMA	Palustrine, Emergent, Temporary
PUSA	Palustrine, Unknown Temporary Tidal, Temporary

National Wetland Inventory Map, USGS Topo Base, Salt Lake City, North, Utah

7.5 Minute Series, 1981

Utah Department of Environmental Quality
Division of Environmental Response and Remediation

Figure 8

Wetland Map

Redwood Road Dump

Salt Lake County, Utah

By: E. Yeomans **Date: 6/21/95** **Scale: 1:24,000**

Figure 9 City Dump site, 2200 Indiana Avenue.

N

Spring 1979

Salt Lake County Maps 15-C and 15-D

Secs. 4, 8, 9, T1S R1W and Secs. 3, 8, 10, T1S R1W

Utah Department of Environmental Quality
Division of Environmental Response and Remediation

Figure 10

Aerial Map

Redwood Road Dump

Salt Lake County, Utah

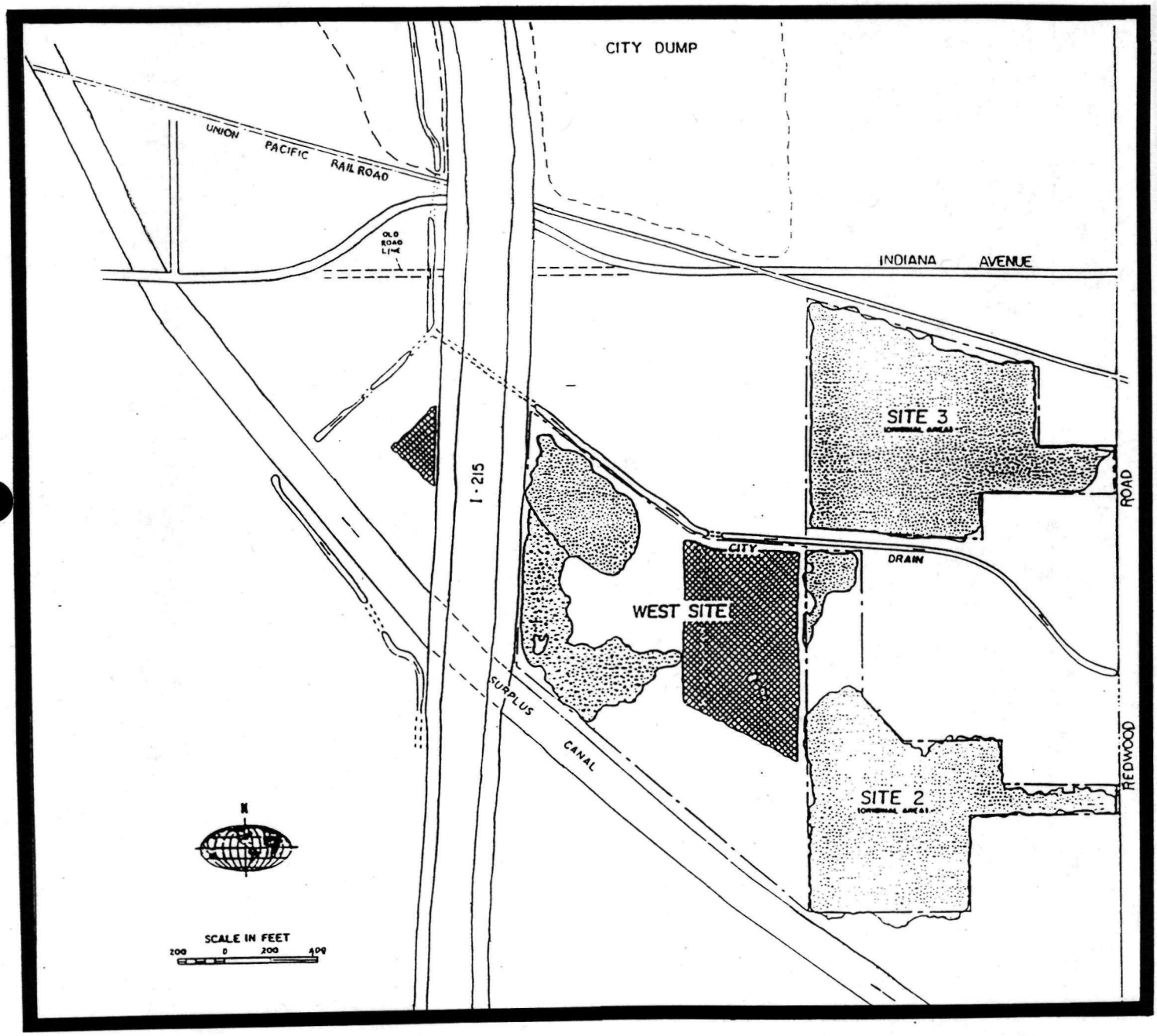
By: E. Yeomans **Date: 9/07/95** **Scale: 1": 400'**

Figure 11

Portland Cement Company Sites

Superfund Site

Waste Cement Kiln Dust Disposal Sites



from Dames and Moore, March 1986

TABLES

LIST OF TABLES

TABLE 1

1977 Sample Results

EXPLOSIVE GAS CONCENTRATIONS *

ALL VALUES ARE PERCENT BY VOLUME

PROBE NO.	28 April '77	3 May '77	5 May '77
G-1A-5-6	N.R.**	0	0
G-1A-10-11	N.R.	0.3	0
G-2A-5-6	N.R.	0	0
G-2A-10-11	N.R.	0	0
G-3A-5-6	N.R.	0	0
G-3A-10-11	N.R.	0	T<1
G-3A-15-16	N.R.	6.0	11
A-4A-5-6	N.R.	0	0
G-4A-10-11	N.R.	0	0
G-4A-14-15	N.R.	0	0
G-5A-5-6	N.R.	0	0
G-5A-10-11	N.R.	0	0
G-7A-5-6	N.R.	0	0
G-7A-9-10	N.R.	0	0
G-1B-4236	6.7	2.25	9
G-1B-5-6	T<1	0	0
G-2B-5-6	0	0	0
G-2B-10-11	1-2	2.25	1.5
G-2B-15-16	6	0	5
G-3B-5-6	0-3	0	0
G-3B-10-11	8	0	0
G-3B-15-16	18	9	15
G-4B-5-6	20	19	17
G-4B-10-11	20	17	20
G-4B-15-16	20	17	27
G-5B-1.5 + 6.5	N.R.	0	0
G-5B-10-11	N.R.	0	0
G-6B-5-6	N.R.	0	0
G-6B-10-11	N.R.	0	0
G-7B-4235	N.R.	0	0
G-7B-5-6	N.R.	0	0
G-8B-5-5 1/2	N.R.	0	0
G-1C-5-6	N.R.	0	0
G-1C-10-11	N.R.	0.7	5
G-2C-5-6	N.R.	0	0
C-2C-10-11	N.R.	0.8	0
G-3C-5-6	N.R.	0	0
C-3C-10-11	N.R.	1.8	3
G-3C-15-16	N.R.	No Probe	No Probe
G-5C-5-6	0	0	0
G-5C-10-11	<1	0.7	0.7
G-6C-5-6	N.R.	0	0
G-6C-9-10	N.R.	0.4	0

* Lower Explosive Limit is approximately 4 percent

** No Reading Taken

TABLE 2 - Physical Groundwater Parameters

Well Number	pH	Specific Conductivity (µmhos)	Temperature (°C)	Sediment Content (%)	Groundwater Elevation (feet)
RD-MW-01					4218.30
RD-MW-02					4228.99
RD-MW-03					4229.06
RD-MW-04					4224.08
RD-MW-01	7.97	19440		7	
RD-MW-02	7.35	1635		7	
RD-MW-03	7.51	9345		5	
RD-MW-04	7.47	25750		8	
RD-MW-01	7.10	20900	12.10		4219.46
RD-MW-02	7.00	1783	13.20		4221.13
RD-MW-03	6.80	1040	22.30		4221.14
RD-MW-04	6.80	31100	21.10		4219.31
RD-MW-06	7.30	2640	9.30		4220.91
RD-MW-07	7.30	2780	10.60		4224.34

Sediment Content = Visusal Estimate of Percentage of Sediment Content in Groundwater

Groundwater Elevation in Feet Above Mean Sea Level

ORGANIC DATA RESULTS FOR GROUNDWATER AND SURFACE WATER SAMPLES Redwood Road Dump, Salt Lake County, Utah										
Measured in ppb (parts per billion)										
Sample Number	RD-GW-01	RD-GW-02	RD-GW-03	RD-MW-04	RD-GW-05	RD-GW-06	RD-MW-07	RD-SW-01	RD-SW-02	RD-SW-03
Traffic Number	HN922	HN923	HN924	HN925	HN926	HN927	HN928	HN918	HN919	HN920
Sample Location	Downgradient	Downgradient	Downgradient	Downgradient	Duplicate of	Background	Background	North Ditch	City Drain D	City Drain U
Sample Type	Groundwater	Groundwater	Groundwater	Groundwater	RD-MW-02	Groundwater	Groundwater	Surface Water	Surface Water	SW-Background
VOLATILES										
Tetrachloroethene										7J
SEMIVOLATILES										
Bis (2-Ethylhexyl) Phthalate									2J	
Phenanthrene		1J								
Fluoranthene					3J					
Pyrene					3J					
N-Nitrosodiphenylamine (1)		2J								

J - the associated numerical value is an estimated because:

1. the Quality Control criteria were not met, or
2. the amount detected in the sample is below the contract required detection limit - Organic analysis only

TABLE 3
1991 SITE INVESTIGATION SAMPLING RESULTS

INORGANIC ANALYSES FOR GROUNDWATER AND SURFACE WATER SAMPLES
Redwood Road Dump, Salt Lake County, Utah

Measured in ppb (parts per billion)

Sample Number	RD-MW-01	RD-MW-02	RD-MW-03	RD-MW-04	RD-MW-05	RD-MW-06	RD-MW-07	RD-SW-01	RD-SW-02	RD-SW-03
Traffic Number	MHN636	MHN637	MHN638	MHN639	MHN640	MHN641	MHN642	MHN632	MHN633	MHN634
Sample Location	Downgradient	Downgradient	Downgradient	Downgradient	Duplicate of	Bgd/Upgradient	Bgd/Upgradient	North Ditch	City Drain Dgd	City Drain Ugd
Sample Type	Groundwater	Groundwater	Groundwater	Groundwater	RD-MW-02	Groundwater	Groundwater	Surface Water	Surface Water	SW- Background
Aluminum	234	385	260	560	251	104	108	1,380	728	666
Antimony	<24.0	<24.0	<24.0	<24.0	34.2	<24.0	<24.0	<24.0	25	<24.0
Arsenic	248	40.8	314	179	41.1	11.6	19	16.7	53.4	59.2
Barium	29.9J	429j	472J	81.7J	395J	37.7J	57.4J	69.4J	72.7J	76.6J
Beryllium	<1.0	<1.0	<1.0	<1.0	2.3	<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Calcium	30,600	59,600	13,400	38,800	55,800	54,600	92,300	46,500	56,300	70,800
Chromium	10	<6.0	27.2	<6.0	<6.0	<6.0	8	<6.0	<6.0	<6.0
Cobalt	8.2	<5.0	17.3	8.2	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Copper	96.1	<5.0	15.2	5.4	6.7	21.9	26.2	19	14.7	24.3
Iron	148	1,260	2,570	659	1,210	44.9	53.7	1,460	1060	710
Lead	<1.0	9.7	4.8	1.1	3.3	<1.0	<1.0	23.6	8	4.8
Magnesium	92,900	63,200	110,000	162,000	59,900	101,000	87,300	16,000	36,500	48,200
Manganese	97.7	538	350	775	500	36.9	222	33	92.4	98.5
Mercury	<.20J	<.20j	<.20J	<.20J	<.20J	<.20J	<.20J	<.20J	<.20J	<.20J
Nickel	40	15.9	30.4	26.2	<12.0	<12.0	<12.0	<12.0	<12.0	<12.0
Potassium	157,000	70,300	141,000	196,000	67,100	39,600	57,400	14,400	37,000	53,900
Selenium	14.8J	<1.0j	<1.0J	<10.0J	<1.0J	<1.0J	7.1J	2.5J	3J	2.5J
Silver	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Sodium	5,420,000	202,000	495,000	6,250,000	197,000	352,000	362,000	112,000	460,000	598,000
Thallium	<10.0R	<1.0j	<10.0J	<10.0R	<1.0J	<1.0J	<1.0J	<10.0J	<10.0J	<10.0
Vanadium	78.3	4.6	17.2	37.4	7.2	8.1	10.4	6.8	8.4	6.1
Zinc	29.8	16.4	51	19.7	19	33	23.6	62.7	53.9	62.3

J - the associated numerical value is an estimated because:

1. the Quality Control criteria were not met, or
2. the amount detected in the sample is below the contract required detection limit - Organic analysis only

R - Quality Control indicates that any positive values or reported detection limits are not reliable. Reported value is "rejected". Resampling or reanalysis may be necessary to verify the presence or absence of the compound.

TABLE 4
1991 SITE INVESTIGATION SAMPLING RESULTS

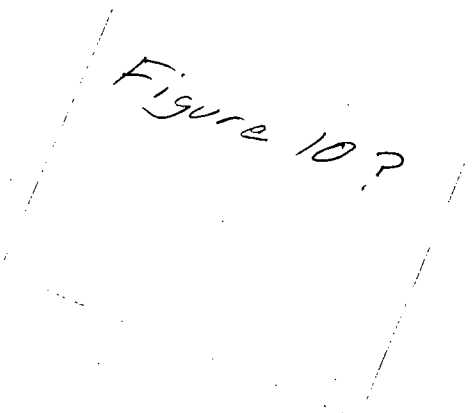


Figure 10?

ORGANIC ANALYSES FOR SOIL AND SEDIMENT SAMPLES
Redwood Road Dump, Salt Lake County, Utah

Measured in ppb (parts per billion)

Sample Number	RD-SO-01	RD-SO-02	RD-SO-03	RD-SO-04	RD-SO-05	RD-SO-06	RD-SO-07	RD-SO-08	RD-SO-09	RD-SO-10	RD-SE-01	RD-SE-02	RD-SE-03
Traffic Number	HN907	HN908	HN909	HN910	HN911	HL951	HL952	HN912	HN913	HN914	HN915	HN916	HN917
Sample Location	Downgradient	Background	Downgradient	Downgradient	Downgradient	RD-MW-02	RD-MW-04	Downgradient	Downgradient	Downgradient	North Ditch	City Drain, Dwn	City Drain, Up
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Sediment	Sediment	Sed- Backgrnd
SEMIVOLATILES													
Acenapthene							80J						
Acenaphthylene	25J												
Anthracene	270J						140J		140J		50J		
Benzo (a) Pyrene	1200		34J	63J					290J		96J		
Benzo (a) anthracene	1700		34J	67J			410J		430		140J		
Benzo (b) fluoranthene	1100		25J	72J			410J		280J		110J		
Benzo (k) fluoranthene	1100		30J	79J			410J		280J		110J		
Benzo (g,h,i) Perylene			140J										
bis (2-Ethylhexyl) phtalate	86J		74J	63J	68J		620J	34J	82J			140J	100J
Carbazole	63J						63J						
Chrysene	1500		35J	83J			760J		350J		150J		
Dibenzofuran							54J						
Di-n-butylphtalate	47J			37J				34J	47J				
Fluoranthene	2,700		56J	110J			1,000		800		240J		
Fluorene							110J						
Indeno (1,2,33-cd) Pyrene	660			77J					200J				
Napthalene							120J						
N-Nitrosodiphenylamine	<88J	<130		<63	<81J						110J		
Phenanthrene	1200		38J	84J			1000		500		240J		
Pyrene	2700		58J	130J			410J		650		280J		59J
2-Methylinapthalene							86J						
VOLATILES													
Acetone			6J			53J	270				16J		
Benzene							6J						
Carbon Disulfide													5J
Ethylbenzene							8J						
Xylenes (total)							61						
PESTICIDES/PCB's													
alpha-Chlordane									1.6J				
Aroclor - 1260									150				
Dieldrin									6.5J		.56J		
Endosulfan II				1.1J							2.5J		
Endrin	.70J			.56J					1.7J				
Endrin aldehyde				.99J									
Endrin ketone									12				
gamma-Chlordane	.54J		.64J	.97J					6.5J		1 3J		
Heptachlor	1J			1.5J	.23J				.80J		.74J	.22J	
Methoxychlor	6J	4.3J	1.9J	5.9J				1.6J	87	2.5J	7.3J		
4,4' - DDD		14		1J					11		.56J		
4,4' - DDE		5.2		1.2J					4.7J				
4,4' - DDT		16	1.1J	2.3J					30J				

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2. the amount detected in the sample is below the contract required detection limit - Organic analysis only

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TABLE 5
1991 SITE INVESTIGATION SAMPLING RESULTS

INORGANIC ANALYSES FOR SOIL AND SEDIMENT SAMPLES
Redwood Road Dump, Salt Lake County, Utah

Measured in ppb (parts per billion)

Sample Number	RD-SO-01	RD-SO-02	RD-SO-03	RD-SO-04	RD-SO-05	RD-SO-08	RD-SO-09	RD-SO-10	RD-SE-01	RD-SE-02	RD-SE-03
Traffic Number	MHN621	MHN622	MHN623	MHN624	MHN625	MHN626	MHN627	MHN628	MHN629	MHN630	MHN631
Sample Location	Downgradient	Background	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	North Ditch	City Drain, Dwn	City Drain, Up
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Sediment	Sediment	Sed-Backgrnd
Aluminum	10,400	8,250	5,650	9,920	8,980	5,590	6,770	23,600	8,070	1,210	13,800
Antimony	28.8J	<6.6J	12.8J	<5.9J	8.4J	30J	14.9J	15.9J	11.9J	12.4J	45.8J
Arsenic	21.2J	10.8J	3.3J	9.4J	8.8J	4.7J	11.5J	28J	4.9J	7J	22J
Barium	534	198	87.5	126	145	61.6	263	1,760	230	38.2	117
Beryllium	<1.2	<.49	<.39	<.58	<.82	<.54	<.81	<1.5	<.86	<.28	<1.0
Cadmium	6.2	<3.3J	<.68	<.85	<.69	<.84	<1.3	<3.3	<1.1	<.69	<.85
Calcium	33,700	36,700	61,300	50,700	40,300	292,000	57,500	80,200	79,100	107,000	51,400
Chromium	56.7	14.2	14.6	16.5	12.4	21.8	17.2	125	12.6	2.5	18.4
Cobalt	14.5	4.1	4.3	6	5.7	1.5	4.4	16.3	5.8	1.7	8.5
Copper	375	59.9	17.9	47.5	22	11.4	58	235	40.5	5.6	55.8
Iron	104,000	9,710	8,590	14,800	13,800	9,900	12,800	165,000	21,500	4,520	19,000
Lead	553	219	15.5	214	24.5	15.5	268	2,610	68.2	5.2	23.8
Magnesium	8,360	21,100	5,270	12,400	9,030	9,770	8,430	17,200	33,000	36,800	16,400
Manganese	529	250	171	293	328	117	246	645	261	129	345
Mercury	.41J	<.14J	<.11J	.22J	<.12J	<.11J	0.22J	0.77J	0.15J	<.11J	<.14J
Nickel	72.7	9.1	7.4	13.8	14.4	11.7	13	52.5	10.9	7.2	17.5
Potassium	3,200	3,550	1,580	3,290	2,860	1,740	2,270	1,560	2,910	345J	5,110
Selenium	<.25J	<.28J	<.22J	<.25J	<.23J	<.23J	<.26J	<.86J	<.26J	<.23J	<.28J
Silver	2	<1.1	<.89	0.98	<.92	<.91	<.97	1.4	<1.0	<.92	<1.1
Sodium	1,040	836	121	566	86	255	181	2,910	625	272	3,770
Thallium	0.36	0.32	<.22	0.32	0.26	<.23	<.24	<.27	<.26	<.23	0.31
Vanadium	26.3	21.8	15.6	24.1	17.6	44.8	18	39.3	18.8	7	29.1
Zinc	2,580	112	49.7	103	55.2	28.9	207	1,570	222	18.3	80.2

J - the associated numerical value is an estimated because:

1. the Quality Control criteria were not met, or
2. the amount detected in the sample is below the contract required detection limit - Organic analysis only

TABLE 6
1991 SITE INVESTIGATION SAMPLING RESULTS

9-21-92 SOIL SAMPLE DATA RESULTS							
Sample Number		Field Blank	AG-1	AG-2	AG-3	AG-4	SCDM Level
Time Collected		9:20 AM	10:46 AM	11:12 AM	11:24 AM	11:44 AM	HRS Benchmarks
							Soil Pathway
All samples in ppm	Laboratory						Ver. Jun 94
Chromium	*Ford A.L.*		2480	1240	1800	560	2900
T-Chromium	*State Lab*	<.04	3300		2200		2900
T-Lead	*State Lab*	<0.3	1600		1000		
Arsenic	*State Lab*	<.005	0.013		0.012		170
Barium	*State Lab*	<.01	0.9		0.7		41000
Cadmium	*State Lab*	<.06	<.06		<.06		290
Chromium	*State Lab*	<.04	0.049		<.04		2900
Lead	*State Lab*	<.30	0.35		0.43		
Mercury	*State Lab*	<.00008	<.0001		<.00009		170
Selenium	*State Lab*	0.005	<.005		<.005		2900
Silver	*State Lab*	<.01	0.035		<.01		2900

TABLE 7
SAMPLES COLLECTED BY UTAH DIVISION OF SOLID & HAZARDOUS WASTE

APPENDICES

APPENDIX A

Site Inspection Data Summary Form

SITE INSPECTION DATA SUMMARY

Site Name: Redwood Road Dump EPA Region: VIII Date: 09/06/95

State Office or Contractor Name and Address: Department of Environmental Quality, Division of Environmental Response and Remediation, 168 North 1950 West, First Floor, Salt Lake City, Utah 84114-4840

GENERAL SITE INFORMATION

1. **CERCLIS ID Number:** UTD980961502

   Address: 2000 West Indiana Ave. City: Salt Lake City

   County: Salt Lake State: UT Zip Code: 84104 Cong. Dist.: 2

2. **Owner Name:** Salt Lake City Corporation

   Owner Address: 77 East 400 South City: Salt Lake City State: UT

   Operator Name: same as owner

   Operator Address: _____ City: _____ State: __

3. **Type of Ownership** (check all that apply):

   ___ Private X Municipal ___ County ___ State

   ___ Federal/Agency Name: _____ ___ Other: _____

   References: 1

4. **Approximate size of Property:** 70 acres. References: 1

5. **Latitude:** 45° 45' 30.0 "

   Longitude: 111° 56' 30.0 " References: 1

6. **Status:** X Active ___ Inactive ___ Unknown References: 1

7. **Years of Operation:** From: 1923 To: Present References: 1

8. **Previous Investigations:**

TYPE	AGENCY/STATE/CONTRACTOR	DATE	
Disposal Rpt.	UDOH/ UT/ Sanitation and Hosp. Services	1955	References: 2
Engin. Rpt.	UDOT/ UT/ David Eckoff	1977	References: 3
PA	UDOH/ UT/ BERR	1987	References: 1
SI-Smpl. Pln	UDOH/ UT/ BERR	1990	References: 4
SI-Fld. A.R.	UDEQ/UT/DERR	1991	References: 5
SI-ARR	UDEQ/ UT/ DERR	1992	References: 6
SHW Sampling	UDEQ/ UT/ DSHW	1992	References: 8
On-st A.R.	EPA/ UT/ Morris Knudsen	1993	References: 7

WASTE SOURCE INFORMATION

1. **Waste source types** (check all that apply):

___ Constituent	___ Wastestream (type): _____
_X_ Landfill	___ Tanks or non-drum containers (type): _____
___ Drums	___ Pile (type): _____
_X_ Contaminated Soil	___ Surface Impoundment (buried)
___ Land Treatment	___ Surface Impoundment (backfilled)
___ Other: _____	

References: 2, 6, 21

2. **Types of wastes** (check all that apply):

_X_ Organic Chemicals	_X_ Inorganic Chemicals	_X_ Municipal Wastes
_X_ Pesticides/Herbicides	_X_ Metals	_X_ Solvents
___ Radionuclides	___ Other: _____	

References: 2, 3, 6

3. **Summarize history of waste disposal operations:**

The landfill was in operation as the Salt Lake City dump from 1923 until 1962. Since 1962 the landfill has been closed to the public but is used for the disposal of leaves, grass clippings, tree trimmings, and storm sewer sludge from Salt Lake City Corporation. During its first 39 years, the landfill was reported to take in residential, commercial and industrial wastes. Ten municipal trucks, commercial refuse collectors and private individuals disposed of materials in the landfill. Disposal procedure at the landfill consisted of pushing refuse off the edge of the dump along a 200 ft section and as the face of the dump progressed, dirt was spread on the top surface. Burning was not permitted on the face of the dump but was allowed for tree stumps and brush in a separate area of the landfill. No manifest system was in place for this facility and no records remain of waste content or quantities. Also, during the site's use as a primary landfill for Salt Lake City regulations were not in effect for the disposal of hazardous materials. According to an inspection from the State of Utah, Division of Health in 1975, underground fires existed at the dump, and hot water vapor and smoke were observed coming from

fissures in the earth. Fires were common in the 1970's and were visible until about 1981. Some areas of the dump had also caved in due to the settling of the landfill. At times obnoxious odors were detected.

In December 1991, chromium contaminated soil was dumped illegally at the Redwood Road Dump at night. The company believed responsible is Tool Design, Engineering & Manufacturing (TDEM), located at 2061 West 2300 South, Salt Lake City, Utah. TDEM manufactures and repairs hydraulic cylinders, oil-field tools and pump parts. Part of the operation at the plant includes a chrome-plating facility. In 1987 the facility was inspected several times by the U.S. EPA, Granger-Hunter Improvement District, and the Salt Lake County Health Department. Results of the investigations and testing revealed elevated concentrations of chromium and other metals found in water being discharged from the plant and in soils that received the discharge water. An employee informed the state that some of the soil was removed and disposed of at the Redwood Road Dump. The Utah Attorney General's office is hoping to conclude its more than 2 year criminal investigation of TDEM this year with a fair resolution which will include cleanup of the dumped soil. Information available to the public is on file at the Utah Department of Solid and Hazardous Waste.

References: 1, 2, 8, 20, 21, 31, 32

4. **Source characterization** (Attach pages to show quantity and calculations):

Source 1 name: Landfill Source Type: pile

Describe Source: various quantities of suspected hazardous materials

Ground water migration containment: None

Surface water migration containment: None

Air migration (gas and migration) containment: None

Physical State of Wastes:

X Solid X Liquid X Sludge/Slurry X Gas ___ Unknown

Constituent Quantity of Hazardous Substances: _____ (specify units).

Wastestream Quantity Containing Hazardous Substances: _____ (specify units).

Volume of Source (yd^3): 1,338,000 Area of Source (ft^2): _____

Hazardous substances associated with source 1:

Heavy Metals	VOAs	
BNAs	TIC compounds	
Pesticides/PCBs		

References: 6

Source 2 name: Contaminated Soil Source Type: Pile

Describe Source: Chromium Contaminated Soil

Ground water migration containment: None

Surface water migration containment: None

Air migration (gas and migration) containment: None

Physical State of Wastes:

X Solid ___ Liquid ___ Sludge/Slurry ___ Gas ___ Unknown

Constituent Quantity of Hazardous Substances: _____ (specify units).

Wastestream Quantity Containing Hazardous Substances: _____ (specify units).

Volume of Source (yd^3): _____ Area of Source (ft^2): approx. 21,750

Hazardous substances associated with source 2:

Chromium		
Lead		

References: 8, 21

Calculations for Volume of Source 1 (yd^3): 1,338,000

70 acres x 43,500 $feet^2$/acre = 3,045,000 $feet^2$ x 11.86 feet = 36,113,700 $feet^3$

36,113,700 $feet^3$ x 0.03704 $yards^3$/$feet^3$ = 1,337,651.4 $yards^3$

Calculations for Volume of Source 2 (yd^3): 21,750

0.5 acre x 43,500 $feet^2$/acre = 21,750 $feet^2$

5. **Description of removal or remedial activities:**

If Removal has occurred, identify the removal authority and describe the activities. Specify the date(s) of the removal.

Removal of drums on August 10, 1993 containing investigation derived wastes from monitoring well installation by EPA's Field Investigation Team during sampling activities in spring of 1991.

References: 7

GROUND WATER INFORMATION

1. **Ground water drinking water use within 4 miles of site sources:**

   __X__ Municipal ___ Private ___ Both ___ No Drinking Water Use

   References: 9, 24, 25, 26, 27, 28

2. **Is ground water contaminated?**

   __X__ Yes ___ No ___ Uncertain but likely ___ Uncertain but not likely

   ___ Additional sampling required

   Is analytical evidence available? __X__ Yes ___ No References: 6

3. **Is ground water contamination attributable to the site?**

   __X__ Yes ___ No ___ Additional sampling required References: 6

   Contaminants were found on-site in downgradient samples. Antimony, arsenic and selenium were detected above MCL's. Fourteen metals, detected at concentrations 3 times greater than background, include aluminum, antimony, arsenic, barium, chromium, cobalt, copper, iron, lead, manganese, nickel, potassium, sodium, and vanadium.

4. **Are drinking water wells contaminated?**

   ___ Yes __X__ No ___ Uncertain but likely ___ Uncertain but not likely

   ___ Additional sampling required

   Is analytical evidence available? __X__ Yes ___ No

   References: 10, 24, 25, 26, 27, 28

5. **Net precipitation** (HRS Section 3.1.2.2): 6 inches.

6. **County average number of persons per residence:**

   3.6 people. References: 11

7. **Discuss general stratigraphy underlying the site.** Attach sketch of stratigraphic column.

   See Well Log Info

   References: 5, 6, 12, 16

8. **Using Table GW-1, summarize geology underlying the site** (starting with formation #1 closest to ground surface). Indicate if formation is interconnected with overlying formation.

TABLE GW-1: SITE GEOLOGY

NAME OF FORMATION	INTER-CONNECT? (yes/no)	TYPE OF MATERIAL	AVERAGE THICKNESS (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	USED FOR DRINKING WATER?
1. Shallow Unconfined Aquifer	Yes	Si, clay, loams			No
2. Principal Unconfined Aquifer	Yes	Sediments	1000'		Yes
3.					
4.					
5.					

References: 13, 30

9. **Does a karst aquifer underlie any site source?**

___ Yes X No References: 12

10. **Depth to top of aquifer:** 0 feet

Elevation: 4220 feet References: 12, 14

11. **In the table below, enter the number of people obtaining drinking water from wells located within 4 miles of the site.** For each aquifer, attach population calculation sheets. Key aquifer to formations listed in Table GW-1.

POPULATION SERVED BY WELLS WITHIN DISTANCE CATEGORIES BY AQUIFER

DISTANCE OF WELL(S) FROM SITE SOURCES	AQUIFER A: INCLUDES FORMATIONS _____	AQUIFER B: INCLUDES FORMATIONS Princ.A	AQUIFER C: INCLUDES FORMATIONS _____
¼ mile or less		0	
>¼ to ½ mile		0	
>½ to 1 mile		0	
>1 to 2 miles		2,900	
>2 to 3 miles		20,850	
>3 to 4 miles		27,798	

References: 10, 24, 25, 26, 27, 28

12. **Is ground water from multiple wells blended prior to distribution?**

X Yes ___ No References: 10, 24, 25, 26, 27, 28

13. **Is ground water blended with surface water?**

X Yes ___ No References: 10, 24, 25, 26, 27, 28

Briefly Describe: Letter from Granger-Hunter Improvement District marked wells "yes" to Blended Surface Water, plus phone calls to Improvement District's.

14. **Distance from any incompletely contained source available to ground water to nearest drinking water well** (HRS Section 3.3.1):

6390 feet References: 9

15. **Briefly describe standby drinking water wells within 4 miles of sources at the site:**

Several of the Granger-Hunter Improvement District Wells #1 and #5 are used during high use periods during the summer.

References: 10, 28

16. **Ground water resources within 4 miles of site sources** (HRS Section 3.3.3):

___ Irrigation (5-acre minimum) of commercial food or commercial forage crops.

___ Commercial livestock watering.

___ Ingredient in commercial food preparation.

___ Supply for commercial aquaculture.

___ Supply for major or designated water recreation area, excluding drinking water use.

___ Water usable for drinking water but no drinking water wells are within 4 miles.

X None of the above.

References: 6

17. **Wellhead protection area (WHPA) within 4 miles of site sources** (HRS Section 3.3.4):

___ Source with non-zero containment factor value lies within or above the WHPA.

___ Observed ground water contamination attributable to site source(s) lies within the WHPA.

___ WHPA lies within 4 miles of site sources.

X None

References: 6

Additional ground water pathway description:

References:

SURFACE WATER INFORMATION

COMPLETE A COPY OF THIS SECTION OF THE DATA SUMMARY FOR EACH WATERSHED

1. **Describe the surface water migration path from site sources to at least 15 miles downstream.** Attach a sketch of the surface water migration route.

The City Drain flows from south to north across the site, joins the Sewer Canal six miles downstream and then empties into the Great Salt Lake 13 miles north of the site. The unnamed north ditch lies on northeast portion of site and joins the Salt Lake City storm drain system. The Jordan River is approx. 7,000 feet east of the site and discharges into the Great Salt Lake 11 miles downstream. The Surplus Canal is located approx. 1,000 feet west of the site and discharges into the Great Salt Lake approx. 6 miles north of the site.

References: 6, 29

2. **Is Surface Water Contaminated?**

X Yes ___ No ___ Uncertain but likely ___ Uncertain but not likely

___ Additional sampling is required

Is analytical evidence available? X Yes ___ No References: 6

3. **Is surface water contamination attributable to the site?**

___ Yes X No ___ Additional sampling required References: 6, 12

4. **Floodplain category in which site sources are located** (check all that apply):

___1-year X 10-year ___100-year ___500-year ___None References: 15

5. **Describe flood containment for each source** (HRS Section 4.1.2.1.2.2):

Source #1 Landfill Flood Containment None

Source #2 Contaminated Soil Flood Containment None

Source #3 _____ Flood Containment _____

References: 6

6. **Shortest overland distance to surface water from any source** (HRS Section 4.1.2.1.2.1.3):

0 feet References: 5

7. **Size of drainage area** (HRS Section 4.4.3):

70 acres References: 14, 15

8. **Describe the predominant soil group within the drainage area** (HRS Section 4.1.2.1.2.1.2):

Sa: Salt Air Silty Clay Loam - silts, clays, loams of former lake plains of the Great Salt Lake. Strongly saline. References: 16

9. **2-year 24-hour Rainfall** (HRS Section 4.1.2.1.2.1.2):

1.79 inches References: 17

10. **Elevation of the bottom of nearest surface water body:**

4220 feet above sea level References: 14

11. **Elevation of top of uppermost aquifer:**

4220 feet above sea level References: 14

12. **Predominant type of water body between probable point of entry to surface water and nearest drinking water intake:**

X River ___ Lake X Canal References: 5

13. **Identify all drinking water intakes, fisheries, and sensitive environments within 15 miles downstream.**

TARGET NAME/TYPE	WATER BODY TYPE	DISTANCE FROM PPE	FLOW (CFS)	TARGET CHARACTERISTICS*	TARGET SAMPLED?
Surplus Canal	Canal	1000 ft.	371 CFS	no intakes	no
City Drain	Canal	0 ft.			yes
Jordan River	River	7000 ft.	146 CFS	fishery, wetlands	no
Wetlands	Canal	0-6 mi.		3 mi.	no
Unnamed north ditch	Ditch	0 ft.			yes

* If target is a drinking water intake, provide number of people served by intake. If target is a fishery, provide species and annual production of human food chain organisms (pounds per year). If target is a wetland, specify wetland frontage (in miles). Attach calculation pages.

References: 15, 18, 19

14. **Is surface water drinking water blended prior to distribution?**

___ Yes X No References: 18

No intakes are located downstream of the site.

15. **Describe any standby drinking water intakes within 15 miles downstream:**

References: _____

16. **Surface water resources within 15 miles downstream** (HRS Section 4.1.2.3.3):

___ Irrigation (5 acres minimum) of commercial food or commercial forage crops

___ Commercial livestock watering

___ Ingredient in commercial food preparation

_X_ Major or designated water recreation area, excluding drinking water use

___ Water designated by the state for drinking water use but is not currently used

___ Water usable for drinking water but no drinking water intakes within 15 miles downstream

___ None of the above

References: 15

SOIL EVALUATION

1. **Is surficial or soil contamination present at the site?**

   _X_ Yes ___ No ___ Uncertain but likely ___ Uncertain but not likely

   ___ Additional sampling required

   Is analytical evidence available? _X_ Yes ___ No References: 6, 8

2. **Is surficial or soil contamination attributable to the site?**

   _X_ Yes ___ No ___ Additional Sampling Required

3. **Is surficial contamination on the property and within 200 feet of a residence, school, daycare center, or workplace?**

   _X_ Yes ___ No ___ Uncertain but likely ___ Uncertain but not likely

   ___ Additional sampling required

   Is analytical evidence available? _X_ Yes ___ No References: 6, 8

4. **Total area of surficial contamination** (HRS Section 5.2.1.2):

   3,045,000 square feet References: 6

5. **Attractiveness/accessibility of the areas of observed contamination** (HRS Section 5.2.1.1). Check all that apply:

   ___ Designated recreational area

   ___ Used regularly, or accessible and unique recreational area

   ___ Moderately accessible with some use

   _X_ Slightly accessible with some use

   ___ Accessible with no use

   ___ Inaccessible with some use

   ___ Inaccessible with no use References: 6, 21

6. **Population within 1-mile travel distance from site.**

DISTANCE FROM SITE SOURCES	POPULATION
¼ mile or less	319
>¼ to ½ mile	1514
>½ to 1 mile	6456

References: 11

1. **Is air contamination present at the site?**

___ Yes ___ No ___ Uncertain but likely _X_ Uncertain but not likely

___ Additional sampling required

Is analytical evidence available? _X_ Yes ___ No References: 3

2. **Is air contamination attributable to the site?**

_X_ Yes ___ No ___ Additional sampling required References: 3

3. **Are populations, sensitive environments, or wetlands exposed to airborne hazardous substances released from the site?**

___ Yes ___ No ___ Uncertain but likely _X_ Uncertain but not likely

___ Additional sampling required

Is analytical evidence available? ___ Yes _X_ No References: 3

4. **Evidence of biogas release from any of the following source types at the site:**

___ Below-ground containers or tanks _X_ Landfill

___ Buried surface impoundment References: 3, 21

5. **Particulate migration potential factor value:** 11 (HRS Figure 6-2)

6. **Particulate mobility factor value:** .0008 (HRS Figure 6-3)

7. **Distance from any incompletely contained source to nearest residence or regularly occupied area:**

1/4 miles References: 6

8. **Population within 4 miles of site sources.**

DISTANCE FROM SITE SOURCES	POPULATION
0 (within sources)	0
¼ mile or less	319
>¼ to ½ mile	1514
>½ to 1 mile	6456
>1 to 2 miles	17002
>2 to 3 miles	25067
>3 to 4 miles	52183

References: 11

9. **Resources within ½ mile of site sources** (HRS Section 6.3.3):

___ Commercial agriculture

___ Commercial silviculture

___ Major or designated recreation area

_X_ None of the above

References: 6

10. **Sensitive environments and wetlands within 4 miles of the site:**

NAME/DESCRIPTION/LOCATION OF SENSITIVE ENVIRONMENT OR WETLAND	DISTANCE FROM SITE (MILES)	TYPE OF SENSITIVE ENVIRONMENT	WETLAND SIZE (ACRES)
Palustrine, Emergent, Temporary	0.25	Wetland	~10
Riverine, Intermittent, Strmbed	0	Wetland	~5
Palustrine, Unknown Temp. Tidal	0.50	Wetlands	~20

References: 15

ADDITIONAL INFORMATION/COMMENTS

LIST OF REFERENCES

1. Utah Bureau of Solid and Hazardous Waste, 1987. Redwood Road Dump - Preliminary Assessment, Salt Lake City, Utah.

2. Utah State Department of Health, Sanitation and Hospital Services, 1955. Survey of Refuse Disposal Problems, Salt Lake City, Utah.

3. Eckoff, David W., 1977. Preliminary Investigations Disposition of Garbage Materials in Abandoned Landfill. (Submitted to: Utah Department of Transportation.

4. Utah Bureau of Environmental Response and Remediation, 1990. Sampling Plan, Redwood Road Dump, Salt Lake County, Utah.

5. Utah Division of Environmental Response and Remediation, 1991. Field Activities Report, Redwood Road Dump, Salt Lake County, Utah.

6. Utah Division of Environmental Response and Remediation, 1992. Analytical Results Report, Redwood Road Dump- UTD980961502, Salt Lake City, Utah.

7. Morris-Knudsen Environmental Services Division, 1993, On-site Activities Report for Redwood Road IDW. (Submitted to: Environmental Protection Agency under ARCS Contract Number 68-W9-0025).

8. Solid and Hazardous Waste Sampling of Salt Lake City Landfill, September 21, 1992, Project Manager - Bill Wallner.

9. Utah Division of Drinking Water and Sanitation, 1995, Drinking Water Wells Listing.

10. Jerry Hunter, Granger-Hunter Improvement District, District Manager, Written Communication, April 17, 1995.

11. Utah Office of Planning and Budget, State Data Center, 1990 Estimates, Census of Population and Housing.

12. Dames and Moore Job No. 12818-011-031, Lone Star Industries, Inc. Phase II Remedial Investigation Report, Portland Cement Company of Utah, Waste Cement Kiln Dust Disposal Site, Salt Lake City, Utah, Volume II - Appendix A, July 21, 1989.

13. U.S. Geological Survey, 1994, "Hydrogeology of recharge areas and water quality of the principal aquifers along the Wasatch Front and adjacent areas, Utah." Water Resources Investigations Report 93-4221.

14. U.S. Geological Survey, 1963, Salt Lake City, North Quadrangle, Utah, 7.5 Minute Series.

LIST OF REFERENCES(Continued)

15. National Wetlands Inventory Maps, 1981, U. S. Department of Interior, Fish and Wildlife Service, Topo Base U.S. Geological Survey, 1963, Salt Lake City North and Saltair Quadrangles, Utah, 7.5 Minute Series.

16. United States Department of Agriculture, 1974, Soil Conservation Service, Soil Survey of Salt Lake Area, Utah.

17. Ashcroft, Gaylen L. et al., 1992, Utah Climate.

18. Utah Division of Water Rights, 1995, Points of Diversion Listing.

19. U.S. Geological Survey, 1993, Water Resources Data-Utah Water Year 1992,Water-Data Report UT-92-1.

20. Dennis Downs, Utah Division of Health, Memorandum to file, Salt Lake City Garbage Dump at 2200 West Indiana Ave., Sept. 11, 1975.

21. Salt Lake City Parks & Recreation Department. June 1995. Personal conversation with Allen Linsley, SLC Parks & Rec. Maintenance, during site visit.

22. Draft Letter Report, Redwood Dump Data Validation, Inorganic Validation, EPA Case #16324, 1991, by Versar A&E, Inc. for Utah Dept. of Environmental Quality, Salt Lake City, Utah.

23. Telephone Conversation with Susan Shay, Salt Lake City Corporation Parks and Recreation Department, Salt Lake City, Utah, August 21, 1995.

24. Telephone conversation between Leroy Hooten and Michelle Lutz, Salt Lake City Water System and DEQ employees respectively, April 4 1995.

25. Telephone conversation between Floyd Nielsen and Michelle Lutz, Taylorsville-Bennion Water Improvement District and DEQ employees respectively, April 4, 1995.

26. Telephone conversation between Dean Stock and Michelle Lutz, South Salt Lake City Water and DEQ employees, April 4, 1995.

27. Telephone conversation with Marvin Taylor, South Salt Lake City Water, August 18, 1995.

28. Telephone conversation with Gerald Larson, Granger-Hunter Improvement District, August 18, 1995.

29. U. S. Geological Survey, 1979 and 1980, Salt Lake City, UT-WY and Tooele, UT, 1:100,000-scale metric topographic maps.

30. Hely, A.G., Mower, R.W., and Harr, C.A., 1971, Water Resources of Salt Lake County, Utah, State Department of Natural Resources, Technical Publication No. 31, pp. 106-111.

31. Telephone conversations with Richard Rathbun, Utah Attorney General's Office, June 22, July 5 and September 7, 1995.

32. Telephone conversation with Ken Farnsworth, Utah Attorney General's Office, September 6, 1995.

APPENDIX B

1977 Preliminary Investigations

PRELIMINARY INVESTIGATIONS

DISPOSITION OF GARBAGE MATERIALS

IN ABANDONED LANDFILL

(18th SOUTH TO 5th SOUTH)
(SALT LAKE CITY, UTAH)

PROJECT NO. I-215-9(13)297

PREPARED FOR

UTAH DEPARTMENT OF TRANSPORTATION
965-4196 or 4029
DISTRICT NO. 2 - PRECONSTRUCTION

SALT LAKE CITY, UTAH

BY

DAVID W. ECKHOFF, Ph.D., P.E.
272-2702(home) 261-0090 (office)
4720 SOUTH ICHABOD DRIVE
SALT LAKE CITY, UTAH
84117

July, 1977

TABLE OF CONTENTS

SECTION I

INTRODUCTION

BACKGROUND

The right-of-way for the Southwestern quadrant of the I-215 "Belt Route" freeway for Salt Lake City traverses the site of an abandoned landfill between Fifth South Street and Indiana Avenue. Recognizing that garbage materials in such a site are generally not suitable for construction (fill) purposes, the Utah Department of Transportation sought means to acceptably utilize the materials in non-structural applications associated with the Belt Route. Such applications could substantially reduce the costs of disposing of the materials, which most likely would involve hauling the materials to another landfill site.

In addition it was recognized that decomposing garbage materials in a landfill environment undergo anaerobic fementation, which yields methane gas (CH_4) as one of the major end products. The process takes place very slowly. It has been estimated that under "normal" conditions approximately ten percent of the decomposable materials remain after ten years. Under such circumstances, explosive concentration of methane gas can continue to accumulate in underground pockets for decades. Previous work by the consultant in the Columbia Point area of Boston had shown that hazardous conditions can easily prevail for up to 50 years after the abandonment of the landfill (dump). There a miniature explosion and fire occured when capping fixtures were being welded on test piles.

Furthermore, methane gas by itself is colorless and odorless, making it a very insidious hazard. Human senses cannot detect it at relatively low, but nonthe-less explosive, concentrations. The explosive range is within four percent to 15 percent by volume in air. Thus a mixture of 24/25 air and 1/25 methane is still explosively dangerous. The four percent value is called the Lower Explosive Limit. The fact that slow-burning underground fires have been observed in the land fill agravates the already potentially hazardous conditions.

Other minor, but significant, problems are associated with opening-up an old garbage dump. Odors head the list. Nothing smells worse than a turned-over dump! Minor products of anaerobic fermentation are the causative agents. Also it should be remembered that any construction project in Utah will generate some dust. In this case much of the dust would not be inorganic particles, but rather "old garbage", which could seriously compound the problem.

PURPOSE

The purpose of the preliminary investigations described herein ~~were~~ was to:

1. Ascertain the relative hazards (particularly with respect to explosive gas and fires) of performing heavy construction activity in and around the decomposing refuse deposits, and

2. Preliminary development of acceptable means of removing existing refuse deposits and placing them within new freeway right-of-way.

Of major concern in this regard were the expolosive gases, odors from decomposing refuse, blowing residue, and the minimization of future problems associated with structural stability and gas generation.

SCOPE

It was the original intent to include five basic task areas in the preliminary investigations:

1. Develop History of Landfill - types of refuse in landfill, methods of placement, burning, and earth-moving activities.

2. Field Sampling, Physical Conditions - quantities and characteristics of refuse materials throughout the site.

3. Field Sampling, Gases - concentations of explosive gases throughout the site (at several depths).

4. Review of Analytical Date - meetings and discussions with DOT personnel.

5. Future Efforts - recommendations for future and/or follow-up work.

SECTION II

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

No official record of the landfilling activities exists within the Salt Lake City Department of Streets and Public Improvements files. According to one interviewee, "A former commissioner ordered all the records hauled to the 'dump' just before he left office". As near as can be ascertained, mixed garbage and refuse were dumped on the site, and extensive burning of the materials took place. This means that the decomposition (and gas generation) potential of the refuse deposits is substantially reduced, relative to materials placed in a modern sanitary land fill.

Field sampling efforts supported the foregoing statement. Volatile (combustible) solids percentages were in every case lower than 25 percent, and the average value was in the range of 10 to 15 percent. These data strongly suggest that virtually all potential decomposition has taken place. The remaining refuse materials appear to be largely inert inorganics - both decomposition residue (such as ash from burning) and mixed-in cover material.

Gas monitoring confirmed the low level of decomposition/fermentation activity in the refuse deposits. Only seven of the 43 gas probe locations consistently showed explosive gas concentrations greater than the Lower Explosive Limit. These locations are all in the general vicinity of Station 590 to the right of center-line. Only two probe holes (four probes) showed explosive gas concentrations in excess of ten percent; G-3B (Sta. 591+50) and G-4B (Sta. 593+50). These results corroborate those of the physical sampling program. The remaining decomposition activity is relatively low-level.

There is one area in the vicinity of Station 595 where smoke can be observed issuing from cracks in the ground. These "hot spots" are most likely slow-burning fires, which are consuming large objects such as timbers from

demolition wastes. These fires are not hazardous in their undisturbed condition, because they are oxygen-limited, but caution must be exercised during excavation. (See Recommendations, below)

There do not appear to be inconsistencies in any of the sampling data. The major area of concern is that having the greatest apparent depth of refuse deposits - in the vicinity of Station 590 to Station 595, to the right of center line.

A very positive result of these preliminary investigations is that the refuse materials can most likely be utilized for structural purposes in the proposed highway embankments. As a result of additional testing conducted by DOT, the strength characteristics of the materials are being ascertained. Also, by limiting the moisture content and proportions of refuse and "clean" fill, it should be possible to eliminate any significant future gas generation within the constructed embankments (see Conclusions, below).

CONCLUSIONS

1. The potential hazards from explosive gas are minimal. The low levels of anaerobic biological activity, as borne out by volatile solids analyses and explosive gas concentration readings, means that very little explosive gas is continuing to be generated in the refuse deposits.

2. Underground fires on the site appear to be relatively insignificant, although they have apparently been burning for several years. They can readily be extinguished prior to excavation.

3. Routine construction activity need not be prohibited in or around the site, but certain precautions need to be taken (see Recommendations, below).

4. As shown in Figures 1 and 2, gas concentrations in the refuse materials can be maintained below the lower Explosive Limit, so long as the following conditions are met:

   a. Volatile Solids content less than ten percent.
   b. Moisture content less than approximately ten percent.

5. Odor problems should be minimal, and would most likely be associated with blowing dust. Curtailment of the latter should minimize the former.

6. Based on the above, the refuse materials can be mixed with "clean" fill materials for purposes of constructing highway embankments, subject to the strength and consilidation constraints of the mixture - which must be determined by suitable soils testing procedures.

RECOMMENDATIONS

1. The existing underground fires should be immediately extinguished by carefully excavating the overlying materials with a backhoe and continuously, saturating the excavated materials and exposed hold with suitable sprays of water. Adequate precautions for operating personnel should be taken. hole

2. Open fires should be prohibited (including arcs from welding) at or around the site during excavation of the refuse deposits. All motorized equipment must have adequate exhaust mufflers and should be equipped with spark arrestors. This is to prevent ignition of gasses accumulated in underground pockets.

3. Dust control during both excavation of the refuse materials and construction of the highway embankments will be mandatory. Much of the fine-grained material is combustion ash, and it can be easily transported by the wind. Adequate water sprays are recommended.

4. If the refuse materials are to be incorporated in the highway embankments, it will be necessary to limit both the overall Volatile Solids content and Moisture content to less than ten percent. The former can be accomplished by limiting the refuse proportion of the mixture to less than 40 percent of the total (i.e., 40 percent refuse, 60 percent "clean" fill). The latter can be achieved by keeping any refuse mixture above the ground water table. This means that the existing refuse deposits must be completely excavated before embankment construction to assure that no significant amounts of refuse materials are placed below the estimated future water table.

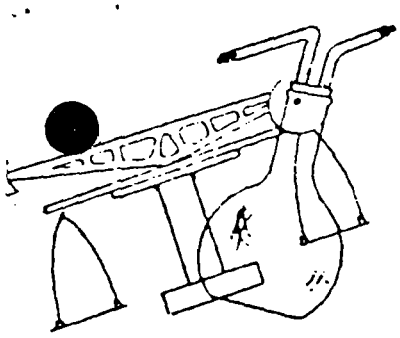
5. Suitable strength and consolidation tests should be performed on the refuse: clean-fill mixtures. It appears the only major constraints to the use of refuse materials (in addition to those specified in No. 4, above) will be the behavior of the refuse: soil mixture under load stress. In order to perform the tests in a normal soils laboratory, it will be necessary to screen the refuse samples to remove any particles larger than approximately 1/8 - inch.

APPENDICES

1. SOIL SAMPLES - Total and Volatile Solids

2. SOIL SAMPLES - BOD and Moisture

3. EXPLOSIVE GAS CONCENTRATIONS



Ford Chemical
LABORATORY, INC.
Bacteriological and Chemical Analysis
40 WEST LOUISE AVENUE
SALT LAKE CITY, UTAH 84115
PHONE 485-5761

April 20, 1977

Utah State Department
of Transportation
757 West 2nd South
ATTN: Mr. David K. Miles
Salt Lake City, UT 84104

CERTIFICATE OF ANALYSIS

77-1830

Dear Mr. Miles:

The following analysis is on samples of soils received on April 1, 1977 under P.O. No. L9601:

Sample: Soils:

Sample	Total Solids %	Volatile Total Solids at 550°C %
G-1A-5-6	93.40	22.86
G-1A-10-11	82.63	14.07
G-2A-5-6	92.49	12.35
G-2A-10-11	94.97	8.89
G-3A-5-6	91.96	11.38
G-3A-10-11	84.44	14.25
G-3A-15-16	77.42	18.60
G-4A-5-6	83.37	17.11
G-4A-10-11	86.49	8.79
G-4A-14-15	91.87	11.32
G-5A-5-6	96.11	8.89
G-5A-10-11	94.87	10.20
G-7A-5-6	94.25	14.51

	Total Solids %	Volatile Total Solids at 550°C %
G-7A-9-10	88.54	12.98
G-1B-4236	64.36	21.98
G-1B-5-6	75.91	16.21
G-2B-5-6	98.33	4.28
G-2B-10-11	88.45	12.82
G-2B-15-16	91.48	12.17
G-3B-5-6	88.38	15.71
G-3B-10-11	91.92	12.92
B-3B-15-16	85.14	14.01
G-4B-5-6	78.28	20.11
G-4B-10-11	74.66	20.10
G-4B-15-16	76.46	23.38
G-5B-5.5 + 6.5	90.73	15.49
G-5B-10-11	94.14	12.69
G-6B-5-6	93.66	8.36
G-6B-10-11	83.13	1.59
G-7B-4235	93.09	13.08
G-7B-5-6	78.94	2.46
G-8B-5-51/2	97.55	9.10
G-1C-5-6	94.58	7.44
G-1C-10-11	76.92	17.39

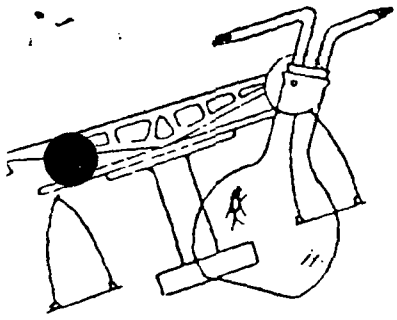
	Total Solids %	Volatile Total Solids at 550°C %
G-2C-5-6	91.33	9.74
G-2C-10-11	89.80	19.93
G-3C-5-6	90.21	13.11
G-3C-10-11	81.16	15.21
G-3C-15-16	93.36	23.18
G-5C-5-6	91.54	9.53
G-5C-10-11	82.54	11.67
G-6C-5-6	87.66	14.84
G-6C-9-10	93.55	14.66

Sincerely,

FORD CHEMICAL LABORATORY, INC.

Lyle S. Ford

LSF/jms



Ford Chemical
LABORATORY, INC.
Bacteriological and Chemical Analysts
40 WEST LOUISE AVENUE
SALT LAKE CITY, UTAH 84115
PHONE 485-5761

April 20, 1977

Utah State Department
of Transportation
757 West 2nd South
ATTN: Mr. David K. Miles
Salt Lake City, UT 84104

CERTIFICATE OF ANALYSIS
77-1829

Dear Mr. Miles:

The following analysis is on samples of soils received on April 1, 1977 under P.O. No. L9601:

Sample: Soils:

Sample:	Bio-Chemical Oxygen Demand Mg/l	Moisture %
G-1A-5-6	410.0	6.60
G-1A-10-11	385.0	17.37
G-2A-5-6	233.0	7.51
G-2A-10-11	195.0	5.03
G-3A-5-6	315.0	8.04
G-3A-10-11	412.0	15.56
G-3A-15-16	347.0	22.58
A-4A-5-6	450.0	16.63
G-4A-10-11	150.0	13.51
G-4A-14-15	290.0	8.13
G-5A-5-6	130.0	3.89
5A-10-11	132.0	5.13
G-7A-5-6	210.0	5.75

	Bio-Chemical Oxygen Demand Mg/l	Moisture %
G-7A-9-10	195.0	11.46
G-1B-4236	2,470.0	35.64
G-1B-5-6	992.0	24.09
G-2B-5-6	38.0	1.67
G-2B-10-11	1,150.0	11.55
G-2B-15-16	5,200.0	8.52
G-3B-5-6	690.0	11.62
G-3B-10-11	1,300.0	8.08
G-3B-15-16	512	14.86
G-4B-5-6	1,910.0	21.72
G-4B-10-11	1,200.0	25.34
G-4B-15-16	612.0	23.54
G-5B-5.5 + 6.5	310.0	9.27
G-5B-10-11	520.0	5.86
G-6B-5-6	240.0	6.34
G-6B-10-11	260.0	11.87
G-7B-4235	340.0	6.91
G-7B-5-6	600.0	21.06
G-8B-5-5 1/2	224.0	2.45
G-1C-5-6	640.0	5.42
G-1C-10-11	337.0	23.08

	Bio-Chemical Oxygen Demand Mg/l	Moisture %
G-2C-5-6	570.0	8.67
C-2C-10-11	372.0	10.20
G-3C-5-6	154.0	9.79
C-3C-10-11	560.0	18.84
G-3C-15-16	287.0	6.64
G-5C-5-6	270.0	8.46
G-5C-10-11	310.0	17.42
G-6C-5-6	320.0	12.34
[illegible]6C-9-10	390.0	6.45

Sincerely,

FORD CHEMICAL LABORATORY, INC.

Lyle S. Ford

LSF/jms

	Bio-Chemical Oxygen Demand Mg/l	Moisture %
G-2C-5-6	570.0	8.67
C-2C-10-11	372.0	10.20
G-3C-5-6	154.0	9.79
C-3C-10-11	560.0	18.84
G-3C-15-16	287.0	6.64
G-5C-5-6	270.0	8.46
G-5C-10-11	310.0	17.42
G-6C-5-6	320.0	12.34
G-6C-9-10	390.0	6.45

Sincerely,

FORD CHEMICAL LABORATORY, INC.

Lyle S. Ford

LSF/jms

Utah State Department
of Transportation
77-1829
April 20, 1977
Page Two

	Bio-Chemical Oxygen Demand Mg/l	1977 April	May 3		Moisture %	
G-7A-9-10	195.0		0%	0%	11.46	
G-1B-4236 10-11	2,470.0	6-7%	2.5%	9%	35.64	22.0 ✓
G-1B-5-6	992.0	T<1%	0%	0%	24.09	
G-2B-5-6	38.0	0%	0%	0%	1.67	
G-2B-10-11	1,150.0	1-2%	2.25%	1.5%	11.55	12.8
G-2B-15-16	5,200.0	6%	0%	5%	8.52	12.2
G-3B-5-6	690.0	0-1%	0%	0%	11.62	15.7
G-3B-10-11	1,300.0	8%	0%	0%	8.08	12.9
G-3B-15-16	512	18%	9%	15%	14.86	14.0
G-4B-5-6	1,910.0	20%	19% 17%	17%	21.72	20.1
G-4B-10-11	1,200.0	20%	17%	20%	25.34	20.1
G-4B-15-16	612.0	20%	17%	27%	23.54	23.4
G-5B-5.5 + 6.5	310.0		0%	0%	9.27	
G-5B-10-11	520.0		0%	0%	5.86	
G-6B-5-6	240.0		0%	0%	6.34	
G-6B-10-11	260.0	No Reading Tk ←	0%	0%	11.87	
G-7B-4235	340.0		0%	0%	6.91	
G-7B-5-6	600.0		0%	0%	21.06	
G-8B-5-5 1/2	224.0		0%	0%	2.45	
G-1C-5-6	640.0		0%	0%	5.42	
G-1C-10-11	337.0		0.7%	5%	23.08	17.4

	Bio-Chemical Oxygen Demand Mg/l	Apr 28	May 3		Moisture %	
G-2C-5-6	570.0	No Reading Taken	0%	0%	8.67	
C-2C-10-11	372.0		0.8%	0%	10.20	
G-3C-5-6	154.0		0%	0%	9.79	
C-3C-10-11	560.0		1.8%	3%	18.84	15.2
G-3C-15-16	287.0		No Probe	No Probe	6.64	
G-5C-5-6	270.0	0%	0%	0%	8.46	
G-5C-10-11	310.0	<1%	0.7%	0.7%	17.42	
G-6C-5-6	320.0		0%	0%	12.34	
G-6C-9-10	390.0	-	0.4%	0%	6.45	

Sincerely,

FORD CHEMICAL LABORATORY, INC.

Lyle S. Ford

LSF/jms

EXPLOSIVE GAS CONCENTRATIONS *

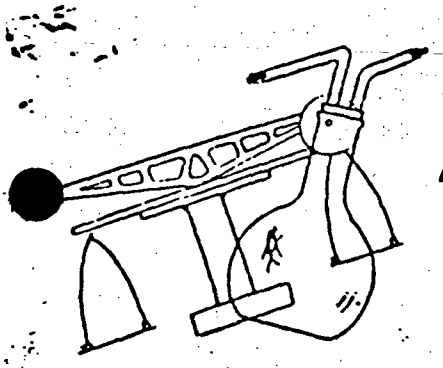
ALL VALUES ARE PERCENT BY VOLUME

PROBE NO.	28 April '77	3 May '77	5 May '77
G-1A-5-6	N.R.**	0	0
G-1A-10-11	N.R.	0.3	0
G-2A-5-6	N.R.	0	0
G-2A-10-11	N.R.	0	0
G-3A-5-6	N.R.	0	0
G-3A-10-11	N.R.	0	T<1
G-3A-15-16	N.R.	6.0	11
A-4A-5-6	N.R.	0	0
G-4A-10-11	N.R.	0	0
G-4A-14-15	N.R.	0	0
G-5A-5-6	N.R.	0	0
G-5A-10-11	N.R.	0	0
G-7A-5-6	N.R.	0	0
G-7A-9-10	N.R.	0	0
G-1B-4236	6.7	2.25	9
G-1B-5-6	T<1	0	0
G-2B-5-6	0	0	0
G-2B-10-11	1-2	2.25	1.5
G-2B-15-16	6	0	5
G-3B-5-6	0-3	0	0
G-3B-10-11	8	0	0
G-3B-15-16	18	9	15
G-4B-5-6	20	19	17
G-4B-10-11	20	17	20
G-4B-15-16	20	17	27
G-5B-1.5 + 6.5	N.R.	0	0
G-5B-10-11	N.R.	0	0
G-6B-5-6	N.R.	0	0
G-6B-10-11	N.R.	0	0

* Lower Explosive Limit is approximately 4 percent

** No Reading Taken

PROBE NO.	28 April '77	3 May '77	5 May '77
G-7B-4235	N.R.	0	0
G-7B-5-6	N.R.	0	0
G-8B-5-5 1/2	N.R.	0	0
G-1C-5-6	N.R.	0	0
G-1C-10-11	N.R.	0.7	5
G-2C-5-6	N.R.	0	0
C-2C-10-11	N.R.	0.8	0
G-3C-5-6	N.R.	0	0
C-3C-10-11	N.R.	1.8	3
G-3C-15-16	N.R.	No Probe	No Probe
G-5C-5-6	0	0	0
G-5C-10-11	<1	0.7	0.7
G-6C-5-6	N.R.	0	0
G-6C-9-10	N.R.	0.4	0



Ford Chemical
LABORATORY, INC.
Bacteriological and Chemical Analysis
40 WEST LOUISE AVENUE
SALT LAKE CITY, UTAH 84115
PHONE 485-5761

April 20, 1977

Utah State Department
of Transportation
757 West 2nd South
ATTN: Mr. David K. Miles
Salt Lake City, UT 84104

CERTIFICATE OF ANALYSIS
77-1829

Dear Mr. Miles:

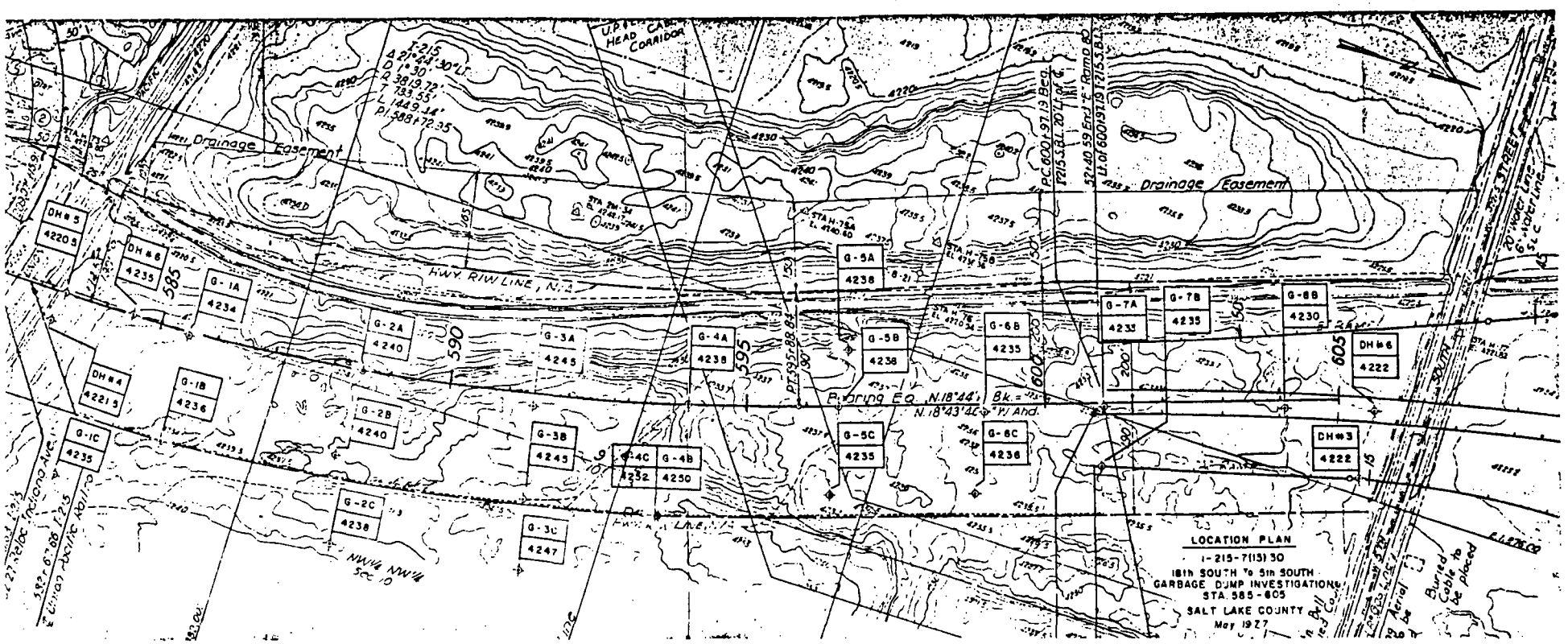
The following analysis is on samples of soils received on April 1, 1977 under P.O. No. L9601:

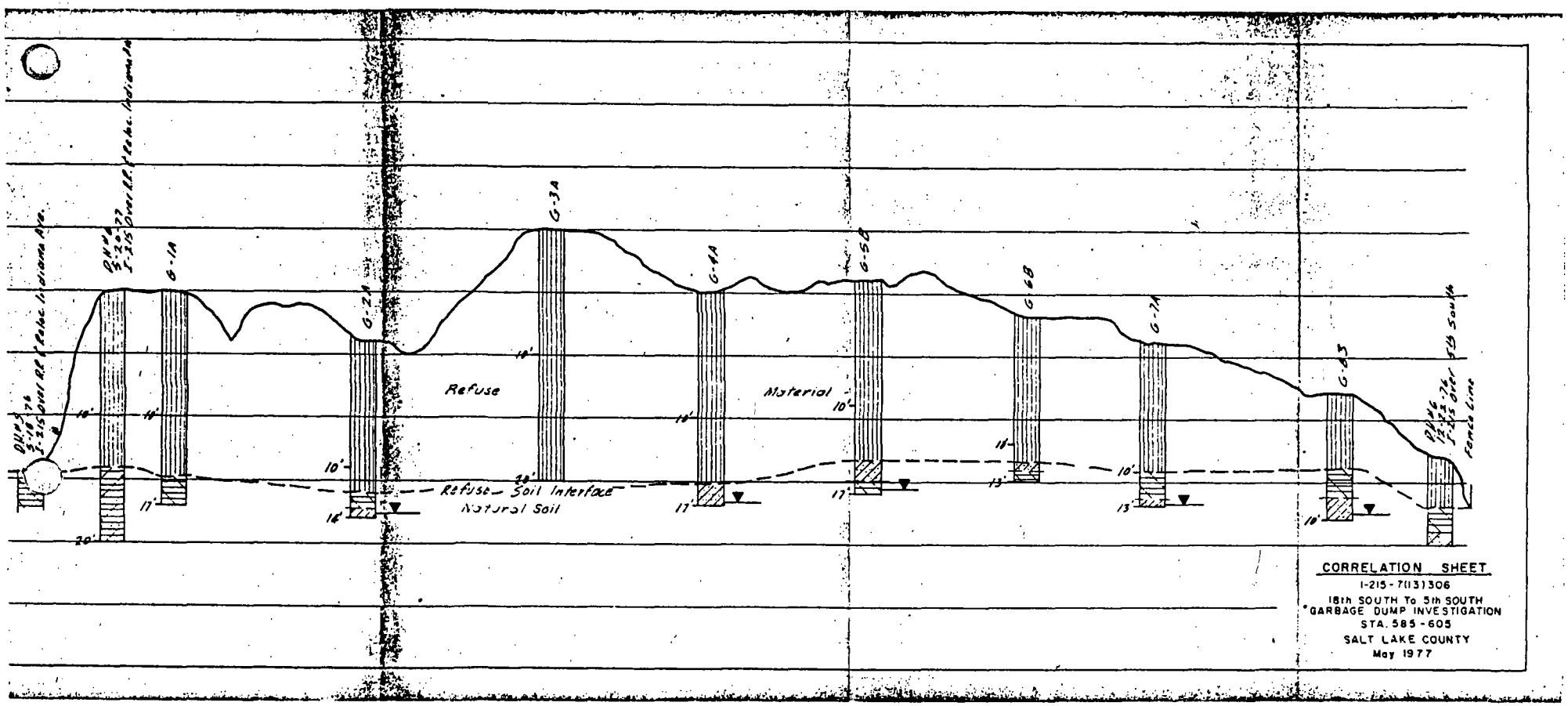
Sample: Soils:

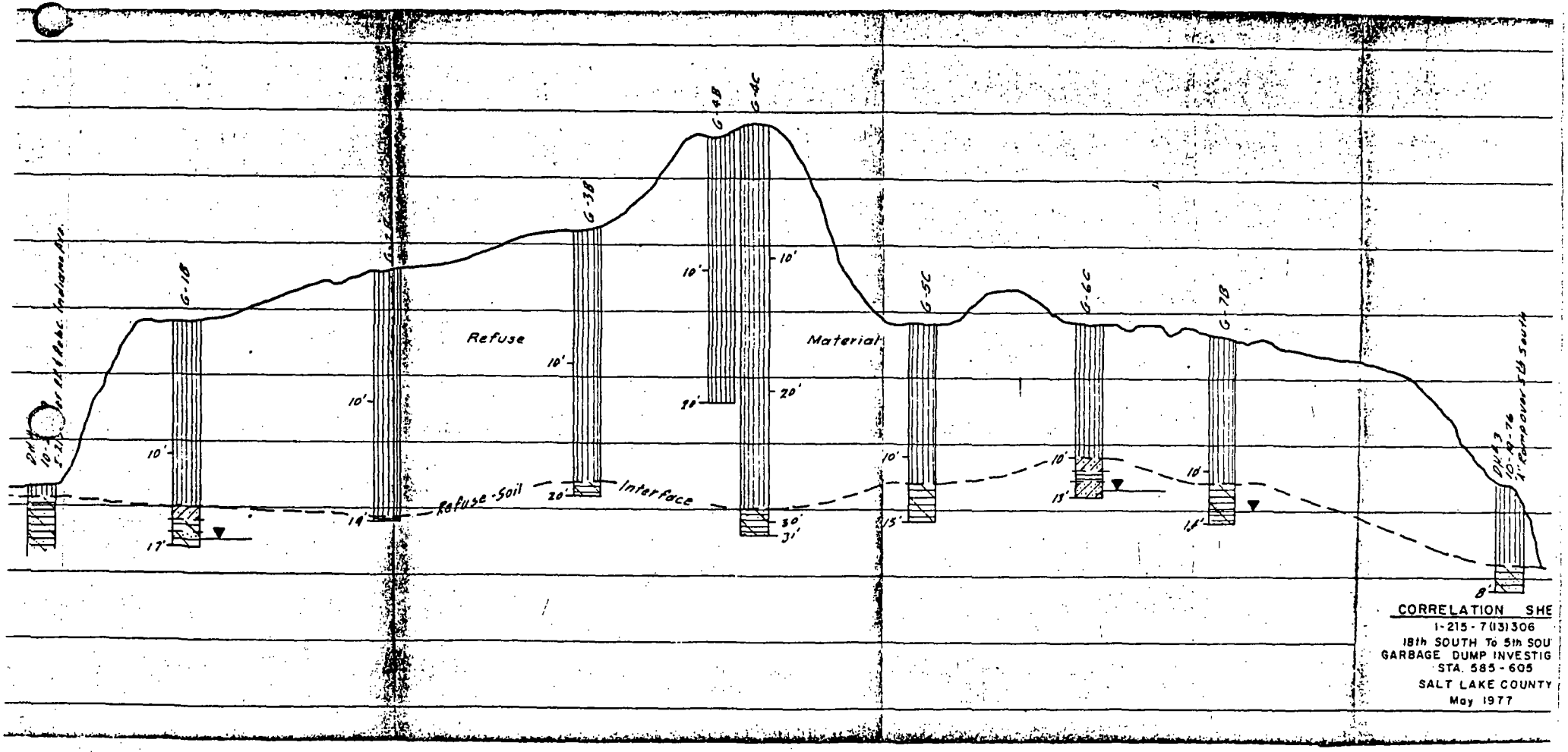
1977

Sample:	Bio-Chemical Oxygen Demand Mg/l	Apr 28	May 3	May 5	Moisture %	Vol. %
G-1A-5-6	410.0		0%	0%	6.60	
G-1A-10-11	385.0		0.3%	0%	17.37	
G-2A-5-6	233.0		0%	0%	7.51	
G-2A-10-11	195.0		0%	0%	5.03	
G-3A-5-6	315.0		0%	0%	8.04	
G-3A-10-11	412.0		0%	T<1%	15.56	
G-3A-15-16	347.0	No Readings Taken	6.2%	11%	22.58	18.6
A-4A-5-6	450.0		0%	0%	16.63	
G-4A-10-11	150.0		0%	0%	13.51	
G-4A-14-15	290.0		0%	0%	8.13	
G-5A-5-6	130.0		0%	0%	3.89	
G-5A-10-11	132.0		0%	0%	5.13	
G-7A-5-6	210.0		0%	0%	5.75	

Test Hole Number	Sample Depth (ft.)	ASSHTO CLASSIFICATION MATERIALS & RESEARCH						FORD CHEMICAL LABORATORY INC.			
		#10	#40	#200	-#200	% Moisture Content	%Volatile Solids	% Total Solids	% Volatile Total Solids at 550°C	Bio-Chemical Oxygen Demand Mg/l	% Moisture Content
G-1A	5-6	49	10	15	26	11.8	17.0	93.40	22.86	410.0	6.60
	10-11	53	14	16	17	26.7	13.0	82.63	14.07	385.0	17.37
G-1B	5-6	54	17	11	18	27.6	14.1	75.91	16.21	992.0	24.09
	10-11	75	15	5	5	57.9	23.9	64.36	21.98	2470.0	35.64
G-1C	5-6	50	13	16	21	15.5	8.3	94.58	7.44	640.0	5.42
	10-11	76	8	6	10	38.3	15.8	76.92	17.39	337.0	23.08
G-2A	5-6	50	16	15	19	12.0	16.7	92.49	12.35	233.0	7.51
	10-11	55	14	13	18	28.6	15.3	94.97	8.89	195.0	5.03
G-2B	5-6	35	19	32	14	21.0	4.3	98.33	4.28	38.0	1.67
	10-11	58	18	13	11	32.2	11.5	88.45	12.82	1150.0	11.55
	15-16	55	20	18	7	21.8	14.1	91.48	12.17	5200.0	8.52
G-2C	5-6	56	12	13	19	13.7	9.7	91.33	9.74	570.0	8.67
	10-11	53	17	12	18	34.7	23.7	89.80	19.93	372.0	10.20
G-3A	5-6	50	19	15	16	34.2	18.0	91.96	11.38	315.0	8.04
	10-11	73	13	7	7	36.8	21.8	84.44	14.25	412.0	15.56
	15-16	65	16	8	11	41.6	24.4	77.42	18.60	347.0	22.58
G-3B	5-6	56	14	14	16	22.2	17.2	88.38	15.71	690.0	11.62
	10-11	52	20	11	17	25.8	18.0	91.82	12.92	1300.0	8.08
	15-16	66	19	7	8	33.3	22.2	85.14	14.01	512.0	14.86
G-3C	5-6	60	16	11	13	19.7	14.6	90.21	13.11	154.0	9.79
	10-11	73	18	4	5	42.9	20.4	81.16	15.21	560.0	18.84
	15-16	75	15	4	6	37.3	26.2	93.36	23.18	287.0	6.64
G-4A	5-6	47	15	12	26	21.7	10.2	83.37	17.11	450.0	16.63
	10-11	48	13	13	26	25.7	6.6	86.49	8.79	150.0	13.51
	14-15	35	18	17	30	20.3	17.4	91.87	11.32	290.0	8.13
G-4B	5-6	64	16	7	13	40.4	22.4	78.28	20.11	1,910.0	21.72
	10-11	77	12	4	7	53.1	27.5	74.66	20.10	1,200.0	25.34
	15-16	79	12	2	7	66.1	34.1	76.46	23.38	612.0	23.54
G-5A	5-6	40	12	20	28	16.6	10.2	96.11	8.89	130.0	3.89
	10-11	42	15	18	25	22.4	11.2	94.87	10.20	132.0	5.13
G-5B	5.5-6.5	46	15	16	23	17.4	13.6	90.73	15.49	310.0	9.27
	10-11	48	15	13	24	16.2	16.0	94.14	12.69	520.0	5.86
G-5C	5-6	45	15	15	25	10.6	13.3	91.54	9.53	270.0	8.46
	10-11	68	17	5	10	33.5	18.5	82.54	11.67	310.0	17.42


Drainage Easement
HWY R/W LINE, N.A.
Drainage Easement
P. of ring Eq. N.18°44'
N.18°43'42"W Ahd.
Bk. =
DH #5
4220.5
DH #6
4235
DH #4
4221.5
DH #3
4222
G-1A
4234
G-1B
4236
G-1C
4235
G-2A
4240
G-2B
4240
G-2C
4238
G-3A
4245
G-3B
4245
G-3C
4247
G-4A
4238
G-4B
4250
G-4C
4232
G-5A
4238
G-5B
4238
G-5C
4235
G-6A
4235
G-6B
4235
G-6C
4236
G-7A
4235
G-7B
4235
G-8B
4230
LOCATION PLAN
I-215-7(113)30
18th SOUTH To 5th SOUTH
GARBAGE DUMP INVESTIGATIONS
STA. 585-605
SALT LAKE COUNTY
May 1977


G-1A
G-2A
G-3A
G-4A
G-5A
G-6B
G-7A
G-8A
Refuse
Material
Refuse - Soil Interface
Natural Soil
CORRELATION SHEET
1-215-7(13)306
18th SOUTH To 5th SOUTH
GARBAGE DUMP INVESTIGATION
STA. 585-605
SALT LAKE COUNTY
May 1977



CORRELATION SHE

I-215-7(13)306

18th SOUTH To 5th SOU

GARBAGE DUMP INVESTIG

STA. 585-605

SALT LAKE COUNTY

May 1977

Form R-353

Date Begun 3-15-77
Date Completed 3-15-77
Hole Diameter 6"

UTAH STATE DEPARTMENT OF HIGHWAYS
MATERIALS and TESTS DIVISION
DRILLING LOG

Hole No. G-1A
Sheet 1 of 1
Total Depth 17'

Project No. I-215-9(13)306
Project Name 18th South to 7th South Salt Lake Co.
Garbage Dump Invest.
Equation Project Line Sta / Other Line Sta.
Type of Structure
Sta. of Structure
Hole Sta. 585+50 Rt. — Ft, Lt. — Ft, of ℄ I-215
Collar Elevation 4234' Reference Plan Sheet Method Used
Field Party Howell, Miller & Sumner Rig Auger

Drilling Method	Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph

Ground Water Table

Depth in Ft.					
Time					
Date					

DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths circulation lost, observed fluctuations in water level, notes on drilling ease, bits used, etc.

Auger

DK brown to brown sandy silt with some gravel

Brown sandy silt with some glass, gravel, bricks and some organic material
(Dry to damp)

Sample
Gas Monitor

Sample
Gas Monitor

DK brown sandy silt with wood, wire, glass & organic material
(Damp to moist)

Natural Ground

Gray sandy clayey silt
(Damp to moist)

TD 17'

No Ground Water Table encountered

Form R-353

Date Begun 3-18-77
Date Completed 3-18-77
Hole Diameter 9"
Project No. I-215-9(17)206
Project Name 18th South to 5th South — Salt Lake Co.
Garbage Dump Invest.
Type of Structure
Sta. of Structure
Collar Elevation 4236'
Field Party Powell, Waller & Sasser

UTAH STATE DEPARTMENT OF HIGHWAYS
MATERIALS and TESTS DIVISION
DRILLING LOG

Hole No. G-1B
Sheet 1 of 1
Total Depth 17'
Equation — Project Line Sta. / Other Line Sta.
Hole Sta. 585 + 50 Rt. 190 Ft, Lt. — Ft, of ℄ I-215
Reference Plan Sheet Method Used
Rig Auger

Ground Water Table

Depth in Ft.					
Time					
Date					

Drilling Method	Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph	DESCRIPTION
Auger				0				Dk tan sandy silt with some gravel
				1				
				2				
				3				Brown sandy silt with metal, glass, china and wood with trace paper (Damp)
				4				
Sample Gas Monitor				5	X			
				6				
				7				
				8				
				9				
Sample Gas Monitor				10	X			Brown to dk brown sandy silt with metal, glass, wood and lawn clippings. (Damp to moist)
				1				
				2				metal cable
				3				
				4				natural ground
				5				Gray sandy silt (damp)
				6				Gray clayey silt with some thin sandy silt lenses at 16'-17'. (Wet at 16.5')
				7				TD 17'
				8				
				9				
				0				Ground Water Table encountered at 16.5'

Form R-353

Date Begun 3-22-77 | UTAH STATE DEPARTMENT OF HIGHWAYS | Hole No. G 1C
Date Completed 3-22-77 | MATERIALS and TESTS DIVISION | Sheet 1 of 1
Hole Diameter 8" | DRILLING LOG | Total Depth 14'
Project No. I-215-9(13)206
Project Name 12th South to 5th South, Salt Lake Co
Garbage Dump Invest
Type of Structure — Equation Project Line Sta. / Other Line Sta.
Sta. of Structure — Hole Sta. 584+00 Ft. 295 Ft. Lt. Ft. of ℄ I-215
Collar Elevation 4235' Reference Plan Sheet Method Used
Field Party Powell, Uhller & Sarver Rig Auger

Ground Water Table

Depth in Ft.					
Time					
Date					

Drilling Method	Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph	DESCRIPTION
Auger				0				Dk tan sandy silt with some gravel & occasional cobble. (Damp)
				2				
				3				Brown sandy silt with trace organic material brick, glass and metal (Damp)
				4				
Sample Gas Monitor				5	X			
				6				
				7				Dk brown to black sandy silt with petroleum product and trace to some wood, metal and glass. (Damp to wet)
				8				
				9				
Sample Gas Monitor				10	X			some paper
				11				A Tire
				12				natural ground Gray sandy clayey silt (Damp)
				13				
				14				Gray sandy silt with trace clay (Wet) TD 14'
				15				
				16				
				17				
				18				
				19				
				20				

Ground Water Table encountered at 13.4'

Form R-353

Date Begun 3-22-77 | UTAH STATE DEPARTMENT OF HIGHWAYS | Hole No. G 2A
Date Completed 3-22-77 | MATERIALS and TESTS DIVISION | Sheet 1 of 1
Hole Diameter 9" | DRILLING LOG | Total Depth 14'
Project No. I-215-7(12)306
Project Name 18th South to 7th South Salt Lake Co.
Garbage Dump Invest.
Equation Project Line Sta. / Other Line Sta.
Type of Structure
Sta. of Structure Hole Sta. 588+50 Rt. — Ft, Lt. — Ft, of ℄ I-215
Collar Elevation 4240' Reference Plan Sheet Method Used
Field Party Powell, Waller & Sorrie Rig Auger

Drilling Method	Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph

Ground Water Table

Depth in Ft.				
Time				
Date				

DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths circulation lost, observed fluctuations in water level, notes on drilling ease, bits used, etc.

Auger

Dk tan to brown sandy silt with trace to some glass, metal, wood and gravel (Damp)

Sample
Gas Monitor

Trace paper
(Damp)

Increasing content of wood
A few wet zones

Sample
Gas Monitor

Dk brown to black sandy silt with petroleum product with wood, glass, metal and trace gravel
Gray clayey silt
(Damp to moist)
Gray sandy silt with clay (Wet)
TD 14'

Ground Water Table encountered at 13.5'

Form R-355

Date Begun 3-22-77
Date Completed 3-22-77
Hole Diameter 9"
Project No. I-215-9(13)306
Project Name 18th South to 5th South — Salt Lake Co.
Garbage Dump Invest.
Type of Structure
Sta. of Structure
Collar Elevation 4240'
Field Party Powell, Waller & Sasser

UTAH STATE DEPARTMENT OF HIGHWAYS
MATERIALS and TESTS DIVISION
DRILLING LOG

Hole No. G-2B
Sheet 1 of 1
Total Depth 19'
Equation — Project Line Sta. / Other Line Sta.
Hole Sta. 588+50 Rt. 150 Ft, Lt. — Ft., of ℄ I-215
Reference Plan Sheet
Method Used
Rig Auger

Ground Water Table

Depth in Ft.					
Time					
Date					

DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths circulation lost, observed fluctuations in water level, notes on drilling ease, bits used, etc.

Drilling Method | Casing Depth | Blows per Foot | Sample Number | Depth in Feet | Sampling | Sample Recovery | Soil Graph

Auger

Brown sandy silt with some gravel (Damp)

pieces of concrete

Sample
Gas Monitor

Dk tan sandy silt with some layers of silty sand. (Damp)

Brown sandy silt with trace to some glass (Damp)

Dk brown to black sandy silt with petroleum product, wood and glass (Damp to wet)

Sample
Gas Monitor

Kept caving in at 12½'

trace bricks (Moist to wet)

Sample
Gas Monitor

(wet)

Gray clayey silt
Couldn't go deeper -- auger needed TD 19'
repair

No Ground Water Table encountered

Form R-353

Date Begun 3-22-77
Date Completed 3-22-77
Hole Diameter 6"

UTAH STATE DEPARTMENT OF HIGHWAYS
MATERIALS and TESTS DIVISION
DRILLING LOG

Hole No. G 2C
Sheet 1 of 1
Total Depth 17'

Pr[redacted] No. I-215-7(13)206
Pro[redacted] Name 18th South to 5th South Salt Lake Co
Garbage dump Invest
Equation Project Line Sta. / Other Line Sta.
Type of Structure
Sta. of Structure
Hole Sta. 58E+50 Rt. 200 Ft, Lt. Ft. of ℄ I-215
Collar Elevation 4228' Reference Plan sheet Method Used
Field Party Powell, Wallace & Farmer Rig Ausman

Ground Water Table

Depth in Ft					
Time					
Date					

DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths circulation lost, observed fluctuations in water level, notes on drilling ease, bits used, etc.

Drilling Method | Casing Depth | Blows per Foot | Sample Number | Depth in Feet | Sampling | Sample Recovery | Soil Graph

Auger

Dk tan to light brown sandy silt with some bricks and concrete (Dry to damp)

Sample Gas Monitor

Dk brown sandy silt with some brick and glass (Damp)

Some wood and paper (Damp)

Sample Gas Monitor

(Damp to moist)

natural ground

Gray to greyish tan sandy clayey silt grading to clayey silt. (Damp to moist)

(Wet at 16.8')

TD 17'

Ground Water Table encountered at 16.8'

Form R-353

ate Begun 3-21-77 | UTAH STATE DEPARTMENT OF HIGHWAYS | Hole No. G-2A

ate Completed 3-21-77 | MATERIALS and TESTS DIVISION | Sheet 1 of 1

ole Diameter 9" | DRILLING LOG | Total Depth 20'

r[illegible] No. I-215-7(13)306

Project Name 18th South to 5th South Salt Lake Co

Garbage Dump Invest Equation Project Line Sta. / Other Line Sta.

ype of Structure

lo. of Structure Hole Sta. 591+50 Rt. — Ft, Lt. — Ft, of ℄ I-215

ollar Elevation 4245' Reference Plan Sheet Method Used

ield Party Powell, Waller & Sarver Rig Auger

Drilling Method	Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph

Ground Water Table

Depth in Ft.				
Time				
Date				

DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths circulation lost, observed fluctuations in water level, notes on drilling ease, bits used, etc.

auger

Gray to rusty brown sandy silt with glass metal, paper and wood

(Damp)

ample
as Monitor

Dk Brown to black sandy silt with petroleum product with wood, glass and metal

(Damp to moist)

ample
as Monitor

(moist to wet)

[illegible]

ample
as Monitor

(moist to wet)

TD 20'

No Ground Water Table encountered

Form R-353

Date Begun 3-23-77 | UTAH STATE DEPARTMENT OF HIGHWAYS | Hole No. G 3B

Date Completed 3-23-77 | MATERIALS and TESTS DIVISION | Sheet 1 of 1

Hole Diameter 9" | DRILLING LOG | Total Depth 20'

Project No. I-215-9(13)206

Project Name 18th South to 5th South Salt Lake Co.

Garbage Dump Invest. Equation Project Line Sta. / Other Line Sta.

Type of Structure

Sta. of Structure Hole Sta. 591+50 Rt. 170 Ft, Lt. Ft., of ℄ I-215

Collar Elevation 4245' Reference Plan Sheet Method Used

Field Party Powell Waller & Sasser Rig Auger

Drilling Method	Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph
Auger				0			
				1			
				2			
				3			
				4			
Sample Gas Monitor				5	X		
				6			
				7			
				8			
				9			
Sample Gas Monitor				10	X		
				1			
				2			
				3			
				4			
Sample Gas Monitor				15	X		
				6			
				7			
				8			
				9			
				20			

Ground Water Table

Depth in Ft.					
Time					
Date					

DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths circulation lost, observed fluctuations in water level, notes on drilling ease, bits used, etc.

Dk brown sandy silt with wood, glass & metal rust and some gravel and trace clay. (Damp)

Dk brown to black sandy silt with petroleum product with wood and some glass & metal (Damp)

Some paper

Kept caving in

Natural Ground

Gray clayey silt (Moist)

TD 20'

No Ground Water Table encountered

Form R-353

Date Begun 3-23-77
Date Completed 3-23-77
Hole Diameter 9"
Project No. I-215-9(13)306
Project Name 18th South to 5th South — Salt Lake Co.
Garbage Dump Invest
Type of Structure
Sta. of Structure
Collar Elevation 4247'
Field Party Powell, Waller & Sasser

UTAH STATE DEPARTMENT OF HIGHWAYS
MATERIALS and TESTS DIVISION
DRILLING LOG

Hole No. G 3C
Sheet 1 of 1
Total Depth 16.5'
Equation — Project Line Sta. / Other Line Sta.
Hole Sta. 591+50 Rt. 300 Ft., Lt. Ft., of ℄ I-215
Reference Plan sheet Method Used
Rig Auger

Ground Water Table

Depth in Ft.					
Time					
Date					

Drilling Method	Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph	DESCRIPTION
Auger				0				Dk tan sandy silt and gravel
				1				
				2				
				3				Brown sandy silt with some gravel, glass paper and wood and trace scraps of metal (Damp)
				4				
Sample Gas Monitor				5	X			
				6				
				7				
				8				
				9				Dk gray sandy silt with chemical waste (Damp)
Sample Gas Monitor				10	X			
				1				Brown sandy silt with glass paper metal & wood. (Damp)
				2				
				3				
				4				Black sandy silt with petroleum products, pieces wood, glass paper and metal (Damp to moist)
Sample Gas Monitor				15	X			
				6				
				7				Couldn't auger any deeper TD 16.5
				8				
				9				
				0				No ground water table encountered

Form R-353

Date Begun 3-22-77 | UTAH STATE DEPARTMENT OF HIGHWAYS | Hole No. G 4A
Date Completed 3-22-77 | MATERIALS and TESTS DIVISION | Sheet 1 of 1
Hole Diameter 9" | DRILLING LOG | Total Depth 17'
Project No. I-215-9(12)306
Project Name 15th S to 5th S Salt Lake Co
Garbage Dump Invest
Type of Structure Equation Project Line Sta. / Other Line Sta.
Sta. of Structure Hole Sta. 594+00 Rt. — Ft, Lt. — Ft, of ℄ I-215
Collar Elevation 4238' Reference Plan sheet Method Used
Field Party Powell, Waller & Sasser Rig Auger

Ground Water Table

Depth in Ft.					
Time					
Date					

DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths circulation lost, observed fluctuations in water level, notes on drilling ease, bits used, etc.

Drilling Method | Casing Depth | Blows per Foot | Sample Number | Depth in Feet | Sampling | Sample Recovery | Soil Graph

Auger

Sample
Gas Monitor

Sample
Gas Monitor

Gas Monitor

Sample

0–1 Brown to dk brown sandy silt with some glass and trace gravel (Damp)

1–5 rust nodules, wire, glass and brick

5–10 Some wood

10–15 Trace to some clay (Damp)

15–16 Black sandy silt with petroleum product (Moist) natural ground

16–16.8 Gray silty sand to sandy silt (Moist)

16.8–17 Gray sandy silt with trace to some clay (Wet at 16.8') TD 17'

Ground Water Table encountered at 16.8'

Form R-353

Date Begun 3-22-77
Date Completed 3-22-77
Hole Diameter 9"
Project No. I-215-9(13)306
Project Name 17th South to 5th South Garbage Dump Invest
Type of Structure
Sta. of Structure
Collar Elevation 4250
Field Party Powell, Waller & Carter

UTAH STATE DEPARTMENT OF HIGHWAYS
MATERIALS and TESTS DIVISION
DRILLING LOG

Hole No. G 4R
Sheet 1 of 1
Total Depth 20'
Equation Project Line Sta. / Other Line Sta.
Hole Sta. 493+50 Rt. 190 Ft., Lt. — Ft., of ℄ I-215
Reference Plan Sheet
Method Used
Rig Rotary

Drilling Method	Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph	DESCRIPTION
Auger				0				Dk tan sandy silt with small pieces of glass and metal and some gravel
				1				
				2				Brown to dk brown sandy silt with wood, paper and some glass (Damp to moist)
				3				
				4				
Sample Gas Monitor				5	X			
				6				
				7				
				8				
				9				
Sample Gas Monitor				10	X			Dk brown to black sandy silt with petroleum product, glass, wood, china, tin cans and wire (Damp to moist)
				1				
				2				(Moist to wet)
				3				
				4				
Sample Gas Monitor				15	X			
				6				
				7				
				8				Hole Keep caving in
				9				
				20				No Ground Water Table encountered TD 20'

Ground Water Table

Depth in Ft.					
Time					
Date					

Form R-353

Date Begun 3-31-77 | UTAH STATE DEPARTMENT OF HIGHWAYS | Hole No. G-4C
Date Completed 3-31-77 | MATERIALS and TESTS DIVISION | Sheet 1 of 2
Hole Diameter 3 | DRILLING LOG | Total Depth 21'
Job No. I-215-9(13)306
Project Name 12th South to 5th South Salt Lake Co
Garbage Dump Investigation Equation Project Line Sta. / Other Line Sta.
Type of Structure
Sta. of Structure Hole Sta. 493+50 Rt. 172 Ft, Lt. — Ft, of ℄ I-215
Collar Elevation 4252 Reference Method Used
Field Party Powell, Gould & Nemeth Rig R-60L

Drilling Method	Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph

Ground Water Table

Depth in Ft.					
Time					
Date					

DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths circulation lost, observed fluctuations in water level, notes on drilling ease, bits used, etc.

Drilling Method: 3B

Casing Depth: Shelby

Sample Number: N.R.

Depth in Feet: 0 1 2 3 4 5 6 7 8 9 10 1 2 3 4 15 6 7 8 9 20

Sampling: RR

Sample Recovery

Soil Graph

Pushed casing to 15'

Brown-th dk brown sandy silt with wood, paper and some glass and metal

Dk brown to black sandy silt with petroleum product, glass, wood, tin cans and wire

No recovery

Pushed and drove casing to 20'
Cor Tire at 17.5'

Form R-353

Date Begun 3-31-77 | Hole No. G 4C
Date Completed 3-31-77 | Sheet 2 of 2
Hole Diameter 3" | Total Depth 31'

UTAH STATE DEPARTMENT OF HIGHWAYS
MATERIALS and TESTS DIVISION
DRILLING LOG

Project No. I-215-9(13)306
Project Name 12th South to 5th South, Salt Lake Co.
Gardner Lower Tunnel
Equation | Project Line Sta. | Other Line Sta.
Type of Structure
Sta. of Structure | Hole Sta. 492+60 | Rt. 122 Ft., Lt. — Ft., of ℄ I-215
Collar Elevation | Reference | Method Used
Field Party Powell, Gould & Morrison | Rig D-40G

Ground Water Table

Depth in Ft.					
Time					
Date					

Drilling Method	Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph	DESCRIPTION
Pen				20				7/6 10/6 10/6 9/6
"		29		1				No recovery
"			NP					
DC				2				Dk brown to black sandy silt with petroleum product, glass wood and glass
				3				
				4				
				25				4/6 3/6 2/6 3/6
"		5		6				No recovery
"			NP					
RB				7				Pushed casing to 30'
				8				
				9				
				30				
				1				
				2				
				3				
				4				
				5				
				6				
				7				
				8				
				9				
				0				

Form R-353

Date Begun 3-22-77
Date Completed 3-22-77
Hole Diameter 9"

UTAH STATE DEPARTMENT OF HIGHWAYS
MATERIALS and TESTS DIVISION
DRILLING LOG

Hole No. G 5A
Sheet 1 of 1
Total Depth 20'

Project No. I-215-9(13)306
Project Name 18th South to 5th South Salt Lake Co
Garbage Dump Faucet.
Equation Project Line Sta. / Other Line Sta.
Type of Structure
Sta. of Structure
Hole Sta. 596+50 Rt. — Ft, Lt. 100 Ft, of ℄ I-215
Collar Elevation 4238' Reference Plan Sheet Method Used
Field Party Powell, Waller & Sasser Rig Auger

Drilling Method	Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph

Ground Water Table

Depth in Ft.					
Time					
Date					

DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths circulation lost, observed fluctuations in water level, notes on drilling ease, bits used, etc.

Auger

Dk tan to dk brown sandy silt with trace gravel and glass (Damp)

Sample
Gas Monitor

Dk brown sandy silt with trace glass and gravel (Damp)

Sample
Gas Monitor

Dk tan silty sand with rust (Damp)

Dk brown sandy silt with trace glass & metal

Dk tan to rusty light brown silty sand with trace to some gravel, rust and glass at 16.5' to 18'

Natural ground

Tan clayey silt (Damp to moist)

No Ground Water Table encountered TD 20'

Form R-353

Date Begun 3-18-77 | UTAH STATE DEPARTMENT OF HIGHWAYS | Hole No. G 5B
Date Completed 3-18-77 | MATERIALS and TESTS DIVISION | Sheet 1 of 1
Hole Diameter 9" | DRILLING LOG | Total Depth 17'
Project No. I-215-9(17)206
Project Name 18th South to 5th South Salt Lake Co.
Courtesy Dump Invest.
Equation Project Line Sta. / Other Line Sta.
Type of Structure
Sta. of Structure Hole Sta. 596+50 Rt. — Ft, Lt. — Ft, of ℄ I-215
Collar Elevation 4238' Reference Plan Sheet Method Used
Field Party Powell, Waller & Sarver Rig Auger

Drilling Method	Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph

Ground Water Table

Depth in Ft.					
Time					
Date					

DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths circulation lost, observed fluctuations in water level, notes on drilling ease, bits used, etc.

Auger

Dk tan to brown sandy silt with paper, metal and glass
(Damp)

Sample & Monitor

with some wood & cinders
(Damp)

Sample & Monitor

With Rubber and paper
(Damp)

(Moist)

natural ground

Gray sandy silt to sandy silt with clay
(Damp to moist)

Gray clayey silt with sand
(wet)

TD 17'

Ground Water Table encountered at 16'

Form R-353

Date Begun 3-22-77
Date Completed 3-22-77
Hole Diameter 9"
Project No. I-215-9(13)306
Project Name 18th South to 5th South; Salt Lake Co
Garbage Dump Invest.
Type of Structure
Sta. of Structure
Collar Elevation 4225'
Field Party Powell, Waller & Sarver

UTAH STATE DEPARTMENT OF HIGHWAYS
MATERIALS and TESTS DIVISION
DRILLING LOG

Hole No. G 5C
Sheet 1 of 1
Total Depth 15'
Equation
Project Line Sta.
Other Line Sta.
Hole Sta. 596+50 Rt. 150 Ft., Lt. — Ft., of ℄ I-215
Reference Plan Sheet
Method Used
Rig Auger

Ground Water Table

Depth in Ft.					
Time					
Date					

Drilling Method	Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph	DESCRIPTION
Auger				0				Dk tan to brown sandy silt (Damp)
				1				
				2				Dk tan to brown sandy silt with trace to some glass, wood, china and layers of metal rust throught. (Damp)
				3				
				4				
Sample for Monitor				5	X			
				6				
				7				
				8				
				9				
Sample for Monitor				10	X			Dk brown to black sandy silt with petroleum product. Trace to some glass, wood, china and metal. (Moist to wet)
				1				
				2				natural ground
				3				Grayish dk tan clayey silt (Damp to moist)
				4				
				5				TD 15'
				6				
				7				
				8				
				9				
				0				

No ground water table encountered

Form R-353

Date Begun 3-21-77
Date Completed 3-21-77
Hole Diameter 11

UTAH STATE DEPARTMENT OF HIGHWAYS
MATERIALS and TESTS DIVISION
DRILLING LOG

Hole No. G 6P
Sheet 1 of 1
Total Depth 12'

Project No. I-215-9(13)306
Project Name 12th South to 5th South Salt Lake Co.
Garbage Dump Invest
Equation Project Line Sta. / Other Line Sta.
Type of Structure
Sta. of Structure
Hole Sta. 599+00 Rt. 10 Ft, Lt. — Ft, of ℄ I-215
Collar Elevation 4235' Reference Plan Sheet Method Used
Field Party Powell Waller & Spencer Rig Auger

Ground Water Table

Depth in Ft.					
Time					
Date					

DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths circulation lost, observed fluctuations in water level, notes on drilling ease, bits used, etc.

Drilling Method | Casing Depth | Blows per Foot | Sample Number | Depth in Feet | Sampling | Sample Recovery | Soil Graph

Auger

Dk tan sandy silt with some gravel

Dk tan to brown sandy silt with some gravel, glass, metal and paper

Sample
Gas Monitor

Some slag

Sample
Gas Monitor

natural ground
Tan sandy silt with trace clay (Damp)

Tan clayey silt with trace sand (Damp)
TD 12'

No Ground Water Table encountered

Form R-355

Date Begun 3-21-77 | UTAH STATE DEPARTMENT OF HIGHWAYS | Hole No. G 6C
Date Completed 3-21-77 | MATERIALS and TESTS DIVISION | Sheet 1 of 1
Hole Diameter 4" | DRILLING LOG | Total Depth 12'
Project No. I-215-9(13)306
Project Name 18th South to 5th South — Salt Lake Co.
Garbage Lagoon Invest
Type of Structure — Equation Project Line Sta. / Other Line Sta.
Sta. of Structure — Hole Sta. 599+00 Rt. 150 Ft, Lt. — Ft, of ℄ I-215
Collar Elevation 4236 — Reference Plan Sheet — Method Used
Field Party Powell, Waller & Sorcer — Rig Buyer

Drilling Method	Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph

Ground Water Table

Depth in Ft					
Time					
Date					

DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths circulation lost, observed fluctuations in water level, notes on drilling ease, bits used, etc.

Auger

Dk tan sandy silt with some gravel and trace glass (Dry to damp)

Dk tan to brown sandy silt with trace to some glass, metal and wood

Sample Gas Monitor

Brown sandy silt with glass wood metal and trace clay

Sample Gas Monitor

Natural ground
Tan sandy silt with some clay to clayey silt with some sand. (Damp to moist)

(wet at 12')
Gray sandy silt with clay (wet)

TD 12.5'

Ground Water Table encountered at 12'

Form R-353

UTAH STATE DEPARTMENT OF HIGHWAYS
MATERIALS and TESTS DIVISION
DRILLING LOG

Hole No. G 7A
Sheet 1 of 1
Total Depth 13'

n 3-21-77
pleted 3-21-77
neter 5"

I-215-9(12)206
12th South to 5th South Salt Lake Co
-base Dump Invert.
Equation Project Line Sta. / Other Line Sta.
ructure
ructure Hole Sta. 601+00 Rt. — Ft, Lt. — Ft, of ℄ I-215
vation 4233' Reference Plan Sheet Method Used
y Powell, Waller & Sasser Rig Auger

Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph
			0			
			1			
			2			
	-		3			
			4			
			5	X		
to			6			
			7			
			8			
			9			
			10	X		
			1			
nter			2			
			3			
			4			
			5			
			6			
			7			
			8			
			9			
			0			

Ground Water Table

Depth in Ft.					
Time					
Date					

DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths circulation lost, observed fluctuations in water level, notes on drilling ease, bits used, etc.

Dk tan to brown sandy silt with some gravel, glass, metal, brick and wood (Dry to damp)

Some paper

Brown sandy silt with wood, cloth and wire

Natural Ground
Gray clayey silt
(Damp to moist)

Gray sandy silt with clay (wet) TD 13'

Ground Water Table encountered at 12.5'

Test Report
Settlement Report
Classification

Form R-353

Date Begun 2-21-77
Date Completed 2-21-77
Hole Diameter 9"
Project No. I-215-7(13)206
Project Name 12th South to 5th South Salt Lake Co.
Garbage Dump Invest.
Type of Structure
Sta. of Structure 4235'
Collar Elevation
Field Party Powell, Waller & Carter

UTAH STATE DEPARTMENT OF HIGHWAYS
MATERIALS and TESTS DIVISION
DRILLING LOG

Hole No. G 7B
Sheet 1 of 1
Total Depth 14'
Equation Project Line Sta. / Other Line Sta.
Hole Sta. 601+00 Rt. 100 Ft, Lt. — Ft, of ℄ I-215
Reference Plan Sheet Method Used
Rig Diesel

Drilling Method	Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph
auger				0			
				1			
				2			
				3			
				4			
				5	X		
[redacted] to OS Monitor				6			
				7			
				8			
				9			
				10	X		
Sample to Monitor				1			
				2			
				3			
				4			
				5			
				6			
				7			
				8			
				9			
				0			

Ground Water Table

Depth in Ft.					
Time					
Date					

DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths circulation lost, observed fluctuations in water level, notes on drilling ease, bits used, etc.

Dk tan to brown sandy silt with some paper wood and metal.
(Dry to damp)

(Damp)

Dk brown to black sandy silt with petroleum product with grass, wood and metal.
(Moist with wet zones)

Gray clayey silt with some thin lenses sandy silt at 13'-14' (lenses are wet)

TD 14'

Ground Water Table encountered at 13'

Form R-353

Date Begun 3-22-77
Date Completed 3-22-77
Hole Diameter 9"
Proj. No. I-15-9(12)206
Proj. Name 14th South to 5th South
Garbage Dump Invest.
Salt Lake Co.
Type of Structure
Sta. of Structure
Collar Elevation 4230'
Field Party Powell, Waller & Sasser

UTAH STATE DEPARTMENT OF HIGHWAYS
MATERIALS and TESTS DIVISION
DRILLING LOG

Hole No. G 9E
Sheet 1 of 1
Total Depth 10'
Equation Project Line Sta. / Other Line Sta.
Hole Sta. 604+00 Rt. — Ft, Lt. — Ft., of ℄ I-215
Reference Plan Sheet Method Used
Rig Dietz

Ground Water Table

Depth in Ft.					
Time					
Date					

Drilling Method	Casing Depth	Blows per Foot	Sample Number	Depth in Feet	Sampling	Sample Recovery	Soil Graph	DESCRIPTION
auger				0				Light brown sandy silt with some gravel and trace glass (Damp)
				1				
				2				
				3				Light brown sandy silt with glass and metal with some gravel (Damp)
as Monitor				4				
sample				5				
				6				natural ground
				7				Greyish dk tan sandy clayey silt (Damp to moist)
				8				
				9				Greyish dk tan sandy silt with trace to some clay (Wet)
				10				TD 10'
				1				
				2				
				3				
				4				
				5				
				6				
				7				
				8				
				9				
				0				

Ground Water Table encountered at 9.5'

UTAH DEPARTMENT OF TRANSPORTATION

Materials and Research

Report of Site Investigation

DATE: May 31, 1977

Project Number: I-215-9(13)306

Project Name: 18th South to 5th South
Garbage Dump Investigation

Stationing: 584+00 to 607+00

County: Salt Lake

Geologist: Keith Powell

In accordance with agreements made between the Utah Department of Transportation and consultant Dr. David Eckhoff, we have provided test hole drilling, sampling, installation of gas monitoring probes and laboratory testing on the subject project.

The purpose of Dr. David Eckhoff's preliminary investigation of the abandoned garbage dump site situated on the I-215 Route is as follows:

1. Ascertain the relative hazards of performing heavy construction activity in and around the decomposing refuse deposit.

2. Preliminary development of acceptable means of removing existing refuse deposits and placing them within the new freeway right-of-way.

Major concerns in this regard, as stated by Dr. Eckhoff are: explosive gases, odors from decomposing refuse, blowing residue, and the minimization of future problems associated with structural stability and gas generation.

The abandoned garbage dump site is bounded by Indiana Ave, 5th South 1900 West and 2100 West. It is situated on the west side of Salt Lake City, in the SE¼ SE¼, Section 4; NW¼ NW¼ Section 10 and the NE¼ NE¼ Section 9, Township 1 South, Range 1 West, SLB&M, Salt Lake County. (See Attached Location Plan.)

Dumping of refuse at this site began in approximately 1923 and continued until it was closed to public dumping in 1962. The Salt Lake City parks Department still does selective dumping of some solid waste materials on the east portion of the refuse site.

To aid in the investigation as proposed by Dr. David Eckhoff, one rotary hole and nineteen auger holes were drilled at specified locations on the I-215 Route. (See Attached Location Plan). These test holes were used to determine the following:

1. Thickness of the refuse
2. Elevations of the refuse-natural ground interface
3. Monitoring of gases
4. Analysis of samples
5. Ground Water Level

One foot samples were taken at five foot intervals in the refuse material. Monitoring gas probes were placed at the depths from which the samples were taken. The test holes were then filled with fine to medium sand with a layer of clay between each gas probe.

The thickness of the refuse material varies from one foot to 28.8 feet in Test Hole G-4C. It is assumed from the surrounding area that the original ground surface was nearly flat, but due to dozer work etc., the refuse-natural ground interface now undulates between elevations of 4216' to 4224: A petroleum-like substance was found to be present in some of the refuse materials. (See Attached Correlation Sheet).

The testing program set up to fulfill the requirments proposed by Dr. Eckhoff is as follows:

Sieve Analysis

Water Content

Volatile Solids

Bio-chemical Oxgen Demand

The sieve analysis, moisture content and volatile solids testing were performed by the UDOT Central Laboratory, Materials and Research Section. Ford Chemical Laboratory, Incorporated, did further testing of the volatile solids and the Bio-chemical Oxygen Demand testing. These test results are tabulated on the attached sheet.

E Mar 77

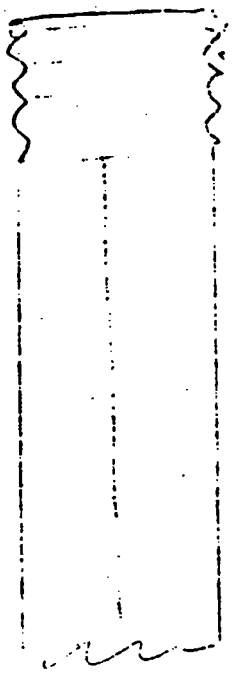
Utah DOT - 5th So/I-215 Garfield Dump

Location of Test Holes & Gas Probes

Hole No.	Location	Elev	No. Probes - Depths*
G-1A	585+50, ℄	4234	2 - 5', 10'
G-1B	"	200' Rt ℄ 4236'	3 - 5', 10', 15'
G-1C	584+00,	300' Rt ℄ 4234'	2 - 5', 10'
G-2A	588+50, ℄	4240'	3 - 5, 10', 15'
G-2B	"	150' Rt ℄ 4240'	3 - "
G-2C	"	300' Rt ℄ 4238'	3 - "
G-3A	591+50 ℄	4243	4 - 5', 10', 15', 20'
G-3B	"	150' Rt ℄ 4244	4 - "
G-3C	"	300' Rt ℄ 4247	4 - "
G-4A	593+50 ℄	4243	4 - 5', 10', 15', 20'
G-4B	"	200' Rt ℄ 4250	4 - "
G-5A	596+50	100' Lt ℄ 4233	2 - 5', 10'
G-5B	" ℄	4238	2 - "
G-5C	"	150' Rt ℄ 4235	2 - "
G-6A	599+00	100' Lt ℄ 4232	2 - 5', 10'
G-6B	" ℄	4234	2 - " -
G-6C	"	150' Rt ℄ 4236	2 - "
G-7A	602+00	50' Lt ℄ 4232	2 - 5', 10'
G-7B	"	100' Rt ℄ 4235	2 - "
G-8A	604+00	100' Lt ℄ 4228	1 - 5'
G-8B	" ℄	4230	1 - "
G-8C	"	100' Rt ℄ 4229	1 - "

* Below soil cover/garbage interface

Utah DOT - SO Co/I-215 Garbo Dump 9 Mar 17
Date



CMP cap w/lid

Auger to O.G (if possible)

Log all holes

Determine W.T.

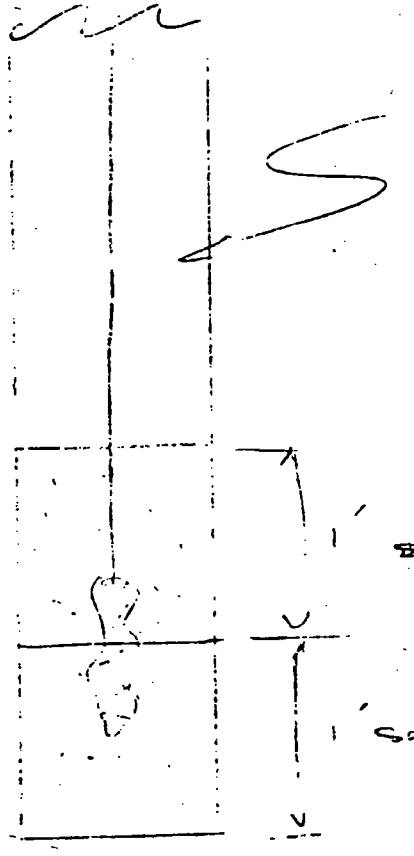
Sample at probe locations

Plastic wrap all samples

color code the probe leads

reference the test hole datum to the top of the cap.

If water, don't install probe



(if possible) be rel. impermeable tamped

1' sand (above)

probe location

1' sand (below)

overall sand depth ~ 33"

Form R-256
(L-1 Rev. 1-66)

UTAH STATE DEPARTMENT OF HIGHWAYS

MATERIALS AND TESTS DIVISION

TEST REPORT

PROJECT NAME 18TH SOUTH TO 5TH SOUTH GARBAGE DUMP INVESTIGATION PROJECT NO. 423-330 I-215-9(13)306

DATES: SAMPLED _____ RECEIVED 4-6 TO 4-13-77 REPORTED 4-20-77

SUBMITTED BY LOREN RAUSHER, CENTRAL LAB.

REPORT ON SAMPLE OF

LABORATORY NO. :
NAME OF MATERIAL :
SOURCE OF MATERIAL : OLD GARBAGE DUMP
EXAMINED FOR : BELOW

IDENTIFICATION MARKS :
QUANTITY REPRESENTED :
LOCATION :

TEST RESULTS

– 40 SCREENED FROM – 4 MATERIAL

SAMPLE	DEPTH FT.	MOISTURE %	VOLATILE MATTER %
G- 2-A	5-6	3.2	16.7
G- 2-A	10-11	2.5	15.3
G- 2-B	5-6	1.4	4.3
G- 2-C	10-11	2.6	23.7
G- 3-A	5-6	3.3	18.0
G- 3-C	5-6	2.4	14.6
G- 3-C	15-16	1.8	26.2
G- 4-B	5-6	2.5	22.4
G- 6-C	9-10	1.6	10.1
G- 7-A	5-6	3.2	16.1
G- 7-B	10-11	2.6	16.8
G- 8-B	5-5.5	1.7	7.7
	– 4 MATERIAL PULVERIZED TO – 40		
G- 1-A	5-6	3.1	17.0
G- 1-A	10-11	2.6	13.0
G- 1-B	5-6	2.4	14.1
G- 1-B	10-11	3.8	23.9

BY Clone K. Bishop
MATERIALS ENGINEER

Form R-256
(L-1 Rev. 1-66)

UTAH STATE DEPARTMENT OF HIGHWAYS

MATERIALS AND TESTS DIVISION

TEST REPORT

PROJECT NAME 18TH SOUTH TO 8TH SOUTH GARBAGE DUMP INVESTIGATION PROJECT NO 423-330 I-215-9(13)306

DATES: SAMPLED _____ RECEIVED 4-6 TO 4-13-77 REPORTED 4-20-77

SUBMITTED BY LOREN RAUSHER, CENTRAL LAB.

REPORT ON SAMPLE OF

LABORATORY NO. :
NAME OF MATERIAL :
SOURCE OF MATERIAL : OLD GARBAGE DUMP
EXAMINED FOR : BELOW

IDENTIFICATION MARKS :
QUANTITY REPRESENTED :
LOCATION :

TEST RESULTS

SAMPLE	DEPTH	MOISTURE %	VOLATILE MATTER %
G-1-C	5-6	1.5	8.3
G-1-C	10-11	1.9	15.8
G-2-B	10-11	2.1	11.5
G-2-B	15-16	1.2	14.1
G-2-C	5-6	2.0	9.7
G-3-A	10-11	2.5	21.8
G-3-A	15-16	3.0	24.4
G-3-B	5-6	2.9	17.2
G-3-B	10-11	1.9	18.0
G-3-B	15-16	2.9	22.2
G-3-C	10-11	1.9	20.4
G-4-A	5-6	2.4	10.2
G-4-A	10-11	1.4	6.6
G-4-A	14-15	1.9	17.4
G-4-B	10-11	2.8	27.5
G-4-B	15-16	2.9	34.1

BY Glenn K. Bishop
MATERIALS ENGINEER

Form R-256
(L-1 Rev. 1-66)

UTAH STATE DEPARTMENT OF HIGHWAYS

MATERIALS AND TESTS DIVISION

TEST REPORT

PROJECT NAME 18TH SOUTH TO 8TH SOUTH GARBAGE DUMP INVESTIGATION PROJECT NO 423-330 I-215-9(13)306

DATES: SAMPLED _____ RECEIVED 4-6 TO 9-13-77 REPORTED 4-20-77

SUBMITTED BY LOREN RAUSHER, CENTRAL LAB.

REPORT ON SAMPLE OF

LABORATORY NO. :
NAME OF MATERIAL :
SOURCE OF MATERIAL : OLD GARBAGE DUMP
EXAMINED FOR : BELOW

IDENTIFICATION MARKS :
QUANTITY REPRESENTED :
LOCATION :

TEST RESULTS

SAMPLE	DEPTH	MOISTURE %	VOLATILE MATTER %
G-5-A	5-6	2.4	10.2
G-5-A	10-11	2.6	11.2
G-5-B	5.5-6.5	3.0	13.6
G-5-B	10-11	2.4	16.0
G-5-C	5-6	3.1	13.3
G-5-C	10-11	2.7	18.5
G-6-B	5-6	2.9	12.1
G-6-B	10-11	2.8	11.0
G-6-C	5-6	2.8	15.3
G-7-A	9-10	2.7	15.3
G-7-B	5-6	4.9	22.3

BY Clyde K. Bishop
MATERIALS ENGINEER

APPENDIX C

Monitor Well Logs

DRILLING RECORD

PROJECT REDWOOD ROAD DUMP | JOB NO. FUT0169SAA | DATE 3-21-91
WELL/BORING RW-MW-1 | LOCATION SALT LAKE CITY, UTAH | LOGGER C. SCHMIDT
DRILL METHOD B-80 MOBILE AUGER | NORTH WEST CORNER OF PROP. | PAGE 1 of 1
WATER LEVEL FIRST ENCOUNTERED ▽ | FINAL ▼ 11.0 G.L. | DRILL CONTRACTOR BOYLES BROS.

WELL CONSTRUCTION (STICK UP (inner csg) = +1.0)		LITHOLOGICAL DESCRIPTION (SURFACE ELEVATION= 4229.30; units in feet, except as noted)	SAMPLE RECOVERY %	BLOW COUNTS	HNU-OVA PPM	NOTES
PROTECTIVE STEEL CASING WITH LOCKING CAP SET IN NEAT CEMENT		BROWN, DARK BROWN SAND, SILTY, ABUNDANT REFUSE (GLASS, ETC.)	30	6 13 35	BKGD	
BENTONITE SEAL: 1/4" TABLETS, HYDRATED	5.0	REFUSE DEBRIS (BRICK, GLASS, ETC.)	50	10 19 16	BKGD	5
2"ID STAINLESS STEEL CASING, FLUSH THREADED, 304, SCH 5	7.0					
	9.0	9.0 TAN - LIGHT GRAY SAND, FINE - VERY FINE GRAINED, SILTY, LAMINATIONS OF GRAY CLAY	60	4 3 6	BKGD	10
SAND PACK: COLORADO SILICA, 10-20 MESH		TAN - GRAY CLAY, SILTY, GRADES TO TAN SILTY SAND, VERY FINE TO FINE GRAINED, TRACE ORANGE STAINING	80	2 2 7	BKGD	15
2"ID STAINLESS STEEL SCREEN, FLUSH THREADED, 304, SCH 5, .010 SLOT		GRAY, DARK GRAY SAND, MEDIUM GRAINED, SILTY, THICK LAMINATIONS OF GRAY CLAY	80	2 3 10	BKGD	20
		22.6 GRAY CLAY, LAMINATIONS OF SAND, MEDIUM TO COARSE GRAINED				
TOTAL DEPTH OF WELL	24.0	24.0 TOTAL DEPTH OF BORING	100	1 1 2	BKGD	

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1776 S. Jackson, #200
Denver, Colorado 80210

RW-MW-1

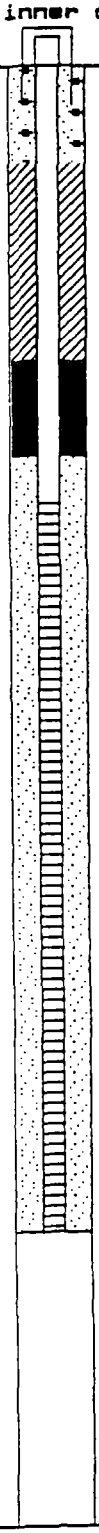
DRILLING RECORD

OJECT REDWOOD ROAD DUMP | JOB NO. FUT0169SAA | DATE 3-19-91

ILL/BORING RW-MW-2 | LOCATION SALT LAKE CITY, UTAH | LOGGER K. MACKEY

ILL METHOD B-80 MOBILE AUGER | NORTH CENTRAL BDRY. OF SITE | PAGE 1 of 1

AT EVEL FIRST ENCOUNTERED ▽ | FINAL ▼ 9.5 G.L. | DRILL CONTRACTOR BOYLES BROS.



LITHOLOGICAL DESCRIPTION (SURFACE ELEVATION= 4229.49, units in feet, except as noted)	SAMPLE	RECOVERY %	BLOW COUNTS	HNU-OVA PPM	NOTES
Dark brown silty soil, abundant pebbles, abundant refuse (glass, plastic, etc.)		30	7 18 18	BKGD	
2.8					
Dark brown silt, laminations of light brown and orange/red sand, very fine grained, abundant refuse material, trace pebbles		30	4 2 3	BKGD	5
10.0		100	3 4 6	BKGD	10
Light brown, dark gray sand, fine grained, silty, rust colored in part, blue clay in bottom 2" of sample					
Tan/light brown clay, silty, trace orange staining, grades downward to sand, medium - coarse grained, blue clay in bottom 2" of sample		100	6 10 5	BKGD	Overall spoon appearance is black and oily. 15
Dark gray clay, silty, laminations of fine grained to silty sand		100	1 1 1	BKGD	20
Light gray/gray clay, silty, grades downward to black clay		90	2 2 1	BKGD	OVA= 20ppm> BKGD when slice sample open. OVA= BKGD in breathing zone.
Total depth of boring					

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Denver, Colorado 80210

RW-MW-2

DRILLING RECORD

PROJECT REDWOOD ROAD DUMP | JOB NO. FUT0169SAA | DATE 3-19-91
WELL/BORING RW-MW-3 | LOCATION SALT LAKE CITY, UTAH | LOGGER K. MACKEY
DRILL METHOD B-80 MOBILE AUGER | WEST BOUNDRY BY I 215. | PAGE 1 of 2
WATER LEVEL FIRST ENCOUNTERED ▽ 19.0 G.L. | FINAL ▽ 12.0 G.L. | DRILL CONTRACTOR BOYLES BROS.

WELL CONSTRUCTION (STICK UP (inner csg) = +2.0)		LITHOLOGICAL DESCRIPTION (SURFACE ELEVATION= 4241.06; units in feet, except as noted)	SAMPLE RECOVERY %	BLOW COUNTS	HNU-OVA PPM	NOTES
Protective steel casing with locking cap set in neat cement.	2.0	Dark brown, light brown sand, silty, abundant refuse (glass, plastic, etc.)	70	10 15 15	BKGD	
2"ID stainless steel casing, flush threaded, 304, sch 5.		Black sand, sooty appearing, melted refuse, lare gravel clasts	50	3 2 4	BKGD	Apparent burning of dump material. 5
Cement / bentonite slurry.	10.0		10	2 2 3	BKGD	As above. 10
		Black sooty gravel, intermixed with burned organic material (wood chips)				
Bentonite seal: 1/4" tablets, hydrated.	14.0		50	17 7 14	BKGD	15
	16.0	Refuse (rubber, metal, etc.)				
	16.6					
	18.0					
Sand pack: colorado silica, 10 - 20 mesh.		Blue/gray clay, silty, black mottled	60	3 6 8	BKGD	20
		Light gray - tan clay, silty, orange staining, trace burned wood	50	4 7 14	~1ppm	25
2"ID stainless steel screen, flush threaded, 304, sch 5, .010 slot		Gray, dark gray clay, silty, silt laminations	90	2 5	BKGD	No methane was detected prior 30

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Denver, Colorado 80210

RW-MW-3

DRILLING RECORD

PROJECT REDWOOD ROAD DUMP | JOB NO. FUT0169SAA | DATE 3-19-91

WELL/BORING RW-MW-3 | LOCATION SALT LAKE CITY, UTAH | LOGGER K. MACKEY

DRILL METHOD B-80 MOBILE AUGER | WEST BOUNDRY BY I 215. | PAGE 2 of 2

WATER LEVEL FIRST ENCOUNTERED ▽ 19.0 G.L. | FINAL ▼ 12.0 G.L. | DRILL CONTRACTOR BOYLES BROS.

WELL CONSTRUCTION DETAILS		LITHOLOGICAL DESCRIPTION		SAMPLE	RECOVERY %	BLOW CTS	HNU-OVA PPM	NOTES
						2		to sample collection, after sample collection methane (presumed) =60ppm> BKGD in hole.
	33.0							
Total depth of well.	34.0	34.0	Gray, dark gray clay, silty					
			Total depth of boring		100	1 2 3	6ppm	

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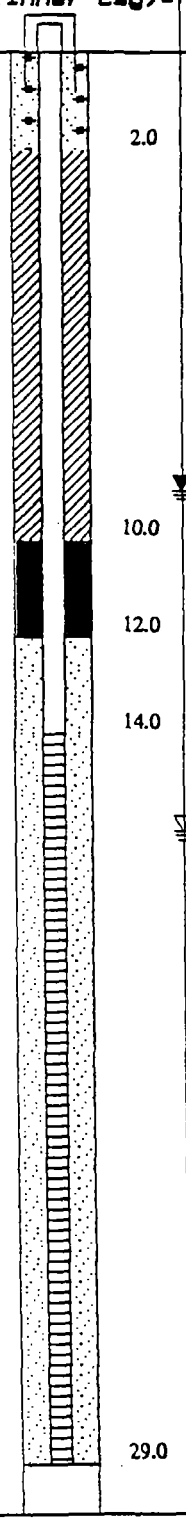
Denver, Colorado 80210

RW-MW-3

DRILLING RECORD

PROJECT: REDWOOD ROAD DUMP
WELL/BORING: RW-MW-4
DRILL METHOD: B-80 MOBILE AUGER
WATER LEVEL FIRST ENCOUNTERED: ▽ 16.0 G.L.
JOB NO.: FUT0169SAA
LOCATION: SALT LAKE CITY, UTAH
NORTHWEST OF I 215
FINAL: ▽ 9.0 G.L.
DATE: 3-21-91
LOGGER: K. MACKEY
PAGE: 1 of 1
DRILL CONTRACTOR: BOYLES BROS.



LITHOLOGICAL DESCRIPTION (SURFACE ELEVATION= 4233.08 units in feet, except as noted)	SAMPLE RECOVERY %	BLOW COUNTS	HNU-OVA PPM	NOTES
Brown - gray silt, abundant gravel, abundant refuse (glass, pottery), grades downward to gray silty clay.	60	3 19 16	BKGD	
Black silt, gravelly, abundant refuse material (glass, etc.).	50	3 2 3	1ppm	OVA= 1ppm> BKGD in hole, HNu= BKGD in hole.
Black gravel.	10	2 1 2	5ppm	OVA= 5ppm> BKGD in hole, HNu= BKGD.
Dark gray, green-gray clay, silty.	60	3 7 11	20ppm	OVA= 20ppm> BKGD in hole, HNu= BKGD.
Green/gray silt, clayey, trace orange staining.	80	2 3 7	50ppm	OVA= 40-50ppm> BKGD in hole, HNu= BKGD.
Gray silt , clayey, trace orange staining.	100	5 5 7	20ppm	OVA= 20ppm> BKGD in hole, HNu= BKGD.
Gray, dark gray sand, fine grained, silty, trace organic material, micaceous.	80	4 7 8	BKGD	
Total depth of boring.				

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Denver, Colorado 80210

RW-MW-4

APPENDIX D

1992 UDS&HW Sampling

Office of the Utah Attorney General
Administration Division

236 State Capitol
Salt Lake City, UT 84114
(801) 538-1015

Telecopy: (801) 538-1135

TELECOPY COVERSHEET

Date: 10/8/92 Time: 2PM

From: BRUCE LARSEN

Please deliver the following pages to:
BILL WALKER / 538-6715

Total number of pages including this page: 4

If you do not receive all pages or have problems with receiving, please call (801) 538-1851 and ask for:
BRUCE

Special Instructions or Comments:
RE: TDEM

Thank you

FORD ANALYTICAL LABORATORIES

CHEMICAL AND BACTERIOLOGICAL ANALYSIS

DATE: 10/05/92 CERTIFICATE OF ANALYSIS

UTAH ATTY GEN OFFICE
% BRUCE LARSEN
236 STATE CAPITOL
SLC, UT 84114

92-027172

SAMPLE: SOIL SAMPLES COLLECTED 9-21-92 BY B. WALLNER RECEIVED 9-21-92 FOR CHROMIUM ANALYSIS STARTING AT 2 P.M.

	AG-1 10:46 AM	AG-2 11:12 AM	AG-3 11:24 AM	DETECTION LIMIT
Chromium Cr ppm EPA 6010	2480	1240	1800	.007

* ND Indicates Not Detected *

FORD ANALYTICAL LABORATORIES

CHEMICAL AND BACTERIOLOGICAL ANALYSIS

CERTIFICATE OF ANALYSIS

92-027172

	AG-4 11:44 AM	DETECTION LIMIT
Chromium Cr ppm EPA 6010	560	.007

* ND Indicates Not Detected *

FORD ANALYTICAL LABORATORIES

FORD ANALYTICAL LABORATORIES

CHEMICAL AND BACTERIOLOGICAL ANALYSIS

CHAIN OF CUSTODY RECORD

PROJECT	SAMPLERS:
SLC Landfill	B. Wallner

LAB #	SAMPLE LOCATION	DATE	TIME	ANALYSIS REQUIRED	SAMPLES NO.	SAMPLES TYPE
AG1		9/21/92	10:46	Cr tot		Soil
AG2		"	11:12	" "		"
AG3		"	11:24	" "		"
AG4		"	11:44	" "		"

RELINQUISHED BY:	RECEIVED BY:	DATE/TIME
Dave Larson	Linda Daniels	9/21/92 1:10pm
RELINQUISHED BY:	RECEIVED BY:	DATE/TIME
RELINQUISHED BY:	RECEIVED BY:	DATE/TIME

DISPATCHED BY:	DATE/TIME	RECEIVED FOR LAB BY:	DATE/TIME

METHOD OF SHIPMENT:

REMARKS:

40 West Louise Avenue • Salt Lake City, Utah 84115 • PHONE (801) 466-8761 • FAX (801) 466-8763

TAL METALS AND OTHER ANALYSIS

Sep 21 9006735

Send Report To: (PLEASE PRINT) LAB NO._____

Name or Agency: SHW

Address: 288 N 1460 WEST

City,State,Zip: SLC, UT 84103

Phone Number: 538-6170

STATE OF UTAH DEPT.OF HEALTH
DIVISION OF LABORATORY SERVICES
46 North MEDICAL DRIVE
SALT LAKE CITY,UTAH 84113
(801)584-8400

COST CODE:_____

Field # HW92080 Date Collected: 9/21/92 Time Collected(24 hr Clock): 0920

Collected By: Bill Wallner Sample Matrix liq

Sampling Site: FIELD BLANK

Exact description of sampling point:_____

__Known Hazardous Waste ___Unknown Material

Analyst_____ Date Rec'd_____ Date Analyzed_____

TOTAL METALS		OTHER ANALYSIS	
Check one of the following		___Oil and Grease	_____PPM
__8 Metals(As,Ba,Cd,Cr,Pb,Hg,Se,Ag)		___T.K.N.	_____PPM
__12 Metals(The 8 above + Cu,Fe,Mn,Zn)		___Reactive HCN	_____PPM
__All 18 Metals listed below.		___Reactive H_2S	_____PPM
__Only those Metals Checked.		___pH	_____
**********		___Solids	_____%
__Aluminum	_____PPM	_____	_____
__Arsenic	_____PPM	_____	_____
__Barium	_____PPM	_____	_____
__Beryllium	_____PPM	_____	_____
__Cadmium	_____PPM	_____	_____
X Chromium	_____PPM		
__Cobalt	_____PPM	___LEAD IN PAINT	_____
__Copper	_____PPM	PLATE_____ BOWL_____	WALL_____
__Iron	_____PPM	OTHER_____	
X Lead	_____PPM		
__Manganese	_____PPM		
__Mercury	_____PPM		
__Molybdenum	_____PPM		
__Nickel	_____PPM		
__Selenium	_____PPM	Results Are:	
__Silver	_____PPM	__Dry Weight basis	
__Vanadium	_____PPM	__As is basis	
__Zinc	_____PPM		
_____	_____PPM		
_____	_____PPM		

Analysis Certified By:_____ Date:_____

LAB USE ONLY:1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28
29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58

CHAIN OF CUSTODY

TOTAL METALS AND OTHER ANALYSIS

Send Report To: (PLEASE PRINT)

LAB NO. SEP 21 92 006736

Name or Agency: DSHW

Address: 288 N 1460 W

City,State,Zip: SLC, UT 84103

Phone Number: 538-6170

STATE OF UTAH DEPT.OF HEALTH
DIVISION OF LABORATORY SERVICES
46 North MEDICAL DRIVE
SALT LAKE CITY,UTAH 84113
(801)584-8400

COST CODE:_____

Field # HW92081 Date Collected: 9/21/92 Time Collected(24 hr Clock): 1046

Collected By: Bill Wallace Sample Matrix SOIL

Sampling Site: SALT LAKE CITY LANDFILL

Exact description of sampling point: ~1900 W Indiana Ave

__Known Hazardous Waste X Unknown Material

Analyst_____ Date Rec'd_____ Date Analyzed_____

TOTAL METALS

Check one of the following

__8 Metals(As,Ba,Cd,Cr,Pb,Hg,Se,Ag)
__12 Metals(The 8 above + Cu,Fe,Mn,Zn)
__All 18 Metals listed below.
X Only those Metals Checked.

__Aluminum	_____	PPM
__Arsenic	_____	PPM
__Barium	_____	PPM
__Beryllium	_____	PPM
__Cadmium	_____	PPM
X Chromium	_____	PPM
__Cobalt	_____	PPM
__Copper	_____	PPM
__Iron	_____	PPM
X Lead	_____	PPM
__Manganese	_____	PPM
__Mercury	_____	PPM
__Molybdenum	_____	PPM
__Nickel	_____	PPM
__Selenium	_____	PPM
__Silver	_____	PPM
__Vanadium	_____	PPM
__Zinc	_____	PPM
X Antimony	_____	PPM
_____	_____	PPM

OTHER ANALYSIS

___Oil and Grease	_____	PPM
___T.K.N.	_____	PPM
___Reactive HCN	_____	PPM
___Reactive H_2S	_____	PPM
___pH	_____	
___Solids	_____	%
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	

___LEAD IN PAINT _____

PLATE_____ BOWL_____ WALL_____

OTHER_____

Results Are:

__Dry Weight basis
__As is basis

Analysis Certified By:_____ Date:_____

LAB USE ONLY:1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28 29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58

CHAIN OF CUSTODY

OTAL METALS AND OTHER ANALYSIS

SEP 21 92 006737

Send Report To: (PLEASE PRINT) LAB NO.

Name or Agency: DSHW

Address: 288 N 1460 W

City,State,Zip: SLC, UT 84103

Phone Number: 538-6170

STATE OF UTAH DEPT.OF HEALTH
DIVISION OF LABORATORY SERVICES
46 North MEDICAL DRIVE
SALT LAKE CITY,UTAH 84113
(801)584-8400

COST CODE:

Field #HW92082 Date Collected: 9/21/92 Time Collected(24 hr Clock): 1124

Collected By: Bill Wallace Sample Matrix SOIL

Sampling Site: SLC LANDFILL (AG2)

Exact description of sampling point: ~ 1900 Indiana Ave

__Known Hazardous Waste X Unknown Material

Analyst Date Rec'd Date Analyzed

TOTAL METALS

Check one of the following

__8 Metals(As,Ba,Cd,Cr,Pb,Hg,Se,Ag)
__12 Metals(The 8 above + Cu,Fe,Mn,Zn)
__All 18 Metals listed below.
X Only those Metals Checked.

****

__Aluminum		PPM
__Arsenic		PPM
__Barium		PPM
__Beryllium		PPM
__Cadmium		PPM
X Chromium		PPM
__Cobalt		PPM
__Copper		PPM
__Iron		PPM
X Lead		PPM
__Manganese		PPM
__Mercury		PPM
__Molybdenum		PPM
__Nickel		PPM
__Selenium		PPM
__Silver		PPM
__Vanadium		PPM
__Zinc		PPM
X Antimony		PPM
		PPM

OTHER ANALYSIS

___Oil and Grease		PPM
___T.K.N.		PPM
___Reactive HCN		PPM
___Reactive H_2S		PPM
___pH		
___Solids		%

___LEAD IN PAINT

PLATE_____ BOWL_____ WALL_____

OTHER_____

Results Are:

__Dry Weight basis
__As is basis

Analysis Certified By: Date:

LAB USE ONLY:1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28
29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58

CHAIN OF CUSTODY

FIELD BLANK
DIV OF SOLID & HAZ.WASTE
288 N 1460 W
SALT LAKE CITY UT 84103 538-6170

UTAH STATE HEALTH DEPARTMENT
DIVISION OF LABORATORY SERVICES
Environmental Chemistry Analysis Report

Description: FIELD BLANK
Site ID: Source: 00
Cost Code: 365
Lab Number: 9206735 Type: 04
Sample Date: 92/09/21 Time: 09:20
Tot. Cations:
Tot. Anions: mg/l Cations: me/l
Grand Total: mg/l Anions: me/l

Date of Review and QA Validation
Inorganic Review: 93/01/15
Organic Review:
Radiochemistry Review: 93/01/15
Microbiology Review:

Laboratory Analyses

Total Chromium

T-Chromium	<0.04	ug/l	T-Lead	<0.3	ug/l
Arsenic HW Hazwaste	<0.005	ppm	Barium HW	<0.01	ppm
Cadmium HW	<0.06	ppm	Cr (HW)	<0.04	ppm
Lead (HW)	<0.3	ppm	Mercury HW *	<0.00008	ppm
Se (HW)	0.005	ppm	Silver HW	<0.01	ppm

*HGHW Holding time was exceeded before analysis was completed

Approved by:

TCLP

SALT LAKE LANDFILL 1900 W INDIANA AVE
DIV OF SOLID & HAZ.WASTE
288 N 1460 W
SALT LAKE CITY UT 84103 538-6170

UTAH STATE HEALTH DEPARTMENT
DIVISION OF LABORATORY SERVICES
Environmental Chemistry Analysis Report

Description:	SALT LAKE LANDFILL 1900 W INDIANA AVE				
Site ID:		Source:	00	Date of Review and QA Validation	
Cost Code:	365			Inorganic Review:	93/01/15
Lab Number:	9206736	Type:	50	Organic Review:	
Sample Date:	92/09/21	Time:	10:46	Radiochemistry Review:	93/01/15
Tot. Cations:				Microbiology Review:	
T Anions:		mg/l	Cations:	me/l	
Grand Total:		mg/l	Anions:	me/l	

Laboratory Analyses

T-Chromium	3300 ppm	T-Lead	1600 ppm
Arsenic HW	0.013 ppm	Barium HW	0.9 ppm
Cadmium HW	<0.06 ppm	Cr (HW)	0.049 ppm
Lead (HW)	0.35 ppm	Mercury HW *	<0.0001 ppm
Se (HW)	<0.005 ppm	Silver HW	0.035 ppm

*HGHW Holding time was exceeded before analysis was completed

Approved by: Leron Fuller

SLC LANDFILL 1900 INDIANA AVE #2
DIV OF SOLID & HAZ.WASTE
288 N 1460 W
SALT LAKE CITY UT 84103 538-6170

UTAH STATE HEALTH DEPARTMENT
DIVISION OF LABORATORY SERVICES
Environmental Chemistry Analysis Report

Description:	SLC LANDFILL 1900 INDIANA AVE #2				
Site ID:		Source:	00	Date of Review and QA Validation	
Cost Code:	365			Inorganic Review:	93/01/15
Lab Number:	9206737	Type:	50	Organic Review:	
Sample Date:	92/09/21	Time:	11:24	Radiochemistry Review:	93/01/15
Tot. Cations:				Microbiology Review:	
T Anions:		mg/l	Cations:	me/l	
Grand Total:		mg/l	Anions:	me/l	

Laboratory Analyses

T-Chromium	2200 ppm	T-Lead	1000 ppm
Arsenic HW	0.012 ppm	Barium HW	0.7 ppm
Cadmium HW	<0.06 ppm	Cr (HW)	<0.04 ppm
Lead (HW)	0.43 ppm	Mercury HW *	<0.00009 ppm
Se (HW)	<0.005 ppm	Silver HW	<0.01 ppm

*HGHW Holding time was exceeded before analysis was completed

Approved by: Doreen Hall

Department of Environmental Quality
Division of Environmental Response and Remediation
CERCLA Branch
Site Assessment Section
Phone Log

To: Richard Rathbun — Date/ Time: 6-22-95 10:55 AM
Number: 536-8275 — Address: Environmental + Envrio Health Division of Attorney General's office
From: E. Uhrmans
Subject/Site: Redwood Road Dump Site
2000 west Indiana Ave.

8:20 am 6-22-95 She will have someone call me back. 10:06 am - Richard Rathbun called.

10:55 am: Over 2 year investigation (criminal) still on-going

Chromium - contaminated soil — Tool Design + Engineering + Manufacturing in so. SL county.
elevated levels, may not be haz. quantity

Quite a bit / some information at S+HW • Bill ~~Walker~~ Wallner knows Tool Design
soil smpls taken! SHW

If we'd like, he would carefully go over his files with us. Don't have someone who can point definitely which piles were Tool Design.

One thing they could share w/ us is soil smpls taken from Tool Design before soil was removed.

Machine shop and they also do chrome-plating - Tool Design - Chrome

S+HW notified Tool Design earlier that they had to clean up their work area — contaminated with area.

Earth Tax Engineering — both did sampling reports at Tool Design - Wasatch Geo-Technical — " " " " " " " before soil was removed.
1 or 2 fairly high ~ 120,000 ppm b? TCLP not run
Sampling also done out at landfill — S+HW

Cont. →

Department of Environmental Quality
Division of Environmental Response and Remediation
CERCLA Branch
Site Assessment Section
Phone Log

To: Richard Rathbun
Number: 536-8275
From: P Yeomans
Subject/Site: RRD SIP

Date/ Time: 6-28-95 / 7-5-95 11:00

Address:

~~Today~~ I called. (He was in mtg.)
He called. (I was in mtg.)
I called. (He's gone to Oregon)

7-5-95

Q: Do you have any documentation of the soil removal from Tool Design to the Redwood Road landfill that we could have without interfering with the criminal investigation? He doesn't - just has memos of witness interviews + those are part of the investigation.

Q: have AG2 11:12 ? from Utah State Health Dept Laboratory ? ?
AG4 11:44 ?

Does he also have map showing location of samples taken?

He's sure they don't. no grid, no map.

are elevated, but failed TCLP so not as hazardous as

Met w/ their deputy AG and feels they are close to a fair resolution: what do they propose to do to clean up this mess - will be talking to Tool Design this week.

Department of Environmental Quality
Division of Environmental Response and Remediation
CERCLA Branch
Site Assessment Section
Phone Log

To: Ken Farnsworth Date/ Time: 9-6-95 9:45 AM
Number: 536-3236 Address: AT Attorney Generals Office
From: Liz Yeomans
Subject/Site:

is active. Have had writing between attorneys
Negotiations: on how to remove it

an offer has been made to them + the AG's office will hear back from them in next 2 weeks

Richard Rathbun is handling it for the AG's office.

They will decide exactly which ~~#~~ criminal ~~#~~ charges are to be filed and what will happen to the soil. Are looking at does soil
① what danger ~~letting~~ pose + ② exactly which soil it is - will use photo's to help determine this -
③ Q: does it need to be removed?

Department of Environmental Quality
Division of Environmental Response and Remediation
CERCLA Branch
Site Assessment Section
Phone Log

To: Richard Rathbun Date/ Time: 9-7-95 9:30 AM

Number: 536-8275 Address: UT ~~Attorney~~ General's office

From: Elizabeth Yamana

Subject/Site: RRD-SIT Redwood Road Dump + illegal dumping of soil which is contaminated w/ chromium + lead.

Did they ever admit to illegal dumping? no - looking @ plea agreement

AG → they have the evidence to show they did, including plenty of witnesses.

AG ~~wants~~ wants them to identify it + get it out of there.

Tool Design to present us (AG) w/ a plan for removal.

Richard will keep us informed.

APPENDIX E

Inorganic Background Soil Samples, Salt Lake Area

(1) = Reference Number
Q = Qualified Data
ND = Not Detected

	BM-S0-01 (1)	BM-S0-02 (1)	MF-S0-01 (2)	RP-S0-02 (3)	MW-S0-01 (4)	CE-S0-01 (5)	HBS-1 (6)	HBS-2 (6)	HBS-3 (6)	KT-SS-37L (7)
Aluminum	14000.00	15400.00	3040.00	7390.00	6790.00	12900.00	6660.00	9640.00	8330.00	13300.00
Antimony	Q	Q	Q	7.40	Q	3ND	1.2ND	3.90	1.3ND	3ND
Arsenic	21.60	24.20	3.40	Q	13.90	8.30	9.40	14.60	20.80	Q
Barium	235.00	197.00	Q	85.80	Q	Q	88.30	121.00	109.00	154.00
Beryllium	2.20	1.90	0.1ND	0.38	0.53	0.82	0.34	0.56	0.26	0.78
Cadmium	2.00	1.90	Q	0.45ND	0.66	1.20	0.1ND	0.25	0.36	0.34ND
Calcium	6830.00	4020.00	10400.00	41800.00	38300.00	48600.00	34600.00	45800.00	39500.00	54700.00
Chromium	17.40	22.90	8.10	8.90	Q	19.40	10.00	14.60	12.00	17.90
Cobalt	11.80	14.80	3.10	4.90	8.80	8.80	4.10	5.90	5.10	7.10
Copper	57.80	50.00	21.50	Q	36.10	41.00	28.00	63.60	Q	44.10
Iron	20700.00	172200.00	Q	8840.00	Q	16600.00	10300.00	15900.00	12900.00	15600.00
Lead	91.10	80.70	53.00	50.00	Q	42.80	39.80	54.80	90.40	Q
Magnesium	4160.00	4370.00	3690.00	11700.00	7710.00	11900.00	7880.00	11700.00	10500.00	13100.00
Manganese	654.00	758.00	Q	213.00	263.00	521.00	204.00	334.00	278.00	374.00
Mercury	0.18	0.12	0.05ND	0.06ND	0.06ND	0.05ND	Q	Q	Q	0.05ND
Nickel	18.60	19.70	5.60	11.00	Q	17.20	7.60	13.70	9.90	13.80
Potassium	5590.00	5430.00	Q	4000.00	1970.00	5000.00	2580.00	3350.00	3030.00	Q
Selenium	0.58	0.13ND	Q	Q	Q	0.13ND	Q	Q	Q	2.25ND
Silver	0.48ND	0.47ND	Q	0.45ND	Q	0.5ND	Q	Q	Q	0.45ND
Sodium	153.00	119.00	109.00	13100.00	101.00	183ND	253.00	203.00	204.00	220.5ND
Thallium	.27ND	0.25ND	0.29ND	0.23ND	0.41	0.25ND	0.11ND	0.23	0.32ND	0.23ND
Vanadium	36.80	34.80	10.10	13.70	13.70	24.80	19.70	25.90	22.60	25.60
Zinc	89.50	74.00	Q	44.50	Q	Q	Q	Q	Q	Q

Measured in parts per million (ppm)

(1) = Reference Number
Q = Qualified Data
ND = Not Detected

	KT-SS-40M (7)	BT-SO-3 (8)	BP-SO-1 (9)	PC-SO-1 (10)	AB-SO-8 (11)	AB-SO-9 (11)	TC-SO-1 (12)	OC-SO-1 (13)	RD-SO-04 (14)	RS-SO-04 (15)
Aluminum	14900.00	8700.00	6430.00	Q	9080.00	6370.00	Q	Q	9920.00	15700.00
Antimony	3.25ND	Q	Q	2.5ND	2.7ND	2.25	Q	Q	5.9ND	6.2ND
Arsenic	Q	16.50	7.90	11.50	Q	Q	Q	Q	9.40	Q
Barium	197.00	167.00	104.00	544.00	208.00	209.00	Q	152.00	126.00	172.00
Beryllium	0.81	0.63	0.52	0.58	0.48ND	0.4ND	0.1ND	1.00	0.58	0.93
Cadmium	.37ND	0.79	0.46ND	2.00	2.10	2.50	1.70	2.50	0.85	1.70
Calcium	45000.00	87100.00	121000.00	67800.00	81100.00	66100.00	Q	Q	50700.00	92400.00
Chromium	17.60	Q	Q	17.70	18.00	15.00	Q	15.80	16.50	20.60
Cobalt	7.90	6.06	4.80	5.40	3.50	6.40	4.60	4.10	6.00	7.60
Copper	46.20	46.30	24.60	Q	Q	70.00	Q	Q	47.50	108.00
Iron	16800.00	9420.00	7930.00	12400.00	10200.00	13200.00	Q	Q	14800.00	20800.00
Lead	Q	155.00	41.30	Q	327.00	313.00	166.00	Q	214.00	306.00
Magnesium	14800.00	Q	35700.00	7650.00	9870.00	7860.00	Q	Q	12400.00	12500.00
Manganese	578.00	Q	314.00	306.00	Q	Q	Q	Q	293.00	343.00
Mercury	.05ND	0.08	0.05ND	0.06ND	Q	Q	Q	Q	0.22	0.17
Nickel	15.00	20.70	9.20	12.10	16.00	13.00	4.10	12.20	13.80	14.80
Potassium	Q	3970.00	1680.00	2610.00	2850.00	1840.00	925.00	2090.00	3290.00	4760.00
Selenium	2.4ND	0.11ND	Q	Q	0.19	0.19	Q	Q	0.25ND	0.54ND
Silver	.48ND	Q	0.46ND	.65ND	2.70	0.85ND	Q	6.3ND	0.98	1.1ND
Sodium	131ND	474.00	184ND	290ND	313.00	391.00	Q	270.00	566.00	780.00
Thallium	.24ND	0.31	0.23ND	Q	Q	Q	1ND	Q	0.32	0.67
Vanadium	21.60	Q	14.90	19.70	15.00	13.00	20.00	16.00	24.10	32.30
Zinc	Q	Q	Q	Q	216.00	261.00	Q	Q	103.00	138.00

Measured in parts per million (ppm)

(1) = Reference Number
Q = Qualified Data
ND = Not Detected

	SC-S0-06 (16)	UC-S0-1 (17)	DPS0-9 (18)	Mean	Standard Deviation	Number of Samples
Aluminum	9270.00	9730.00	7430.00	9749.00	3516.93	20
Antimony	19.00	Q	19.00	10.31	8.15	13
Arsenic	11.90	Q	35.20	14.90	8.26	15
Barium	149.00	192.00	Q	178.34	101.45	19
Beryllium	0.71	0.2ND	0.57	0.78	0.50	23
Cadmium	0.96	0.86ND	1.90	1.46	0.74	21
Calcium	58600.00	244000.00	112000.00	64302.38	51566.15	21
Chromium	20.00	8.50	17.80	15.72	4.33	19
Cobalt	Q	3.20	4.40	6.29	2.85	22
Copper	64.10	Q	58.70	50.47	20.92	16
Iron	14600.00	5640.00	10200.00	21527.89	36715.68	19
Lead	90.10	17.20	163.00	127.51	101.36	18
Magnesium	10400.00	4710.00	7270.00	10493.50	6770.65	20
Manganese	233.00	123.00	215.00	353.18	173.85	17
Mercury	0.11ND	0.1ND	0.28	0.18	0.07	15
Nickel	14.50	9.1ND	10.90	13.02	4.30	22
Potassium	3330.00	2530.00	2280.00	3155.25	1294.90	20
Selenium	0.71	Q	Q	0.42	0.27	10
Silver	0.87ND	Q	1.00ND	1.84	1.22	13
Sodium	266.00	525.00	318.00	1067.35	3106.18	21
Thallium	0.44	0.6ND	0.25	0.38	0.15	18
Vanadium	42.40	15.60	15.90	21.74	8.54	22
Zinc	102.00	809.00	224.00	206.10	223.65	10

Measured in parts per million (ppm)

REFERENCES
BACKGROUND SOIL DATA (CLP Validated-METALS)
IN THE SALT LAKE CITY AREA, MAY 21, 1991

1. UBERR, 1991 (Draft). Analytical Results Report, Butterfield Mine Site, Salt Lake County, Utah, Table 2.

2. UBERR, 1990. Analytical Results Report, Mineral Fertilizer, Davis County, Utah, Table 4.

3. UBERR, 1991 (Draft). Analytical Results Report, Rose Park Canals (Northwest Oil Drain), Salt Lake County, Utah, Appendix E.

4. UBERR, 1991. Analytical Results Report, Utah Metal Works, Table 6.

5. UBSHW, 1990. Analytical Results Report, General Electric Apprartus Service Shop, Davis County, Utah, Table 5.

6. UBSHW, 1990. Analytical Results Report, Highland Boy Smelter Site, Salt Lake County, Utah, Table 3.

7. UBSHW, 1990. Analytical Results Report, Kennecott Tailings Pond, Salt Lake County, Utah, Table 3.

8. U.S. EPA, 1989. Analytical Results Report, Barber Company Tar Products, Salt Lake City, Utah, Table 4.

9. U.S. EPA, 1989. Analytical Results Report, Bennett Paint/Karpowitz Coal Facility, Salt Lake City, Utah, Table 2.

10. U.S. EPA, 1990. Field Activities and Analytical Results Report for Petrochem/Ekotek Plant, Salt Lake City, Utah, Table 13.

11. U.S. EPA, 1988. Report of Analytical Results, American Barrel, Salt Lake City, Utah, Table 2.

12. U.S. EPA, 1988. Report of Analytical Results, Thatcher Chemical Company, Salt Lake City, Utah, Table 8.

13. U.S. EPA, 1991. Final Site Inspection, Old Continental Dry Cleaners, Salt Lake City, Utah, Table 1.

14. UDERR, 1992. Analytical Results Report, Redwood Road Dump, Salt Lake City, Utah, Table 5.

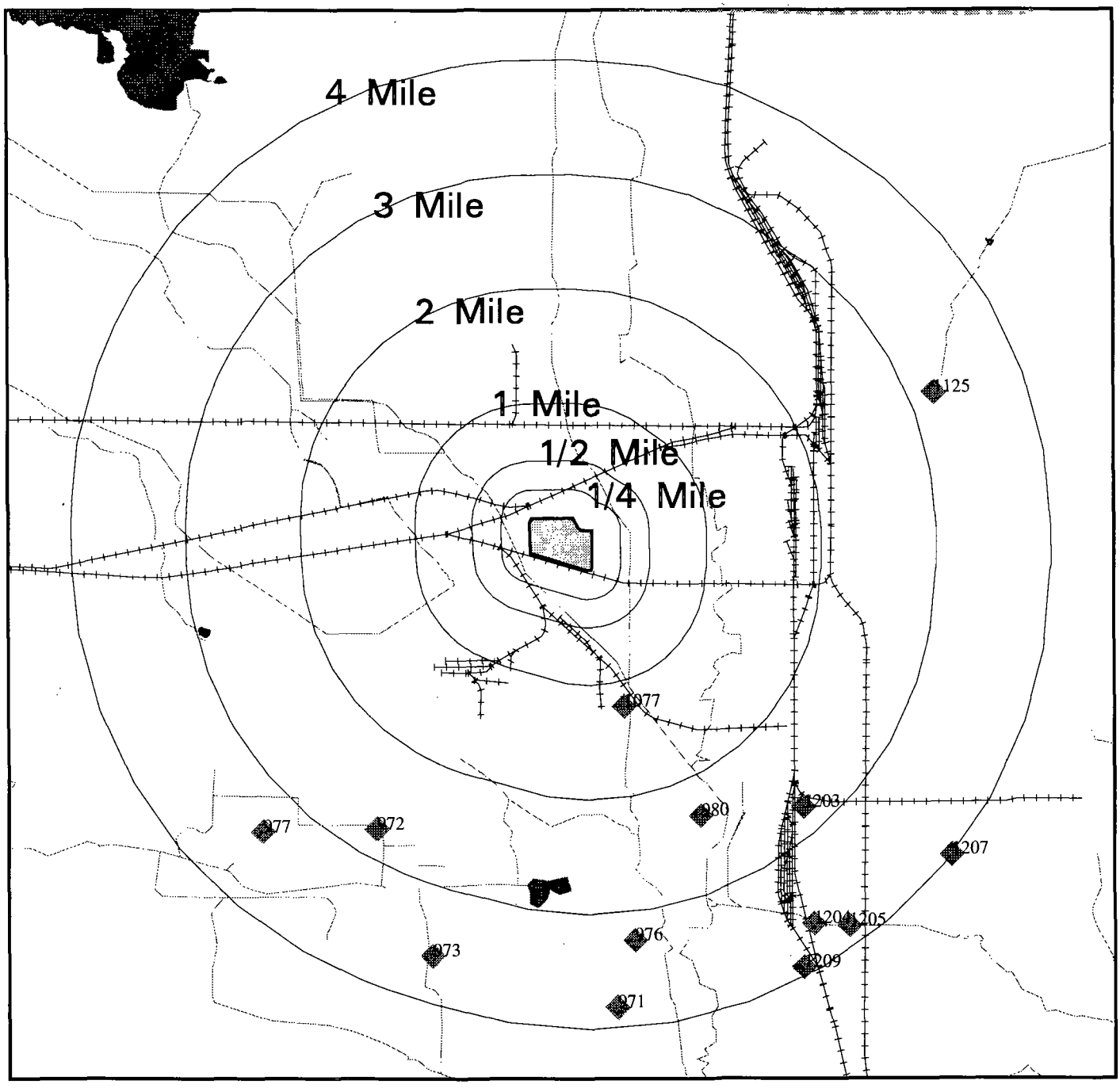
15. UDERR, 1991. Analytical Results Report, Radio Station Properties, Salt Lake City, Utah, Table 7.

16. UDERR, 1991. Analytical Results Report, Stone Container Corporation, Salt Lake City, Utah, Table 5.

17. U.S. EPA, 1991. Final Site Inspection Report, Union Carbide - Linde Division Site, Salt Lake City, Utah,

APPENDIX F

Groundwater Targets

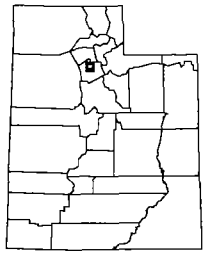


Redwood Road Dump
Drinking Water Sources Within 4 Miles

Scale
1" = 1.33 Miles

Legend

- Site
- Drinking Water Sources
- Concentric bands
- Hydrography
- Railroads USGS
- County boundaries



UDEQ
Division of Environmental
Response and Remediation

file: redrddr created by: hsandbec on 03/22/95

DRINKING WATER WELL REPORT
Date: March 22, 1995 4:15 PM

Distance to Site: 3.81 miles
SYSTEM-NUM: 18007
SYSTEM-NAME: GRANGER-HUNTER IMP DIST
HDDWS-ID: 971
LOCATION: SALT LAKE CITY
ADDRESS: P. O. BOX 701110
CITY-STATE: WEST VALLEY, UT
ZIP-CODE: 84170
MANAGER: GERALD LARSON
MGRS-PHONE: 968-3551
SYSTEM-OWNER: GRANGER-HUNTER IMP DIST
COUNTY: SALT LAKE
SYSTEM-TYPE: COMMUNITY-POLITICAL SUBDI
USER-POPUL: 85000
TYPE-CONNECT: 1
SOURCE-NUM: 02
SOURCE-TYPE: WELL
SOURCE-NAME: 3500S 1300W #1
WELL-DEPTH: D
WELL-DIAMETER: 16

Distance to Site: 2.74 miles
SYSTEM-NUM: 18007
SYSTEM-NAME: GRANGER-HUNTER IMP DIST
HDDWS-ID: 972
LOCATION: SALT LAKE CITY
ADDRESS: P. O. BOX 701110
CITY-STATE: WEST VALLEY, UT
ZIP-CODE: 84170
MANAGER: GERALD LARSON
MGRS-PHONE: 968-3551
SYSTEM-OWNER: GRANGER-HUNTER IMP DIST
COUNTY: SALT LAKE
SYSTEM-TYPE: COMMUNITY-POLITICAL SUBDI
USER-POPUL: 85000
TYPE-CONNECT: 1
SOURCE-NUM: 03
SOURCE-TYPE: WELL
SOURCE-NAME: 2400S 3600W #5
WELL-DEPTH: D
WELL-DIAMETER: 16

Distance to Site: 3.59 miles
SYSTEM-NUM: 18007
SYSTEM-NAME: GRANGER-HUNTER IMP DIST
HDDWS-ID: 973
LOCATION: SALT LAKE CITY
ADDRESS: P. O. BOX 701110
CITY-STATE: WEST VALLEY, UT
ZIP-CODE: 84170
MANAGER: GERALD LARSON
MGRS-PHONE: 968-3551
SYSTEM-OWNER: GRANGER-HUNTER IMP DIST
COUNTY: SALT LAKE
SYSTEM-TYPE: COMMUNITY-POLITICAL SUBDI
USER-POPUL: 85000
TYPE-CONNECT: 1

SOURCE-NUM: 04
SOURCE-TYPE: WELL
SOURCE-NAME: ABANDONED #3
WELL-DEPTH: D
WELL-DIAMETER: 16

Distance to Site: 3.24 miles
SYSTEM-NUM: 18007
SYSTEM-NAME: GRANGER-HUNTER IMP DIST
HDDWS-ID: 976
LOCATION: SALT LAKE CITY
ADDRESS: P. O. BOX 701110
CITY-STATE: WEST VALLEY, UT
ZIP-CODE: 84170
MANAGER: GERALD LARSON
MGRS-PHONE: 968-3551
SYSTEM-OWNER: GRANGER-HUNTER IMP DIST
COUNTY: SALT LAKE
SYSTEM-TYPE: COMMUNITY-POLITICAL SUBDI
USER-POPUL: 85000
TYPE-CONNECT: 1
SOURCE-NUM: 07
SOURCE-TYPE: WELL
SOURCE-NAME: ABANDONED #6
WELL-DEPTH: D
WELL-DIAMETER: 16

Distance to Site: 3.36 miles
SYSTEM-NUM: 18007
SYSTEM-NAME: GRANGER-HUNTER IMP DIST
HDDWS-ID: 977
LOCATION: SALT LAKE CITY
ADDRESS: P. O. BOX 701110
CITY-STATE: WEST VALLEY, UT
ZIP-CODE: 84170
MANAGER: GERALD LARSON
MGRS-PHONE: 968-3551
SYSTEM-OWNER: GRANGER-HUNTER IMP DIST
COUNTY: SALT LAKE
SYSTEM-TYPE: COMMUNITY-POLITICAL SUBDI
USER-POPUL: 85000
TYPE-CONNECT: 1
SOURCE-NUM: 08
SOURCE-TYPE: WELL
SOURCE-NAME: 4400W 2400S #9
WELL-DEPTH: D
WELL-DIAMETER: 12

Distance to Site: 2.34 miles
SYSTEM-NUM: 18007
SYSTEM-NAME: GRANGER-HUNTER IMP DIST
HDDWS-ID: 980
LOCATION: SALT LAKE CITY
ADDRESS: P. O. BOX 701110
CITY-STATE: WEST VALLEY, UT
ZIP-CODE: 84170
MANAGER: GERALD LARSON
MGRS-PHONE: 968-3551
SYSTEM-OWNER: GRANGER-HUNTER IMP DIST
COUNTY: SALT LAKE

SYSTEM-TYPE: COMMUNITY-POLITICAL SUBDI
USER-POPUL: 85000
TYPE-CONNECT: 1
SOURCE-NUM: 11
SOURCE-TYPE: WELL
SOURCE-NAME: 1300W 2320S #7
WELL-DEPTH: D
WELL-DIAMETER: 20

Distance to Site: 1.21 miles
SYSTEM-NUM: 18021
SYSTEM-NAME: TAYLORSVILLE-BENNION WID
HDDWS-ID: 1077
LOCATION: TAYLORSVILLE
ADDRESS: 1800 W 4700 SO
CITY-STATE: SALT LAKE, UT
ZIP-CODE: 84118
MANAGER: FLOYD J. NIELSEN
MGRS-PHONE: 968-9081
SYSTEM-OWNER: TAYLORSVILLE-BENNION WID
COUNTY: SALT LAKE
SYSTEM-TYPE: COMMUNITY-POLITICAL SUBDI
USER-POPUL: 48000
TYPE-CONNECT: 1
SOURCE-NUM: 26
SOURCE-TYPE: WELL
SOURCE-NAME: RAWSON WELL
WELL-DEPTH: D
WELL-DIAMETER: 20

Distance to Site: 3.21 miles
SYSTEM-NUM: 18026
SYSTEM-NAME: SALT LAKE CITY WATER SYS.
HDDWS-ID: 1125
LOCATION: SALT LAKE CITY
ADDRESS: 1530 S W TEMPLE
CITY-STATE: SALT LAKE, UT
ZIP-CODE: 84115
MANAGER: LEROY HOOTEN
MGRS-PHONE: 483-6772
SYSTEM-OWNER: SALT LAKE CITY
COUNTY: SALT LAKE
SYSTEM-TYPE: COMMUNITY-POLITICAL SUBDI
USER-POPUL: 285258
TYPE-CONNECT: 1
SOURCE-NUM: 17
SOURCE-TYPE: WELL
SOURCE-NAME: 202 CANYON RD.
WELL-DEPTH:
WELL-DIAMETER: 20

Distance to Site: 2.76 miles
SYSTEM-NUM: 18032
SYSTEM-NAME: SOUTH SALT LAKE CITY
HDDWS-ID: 1203
LOCATION: SOUTH SALT LAKE
ADDRESS: 220 E MORRIS AVE
CITY-STATE: S SALT LAKE UT
ZIP-CODE: 84115
MANAGER: DEAN STOCK

MGRS-PHONE: 483-6014
SYSTEM-OWNER: CITY OF SOUTH SALT LAKE
COUNTY: SALT LAKE
SYSTEM-TYPE: COMMUNITY-POLITICAL SUBDI
USER-POPUL: 11500
TYPE-CONNECT: 2
SOURCE-NUM: 02
SOURCE-TYPE: WELL
SOURCE-NAME: BOLINDER NO 2
WELL-DEPTH: D
WELL-DIAMETER: 16

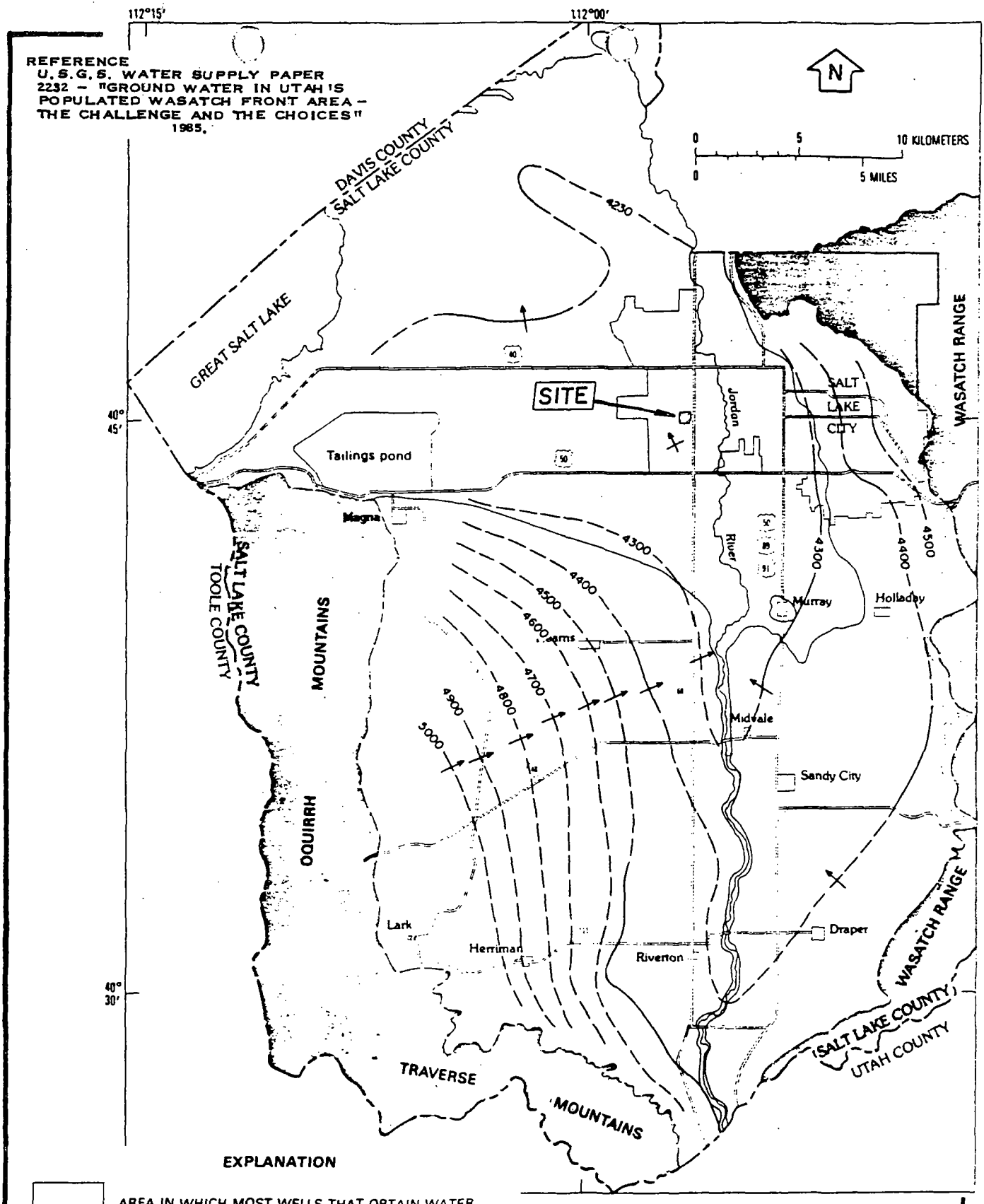
Distance to Site: 3.63 miles
SYSTEM-NUM: 18032
SYSTEM-NAME: SOUTH SALT LAKE CITY
HDDWS-ID: 1204
LOCATION: SOUTH SALT LAKE
ADDRESS: 220 E MORRIS AVE
CITY-STATE: S SALT LAKE UT
ZIP-CODE: 84115
MANAGER: DEAN STOCK
MGRS-PHONE: 483-6014
SYSTEM-OWNER: CITY OF SOUTH SALT LAKE
COUNTY: SALT LAKE
SYSTEM-TYPE: COMMUNITY-POLITICAL SUBDI
USER-POPUL: 11500
TYPE-CONNECT: 2
SOURCE-NUM: 03
SOURCE-TYPE: WELL
SOURCE-NAME: DAVIS
WELL-DEPTH: D
WELL-DIAMETER: 16

Distance to Site: 3.82 miles
SYSTEM-NUM: 18032
SYSTEM-NAME: SOUTH SALT LAKE CITY
HDDWS-ID: 1205
LOCATION: SOUTH SALT LAKE
ADDRESS: 220 E MORRIS AVE
CITY-STATE: S SALT LAKE UT
ZIP-CODE: 84115
MANAGER: DEAN STOCK
MGRS-PHONE: 483-6014
SYSTEM-OWNER: CITY OF SOUTH SALT LAKE
COUNTY: SALT LAKE
SYSTEM-TYPE: COMMUNITY-POLITICAL SUBDI
USER-POPUL: 11500
TYPE-CONNECT: 2
SOURCE-NUM: 04
SOURCE-TYPE: WELL
SOURCE-NAME: 265 W 2975 S
WELL-DEPTH: D
WELL-DIAMETER: 16

Distance to Site: 3.99 miles
SYSTEM-NUM: 18032
SYSTEM-NAME: SOUTH SALT LAKE CITY
HDDWS-ID: 1207
LOCATION: SOUTH SALT LAKE
ADDRESS: 220 E MORRIS AVE

CITY-STATE:	S SALT LAKE UT
ZIP-CODE:	84115
MANAGER:	DEAN STOCK
MGRS-PHONE:	483-6014
SYSTEM-OWNER:	CITY OF SOUTH SALT LAKE
COUNTY:	SALT LAKE
SYSTEM-TYPE:	COMMUNITY-POLITICAL SUBDI
USER-POPUL:	11500
TYPE-CONNECT:	2
SOURCE-NUM:	06
SOURCE-TYPE:	WELL
SOURCE-NAME:	2501 S. 300 E.
WELL-DEPTH:	D
WELL-DIAMETER:	16

Distance to Site:	3.92 miles
SYSTEM-NUM:	18032
SYSTEM-NAME:	SOUTH SALT LAKE CITY
HDDWS-ID:	1209
LOCATION:	SOUTH SALT LAKE
ADDRESS:	220 E MORRIS AVE
CITY-STATE:	S SALT LAKE UT
ZIP-CODE:	84115
MANAGER:	DEAN STOCK
MGRS-PHONE:	483-6014
SYSTEM-OWNER:	CITY OF SOUTH SALT LAKE
COUNTY:	SALT LAKE
SYSTEM-TYPE:	COMMUNITY-POLITICAL SUBDI
USER-POPUL:	11500
TYPE-CONNECT:	2
SOURCE-NUM:	08
SOURCE-TYPE:	WELL
SOURCE-NAME:	VITRO WELL
WELL-DEPTH:	D
WELL-DIAMETER:	10



EXPLANATION

AREA IN WHICH MOST WELLS THAT OBTAIN WATER FROM THE BASIN FILL FLOW UNDER ARTESIAN PRESSURE (1980)

CONSOLIDATED ROCK

LINE OF EQUAL ALTITUDE OF THE POTENTIOMETRIC SURFACE, FEBRUARY 1981—Dashed where approximately located (from Herbert and others, 1981, fig. 9). *Contour interval 70 and 100 feet. Arrow shows direction* of ground-water flow. National Geodetic Vertical Datum of 1929 (sea level).

APPROXIMATE CONTACT BETWEEN VALLEY FILL AND CONSOLIDATED ROCK

APPROXIMATE BOUNDARY OF AREA WITH FLOWING WELLS

POTENTIOMETRIC SURFACE OF GROUND WATER

Dames & Moore

from general corresp. file

WELL INVENTORY

KEY

WELL NUMBER	- Sequential number used to reference well
OWNER OR NAME	- Owner of record on well completion report
APPL NUMBER	- State Engineer's application number for well
LOCATION	- Utah State location designation system - see explanation on following page
YEAR DRILLED	- Year well was drilled
USE	- Reported water use: D = Domestic, I = Irrigation, M = Mining, N = Industrial, P = Municipal, S = Stock Watering, T = Test well, U = Unused, A = Abandoned
YIELD	- Reported test yield
DRAWDOWN	- Reported test drawdown in feet for reported test yield
TYPE	- Well drilling method: C = Cable tool, R = Rotary, D = Dug, J = Jetted
DIAM	- Reported minimum cased well diameter in inches
WELL DEPTH	- Maximum well depth in feet
WATER-BEARING ZONE CHAR	- Lithologic character of the water-bearing zone: B = Boulders, C = Clay, G = Gravel, J = Fractured Shale, L = Limestone, S = Sand, T = Sandstone
WATER-BEARING ZONE INTERVAL	- Uppermost and lowermost depth of performations in well; may contain unperforated section within this zone
WATER LEVEL	- Reported water level depth in feet
MONTH-YEAR MEASURED	- Date of water level measurement

TABLE 3.5

MUNICIPAL WELL INVENTORY

WELL NUMBER	OWNER OR NAME	APPL NUMBER	LOCATION	YEAR DRILLED	USE	YIELD (GPM)	DRAW DOWN	TYPE	DIAM (IN)	WELL DEPTH	WATER-BEARING-ZONE CHAR	WATER-BEARING-ZONE DEPTH	WATER-BEARING-ZONE THICK	WATER LEVEL	MONTH-YR MEASURED
1	SLC CORP	A-12880	C-1-1 12CCD-1	1940	M	22			3	500				+ 25	05-40
2	S.SLC MUNICP.	A-15614	D-1-1 19CBB-5	1944	M	12			2	336	G	332	4	+ 12	03-44
3	SOUTH SLC CORP	A-32687	C-1-1 24BAC-0	1961	M	1350	70	C	16	667	G	618	24	+	07-61
4	SOUTH SLC	A-32687	C-1-1 24BBD-0	1964	M	525	95	C	16	772	S G	484	40		09-64
5	CITY SOUTH SL	A-44839	C-1-1 24BCA-0	1976	M	844	75	C	16	1088	S G	157	49		03-76
6	SOUTH SLC TOWN	A-17312	C-1-1 24DDC-0	1947	M	200			4	655				+ 35	06-47
7	SOUTH SLC TOWN	A-17312	C-1-1 24DDC-0	1947	M	80			4	399	S G			+ 15	05-47
8	SOUTH SLC TOWN	A-17312	C-1-1 24DDB-0	1947	M	180			4	848	S G			+ 35	09-47
9	SOUTH SLC TOWN	A-17312	C-1-1 24DAC-0	1947	M	150			4	632	S G			+ 35	11-47
10	SOUTH SLC CORP	A-17313	C-1-1 25ACC-0	1954	M	320			12	967	S G	705	71		02-54
11	SL COUNTY	A-14322	C-1-1 25CAD-0	1941	M	300			4	550	S G	530	20	+ 57	06-41
12	SOUTH SLC TOWN	A-17312	C-1-1 25AAB-0	1947	M	200			4	1083	S G			+ 35	08-47
13	SOUTH SLC TOWN	A-17314	C-1-1 25ACC-0	1953	M	150			4	763	S G	746	17	+ 40	06-53
14	SOUTH SLC CORP	A-32687	C-1-1 25BDB-0	1967	M	2040	75			1000	S G	214	51		07-67
15	GRANITE SCHOOL	A-14322	C-1-1 25CAD-0	1953	M	300			8	641	G	635	6		4-53
16	CITY SOUTH SL	A- 7301	C-1-1 24SCD-0	1973	M	1001	195	C	20	1018	S G	326	29		7-73
17	G-H IMPRV DIST	A-26687	C-1-1 27DDA-0	1958	M	500			16	775	S G	670			5-58
18	G-H IMPRV DIST	A-26626	C-1-1 27ADC-0	1974	M	1625	150	C	16	990	S G	579	69	27	09-74
19	G-H IMPRV DIST	A-30897	C-1-1 27DAD-0	1962	M	200	200	C	16	910	S G	563	74	0	01-62
20	SALT LAKE CITY	A-11816	A-1-1 31CAC-0	1943	M	8.9	12		20	464				142	07-43
21	SALT LAKE CITY	A-27078	D-1-1 30CDA-0	1956	M	240	99		20	855	S G	611	244	11	10-56
22	SALT LAKE CITY	A- 4219	D-1-1 30ACB-0	1963	M	560	92	C	16	904	G	487	179		10-63
23	SALT LAKE CITY	A-34029	D-1-1 6CAD-0	1963	M			C	12	581	S G	140	60	34	11-63
24	SALT LAKE CORP	A-13257	D-1-1 7DDA-1	1945	M	9			3	460				8	12-53
25	H-G IMPRV.DIST	A-26627	C-1-1 20BDD-0	1965	M	1400	87	C	16	916	S G	607	240	+ 10	04-65
26	S.L. COUNTY	59-2156	C-1-1 23BDA-0	1929	S	5	D		3	80					-

988 N. 1460 W.

TABLE 3.6

NONMUNICIPAL WELL INVENTORY

WELL NUMBER	OWNER OR NAME	APPL NUMBER	LOCATION	YEAR DRILLED	USE	YIELD (GPM)	DRAW DOWN	TYPE	DIAM (IN)	WELL DEPTH	WATER-BEARING-ZONE CHAR	DEPTH	THICK	WATER LEVEL	MONTH-YR MEASURED
1	MCFARLAND CO.	A-16575	C-1-1 25DDA-0	1945		200			4	921	S			+ 46	05-45
2	D&RGW CO.	A-12362	C-1-1 25BBC-0	1937		600			4	640				+ 56	07-37
3	KALUNITE CORP.	A-15529	C-1-1 25CBD-0	1943		250			4	612	S G	550	62	+ 36	10-43
4	KALUNITE CORP.	A-17883	C-1-1 25CBD-3	1943		250			4	582	S G	550	32	+ 36	09-43
5	KALUNITE CORP.	A-14678	C-1-1 25CDA-0	1942		280			8	620	S G	438		+ 30	12-42
6	DOCTORMAN CO.	A-20470	C-1-1 25ACB-1	1949		200			4	453	G	441	12	+ 18	09-49
7	SAVAGE BROS.	A-53934	C-1-1 19ADD-0	1981	N	1100		C		1473	S G	798	173	10	01-81
8	KENNECOTT CORP	A-34118	C-1-1 19CAA-0	1961	T	2000	84	C	12	1200	S G	452	281	+ 50	09-62
9	D&RGW CO.	A-13049	C-1-1 24BBB-0	1939		200			4	740	S	715	25	+ 55	11-39
10	LDS CHURCH	A-25606	A-1-1 31CCC-2	1955		2050	5		20	390	S G	114		107	05-55
11	HOTEL UTAH	A-19754	A-1-1 31CCC-1	1948		900			12	350	S G	167		104	08-48
12	LDS CHURCH	A-30215	A-1-1 31CCC-0	1965	N	3200	39	C	20	705	G	415	177	108	05-65
13	HOTEL UTAH	A-19754	A-1-1 31CCC-0	1948		450	3		8	314	G	290	24	104	08-48
14	LDS HOSPITAL	A- 5233	A-1-1 31ACB-0	1971		400	132	C	16	800	S G	420	188	368	01-71
15	AMOCO OIL CO.	A- 7992	B-1-1 36ABC-0	1974	N	1500	18	C	14	163	G	111	35		-
16	UTAH ICE CO.	C- 6909	B-1-1 36CAB-0	1950		450			10	131	S G	82	46	17	11-50
17	HOTEL UTAH	A-19754	B-1-1 36DDC-0	1954		1200	5		12	361	S G	200	156	90	10-56
18	LDS CHURCH	A-30215	B-1-1 36DDD-0	1963		3200	60	C	24	635	G	430	162	110	10-63
19	DEMMAN ENT INC	A-35506	B-1-1 34DDC-0	1964	I	250		C		366	G	364	2		-
20	UTAH OIL CO.	A-21500	B-1-1 36BAC-0	1950		700	88		12	400	S G	120	173	12	07-50
21	UTAH OIL CO.	A- 1380	B-1-1 36BAC-0	1938		500	17		12	112	G	88	24	+ 7	01-38
22	UTAH OIL CO.	A- 1300	B-1-1 36BAC-0	1938		500	17		12	113	G	88	25	+ 7	02-38
23	UTAH OIL CO.	A- 2076	B-1-1 36BAC-0	1947		240	10		12	125	G	112	13	12	05-47
24	UTAH OIL CO.	A- 1380	B-1-1 36BAC-0	1938		500	17		12	113	G	88	25	+ 7	05-38
25	UTAH OIL CO.	A- 1380	B-1-1 36BAC-0	1958		760	7		12	135	S G	75	60	7	10-58
26	UTAH OIL CO.	A- 1380	B-1-1 36BAC-0	1938		500	17		12	115	G	88	27	+ 7	02-38
27	BEN ALBERT APT	A-22655	D-1-1 6ABD-1	1951		250	15		8	325	S G	150	21	80	04-51
28	MT STATES TEL.	A 12867	D-1-1 6BBB-0	1948		400	10		10	216	S G	139		80	06-48
29	DOXEY & LAYTON	A-21551	D-1-1 6AAB-0	1950		400			6	190	G	174	16	128	05-50
30	PARIS CO.	A-22029	D-1-1 6CBB-1	1950		700			10	700	S G	133	52	35	10-50
31	ZCMI	A-12408	D-1-1 6BBB-0	1937		450	92		8	440	S G			76	08-57
32	MT STATES TEL.	A-12867	D-1-1 6BBD-0	1939		200	82		8	200		160	35	85	09-39
33	PARIS CO.	A-22029	D-1-1 8CBB-0	1950		350	135		10	670	S G	147	56	35	09-50
34	MED. ARTS CO.	A-16520	D-1-1 6BBB-2	1950		500	3		12	350	S G	200		115	03-50
35	MED. ARTS CO.	A-16520	D-1-1 6BBB-0	1950		450	24		8	150	S G	128	21	106	03-50
36	G.C.BILLS&SONS	A-33721	C-1-1 27BDD-0	1967	D	235	68	C	8	716	S G	671	15	+ 3	02-67

TABLE 3.7

OFF-SITE WELL INVENTORY

WELL NUMBER	OWNER OR NAME	APPL NUMBER	LOCATION	YEAR DRILLED	USE	YIELD (GPM)	DRAW DOWN	TYPE	DIAM (IN)	WELL DEPTH	WATER-BEARING-ZONE CHAR	DEPTH	THICK	WATER LEVEL	MONTH-YR MEASURED
1	D.D. STOKES	A-47847	C-1-1 2CDA-1	1978	I	30	60	C	6	320	S	292	28	42.6	02-83
2	R. CULLIARD	A-13088	C-1-1 2 -0	1942		18			2	147	G	105	42	+ 7	08-42
3	FISCHER BROW.	A-19048	C-1-1 2BAC-0	1947		254	143		8	750	S G	412	30	2	12-47
4	THORNTON MFG.	A-34721	C-1-1 2DAD-0	1963		20	120		6	283	S G	278	5		04-63
* 5	J.W. PERRY	C-20145	C-1-1 2CBC-0	1940	A	1			2	318					-
6	T. ALLEN	A-20488	C-1-1 2CAD-0	1943											-
7	M. CROWTHER	A-15694	C-1-1 2CDC-0												-
8	N.C.AVERY	57-4494	C-1-1 2CAD-0	1936					3	110		100	10		-
9	W.&L.WOHLFORTH	57-5147	C-1-1 2CAD-0	1937			3.3		2	250					-
10	C.BERIDON	59-1843	C-1-1 2CAC-0	1911	D I	6			2	585	S	145			-
11	W&H HAMEL	59-2763	C-1-1 2CBB-2	1919	D I	15			2	375					-
12	G.A.NEWMAN	59-3091	C-1-1 2CCA-0	1910	D I	6			2	250					-
13	J.F. LATIMER	A-36886	C-1-1 3BDA-0	1968	D I	25			2	310	S	295	4	+ 2	06-68
14	R.G. HEUSER	A-14719	C-1-1 3AAB-3	1942		8			2	350	S	336	14	+ 9	06-42
15	E.B. WALTERS	A-16572	C-1-1 3AAB-6	1948		6			2	257	G	245	12	+ 5	07-45
16	J.B. MCKEE	A-14804	C-1-1 3AAB-0	1943		7			2	187	S	170	17	+ 3	04-43
17	H. DRECHESEL	A-13973	C-1-1 3CBA-4	1938		6			2	445	G	429	16	+ 5	05-38
18	O.L. JONES	A-15612	C-1-1 3AAB-5	1945		1			2	315	S G	295	20	+ 2	08-45
19	J.C. HARDMAN	A-16694	C-1-1 3AAA-2	1945		7			2	310	S G	295	15	+ 5	07-45
20	O. JONES	A-20528	C-1-1 3AAB-7	1949		4			2	189	S	173	16	+ 4	06-49
21	H.S. GOUDIE	A-13491	C-1-1 3ACC-2	1939		6			2	304	G	295	9	+ 8	08-39
22	A. HEDGE	A-20789	C-1-1 3AAA-3	1949		12			2	318	S G	310	8	+ 6	06-49
* 23	O.FARNSWORTH	59-3108	C-1-1 3DBC-0	1925	A				3	95					-
24	J.E. HENRY	A-14503	C-1-1 4DAA-0	1941		15			2	288	G	275	13	+ 5	10-41
25	F. BAIRD	A-18456	C-1-1 4DBC-4	1947		12			2	273	S G	260	13	+ 5	09-47
26	E.R.BISBERDORF	A-16029	C-1-1 4CDA-1	1944		20			2	325	S	320	5	+ 9	08-44
* 27	R. BURNINGHAM	A-26160	C-1-1 4DCA-0	1954	A	20			2	130	S G	121	9	+ 4	09-54
28	P. BALLEGOOIE	A-23096	C-1-1 4CBD-1	1946		15			2	283	G	270	13	+ 6	09-46
29	L.L. JEWELL	A-13563	C-1-1 4CCA-0	1940		15			2	295	G	290	5	+ 5	06-51
30	Z.L. SAWYER	C-18799	C-1-1 4DBC-0	1942		10			2	288	G	275	13	+ 5	09-42
31	H.J. WILL	A-14526	C-1-1 4DCB-0	1942		20			2	277	G	283	6	+ 7	07-42
32	G.W. BAIRD	A-15394	C-1-1 4DCA-2	1944		18			2	273	G	268	5	+ 8	08-44
* 33	L.G. RACKLY	C- 9052	C-1-1 4CCA-1	1949	A	3			2	260					-
34	A. WALKENHURST	A-15514	C-1-1 4CCB-4	1944		18			2	360	S	315	11	+ 5	06-54
35	F. CROSBY	A-18751	C-1-1 4CCA-0	1950		12			2	283	G	271	12	+3.5	07-50
36	D. PARRY	A-15164	C-1-1 4CCA-0	1943		7			2	247	S G	230	17	+ 4	07-43
37	K. HILL	A-13013	C-1-1 4CCA-0	1939		12			2	290	S	280	10		-
38	H. WALKENHURST	A-13008	C-1-1 4CCA-0	1939		9			2	280		275	5		-
39	J. JENSEN	C-20569	C-1-1 4CBC-0	1938		10			2	305		285	20	+ 6	10-38
40	W. GULLICKSON	A-16889	C-1-1 9BAB-1	1950		15			2	285	S G	274	11	+5	04-50
* 41	L.E. ANDERSON	A-25238	C-1-1 9ABC-3	1953	A										-
42	L.S. SWANER	A-26242	C-1-1 9CBD-1	1954		18			2	250	S G	240	10	+5	10-54
43	MILLER ELECTRC	A-25583	C-1-1 9BBA-3	1954		10			2	341	G	339	2	+4.5	03-54
44	L. FULMER	A-13146	C-1-1 9BCA-1	1939		6			2	267	G	254	13	+4	12-39
45	R.C.SKOLA	59-3691	C-1-1 9ABA-0	1920	D I	7									-
46	ZION SECURITY	59-1250	C-1-1 9ACD-0	1955	S	1									-
47	ZION SECURITY	59-1233	C-1-1 9DDB-0	1954	S	7									-
48	ZION SECURITY	59-1235	C-1-1 9DCA-0	1954	S	7									-
49	O.A. NEMELKA	C-18222	C-1-1 10CDA-4	1940		30			2	410	G	403	7	+12	11-84
50	C.A. NEMELKA	C- 8918	C-1-1 10CDA-0	1940		15			2	117		117			-

TABLE 3.7 (Continued - 2)

OFF-SITE WELL INVENTORY

WELL NUMBER	OWNER OR NAME	APPL NUMBER	LOCATION	YEAR DRILLED	USE	YIELD (GPM)	DRAW DOWN	TYPE	DIAM (IN)	WELL DEPTH	WATER-BEARING-ZONE CHAR	DEPTH	THICK	WATER LEVEL	MONTH-YR MEASURED
51	C.A. NEMELKA	A-16392	C-1-1 10CDA-5	1945		10			2	126	G	115	11	+ 5	05-45
52	E.D. DAWSON	A-16254	C-1-1 10CAD-4	1945		30			2	105	G	95	10	+ 9	01-45
53	J.M. GREGORY	A-19494	C-1-1 10CAD-5	1948		30			2	84	G	75	9	+ 5	04-48
54	E.L. MCGEE	A-13970	C-1-1 10CAD-0	1941		8			2	110	G	106	4	+ 5	01-41
55	E. OLERENSHAW		C-1-1 10BDD-2	1936		15			2	120	G	110	10		-
*56	S. WARWOOD	A-14906	C-1-1 10BDB-0	1942	A	9			2	109	S	95	2	+ 7	07-42
57	A. RILLSTON	A-15502	C-1-1 10DBC-0	1943	D	7		R	3	136	S G	95	20		-
58	W. MANN	A-19120	C-1-1 10DBC-5	1947		15			2	137	G	128	9	+ 5	09-47
59	M.D. RICHARDS	A-13011	C-1-1 10DBB-0	1938		8			2	186		183	3	+ 5	09-38
*60	F. MCCAULEY	A-14893	C-1-1 10DBB-0	1942	A	8			2	130	S	126	4	+4.5	07-42
61	M.B. GAMBRELL	A-14338	C-1-1 10DBB-0	1941		10			2	114	G	101	13	+ 8	11-41
62	M.B. GAMBRELL	A-14338	C-1-1 10DBB-0	1941		10			2	115	S	105	10	+ 9	07-41
63	R.F. RICHARDS	A-14210	C-1-1 10DBB-0	1941		10			2	115	S	112	16	+ 6	05-41
64	V. AXTELL	A-19079	C-1-1 10DBB-0	1947		15			2	136	G	128	8	+ 4	09-47
65	E.C. WILLIAMS	A-15881	C-1-1 10DBC-0	1945		10			2	132	G	125	7	+ 8	01-45
66	E. JOHNSON	A-16132	C-1-1 10DBC-0	1945		8			2	136	G	130	6	+ 8	01-45
67	R.H. CLUFF	A-15264	C-1-1 10DBC-0	1943		10			2	136	G	130	6	+3.5	07-43
68	C.O. EWALD	A-16132	C-1-1 10DBC-0	1955		20			2	125	S G	116	9	+ 6	04-55
69	COOP. SECURITY	A-39153	C-1-1 10AAD-0	1969		20		C	12	1580		1491	85	1	11-69
70	S.D. LOCKHART	A-26034	C-1-1 10DDC-0	1954		8			2	136	G	100	36	+ 3	07-54
71	C.E. LEE	A-25723	C-1-1 10DBC-0	1954	D I	18			2	133	S G	121	12	+ 3	04-54
72	B. VAN BEHAZEL	A-20237	C-1-1 10DCB-0	1948		10			2	105	G	100	5	+ 4	10-48
73	H.M. STASSI	A-20080	C-1-1 10DCA-0	1948		25				131	G	120	9	+ 4	09-48
74	ANDERSON&MARSH	A-12439	C-1-1 10BCD-0	1937	I	5									-
75	V&A GRIMSLEY	59-2645	C-1-1 10CAA-0	1934	D I	80									-
76	P.H.FRANKE	59-2593	C-1-1 10DCC-1	1936	D I	40									-
77	J.PLOESER	59-3716	C-1-1 10DBC-0	1935	D I	10									-
78	T&J SOLLIS	59-1174	C-1-1 10DCD-0	1954	D I	8									-
79	M.S.COSTELLO	59-3114	C-1-1 10BAA-0	1910	D I	30									-
80	F. MELLON	A-33042	C-1-1 11DDD-0	1961		10		J	2	168	S G	160	8	+ 3	06-61
81	C.E. KEANE	C-16779	C-1-1 11DCA-0	1970	I S	60			2	175	S G	165	10		-
82	W.F. WIMMER	A-21603	C-1-1 11CAD-3	1950		8			2	285	S	278	7	+4.5	05-50
83	W.S. BRADY	A-26226	C-1-1 11BDC-3	1954		30			2	386	G	385	1	+ 2	09-54
84	E.L. SACKETT	A-14862	C-1-1 11CCD-0	1942		30			2	126	S	120	6	+ 7	07-42
85	L.W. CARPENDER	A-13080	C-1-1 11CCB-0	1939		19			2	124	G	118	6	+ 8	10-39
86	R.M. FOREST	A-12494	C-1-1 11DDD-0	1935		10			2	252	S	240	12	+ 4	06-35
87	C. INGERSOLL	N.A.	C-1-1 11DDD-4	1936		30			2	165	G	158	8	+ 6	04-36
88	N.B. DODGE	A-12991	C-1-1 11DDD-3	1936		30			2	165		162	3	+ 6	08-36
89	F. YANCHER	C- 8550	C-1-1 11DDD-0	1940		18			2	260	S G	250	10	+ 9	03-40
90	C.J. HAYCOCK	A-12494	C-1-1 11DDD-0	1948		10			2	168	G	158	10	+3.5	06-48
91	A. ZILONKA	C-20489	C-1-1 11CCA-0	1943		1								+ 7	06-48
92	A. NAGEL	C-15838	C-1-1 11CCD-0	1943		10			2						-
93	W. WYATT	A-13088	C-1-1 11B -0	1943					2	97	G	91	6	+ 7	05-43
94	A.J. TADIE	A-15260	C-1-1 11CCD-0	1943		6			2	325	S	310	15	+ 6	08-43
95	G. NEWPORT	C- 8550	C-1-1 11DDD-0	1961		20			2	170	S G	160	10	+ 7	04-61
96	R.SCHETSELLAR	59-3110	C-1-1 11BAB-0	1890	D I	6									-
97	G.CAMP	57-7013	C-1-1 11CDD-0	1940	D I	5									-
98	J.&C.WOUDEN	59-2595	C-1-1 11CDD-0	1906	D I	20									-
99	W.DITTMAR	59- 480	C-1-1 11CCA-0	1926	D I	4									-
100	P.&H.FRANKE	59-3037	C-1-1 11CCD-0	1900	D I	17									-

TABLE 3.7 (Continued - 3)

OFF-SITE WELL INVENTORY

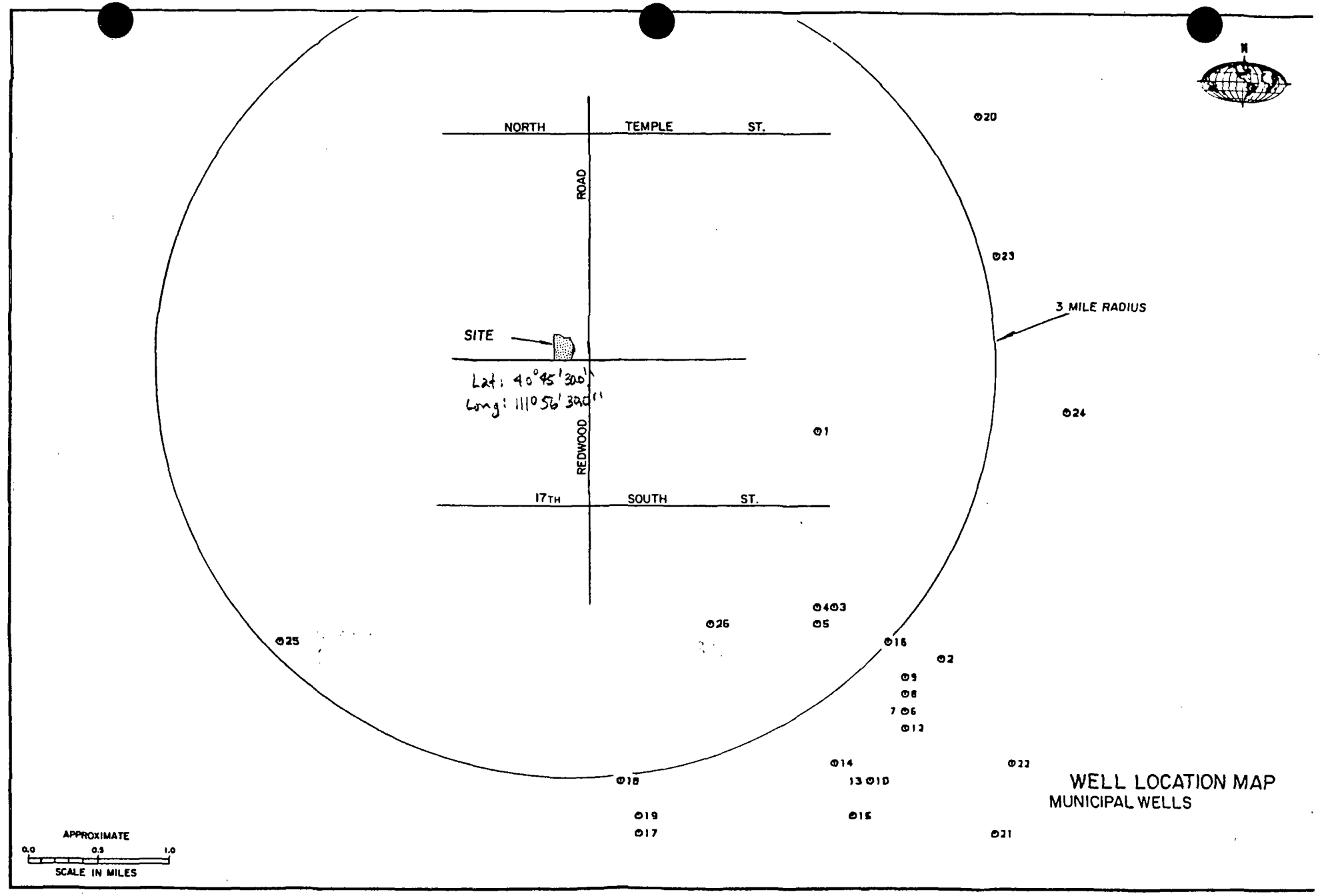
WELL NUMBER	OWNER OR NAME	APPL NUMBER	LOCATION	YEAR DRILLED	USE	YIELD (GPM)	DRAW DOWN	TYPE	DIAM (IN)	WELL DEPTH	WATER-BEARING-ZONE CHAR	DEPTH	THICK	WATER LEVEL	MONTH-YR MEASURED
101	W.J.SCHMIDT	59-2944	C-1-1 11CCD-0	1917	D I	15									-
102	E.R.GOLD	59-3752	C-1-1 11CAB-0	1880	I	100									-
103	HOMES & GARDEN	A-19654	C-1-1 14AAB-2	1948		10			2	168	S G	152	16	+ 3	05-48
104	HOMES & GARDEN	A-19653	C-1-1 14AAA-3	1948					2	169	S G	150	19	+3.5	05-48
105	HOMES & GARDEN	A-19656	C-1-1 14AAA-4	1948		5			2	168	G	149	19	+ 3	05-48
106	HOMES & GARDEN	A-19655	C-1-1 14AAB-1	1948		15			2	168	S G	150	18	+ 3	05-48
107	M.BOCK	A-34649	C-1-1 14BAC-1	1978	D			J	4	172		166	6	+8.3	10-81
108	M.BOCK	A-34649	C-1-1 14CAA-0	1962	D	12		J	2	168	S G	155	13	+ 6	11-62
109	O.DANZER	A-22952	C-1-1 14CAD-4	1951		35			2	105	S G	100	5	+ 8	06-51
110	I.W.HARPER	C-18687	C-1-1 14ABB-5	1		15			3	570					-
111	MASAO SHIO	59-2307	C-1-1 14BCA-1	1935	D S I	8			2	293	S			+ 2	08-44
112	J.LINDEMAN	A-14816	C-1-1 14CAD-0	1942		60			2	165	G	152	13	+ 9	06-42
113	BAUMAN CO.	A-29027	C-1-1 14CAD-7	1957		25			2	232	S G	223	9	+ 8	05-57
114	K.FACKRELL	A-30194	C-1-1 14BBC-3	1958		7			2	95	G	92	3	+ 6	10-58
115	A.DOHNER	A-28389	C-1-1 14CAD-6	1956		20			2	170	S G	160	10	+ 8	08-56
116	J.CARTER	A-26855	C-1-1 14CAD-5	1955		25			2	175	S G	166	9	+ 10	04-55
117	J.KNORR	A- 5818	C-1-1 14BDA-0	1969	D	18		J	2	238	S G	228	10		-
118	C.HALVORSEN	A-13681	C-1-1 14BCB-0	1947		15			2	182	S	160	13	+ 12	09-47
119	HOME&GARDEN	A-21309	C-1-1 14CBD-1	1949		25			2	222	G	211	11	+ 9	12-49
*120	N.H.CLAYTON	A-15174	C-1-1 14BBC-0	1943	A	15			2	142	S G	120	22	+ 5	03-43
121	D.E.CLAYTON	A-15074	C-1-1 14CCA-0	1943		32			2	117	S G	106	11	+ 8	04-43
122	J.MARELLI	A-16445	C-1-1 14BBA-3	1945		20			2	126	G	105	21	+ 6	05-45
123	L.BARLOW	A-15385	C-1-1 14ABB-9	1943		7			2	312	S	305	7	+ 6	08-43
124	F.BREDTHAUER	A-37654	C-1-1 14CAB-0	1966	D	3		J		235	S G	226	4	+ 10	07-66
125	R&S WHITE	59-3016	C-1-1 14BCA-0	1931	D I	10			2	270					-
126	P.SOUTHWICK	59-1845	C-1-1 14BAB-0	1920	D I	25			2	752		172			-
*127	K.F. SCHELL	A-23292	C-1-1 15ACB-4	1952	A	10			2	103	G	100	3	+ 3	02-52
*128	C. MILLION	A-16354	C-1-1 15ADC-3	1945	U	15			2	105	G	95	10		-
*129	K. BAILEY	A-15794	C-1-1 15ACC-3	1944	U	6			2	126	S G	105	11	+ 5	09-44
*130	J. BRITSCHE	C- 9355	C-1-1 15BDD-0	1940	U	10			2	121					-
*131	L. DAVIS	A-13124	C-1-1 15AAA-1	1940	A	17			2	115	S G	108	7	+ 8	08-40
*132	R. LEGGAT	A-13543	C-1-1 15BCD-4	1940	A	12			2	106	G	96	10	+ 4	08-40
*133	W. DAWSON	A-17044	C-1-1 15BAA-1	1946	A	10			2	105	G	95	10	+ 4	08-46
*134	SOUVALL BROS.	A-13750	C-1-1 15BDD-1	1940	U	31			2	445	S	440	5	+ 7	02-83
135	R.H. HALSMAN	A-53409	C-1-1 15ADA-0	1981	D I			C	6	210	G	170	40	+ 2	08-81
136	J.K. KNORR	A-17561	C-1-1 15DDC-1	1946		12			2	198	S G	187	11	+ 8	05-46
137	M.O. KNORR	A-24112	C-1-1 15DDD-1	1952					2	136	S G	89	47	+ 8	10-52
138	E. HOUSEMAN	A-16156	C-1-1 15AAB-0	1946		5			2	126	S	115	11	+ 3	06-46
139	P. FEIL	A-13685	C-1-1 15ACC-0	1940		2.5			2	100	S G	79	21	+34	07-40
140	H. BLAUDSHUM	A-14011	C-1-1 15ABD-0	1935		8			2	117	G	100	17	+2.5	09-35
141	STANDARD PLUM.	A-41120	C-1-1 15CAD-0	1976	N	10		C		960	S G	625	80	+ 1	03-76
142	M.KOEHLER	59-2942	C-1-1 15ADB-0	1920	D S I	5									-
143	T.&D.BANKHEAD	59-3205	C-1-1 15ADB-0	1900	S I	10									-
144	R.S.VATSEND	59-2437	C-1-1 15ABA-0	1916	I	15									-
145	S.O.VATSEND	59-2152	C-1-1 15BAB-0	1931	I	20									-
146	T.W.JAYNES	59-3742	C-1-1 15DBA-0	1915	D I	20									-
147	W.C. AMES	A-13775	C-1-1 16ACD-1	1946		10			2	315		295	9	+ 7	09-40
148	F.H. MCCAULEY	A-29610	C-1-1 16AAA-0	1958		20			2	220	G	210	10	+ 1	02-58
149	E.A. STOLLA	A-13128	C-1-1 16BCA-1	1939		17			2	286		280	6	+ 6	11-39
150	H. GATZEMEIR	A-23251	C-1-1 16BCB-2	1951		30			2	147	G	137	10	+ 8	11-51

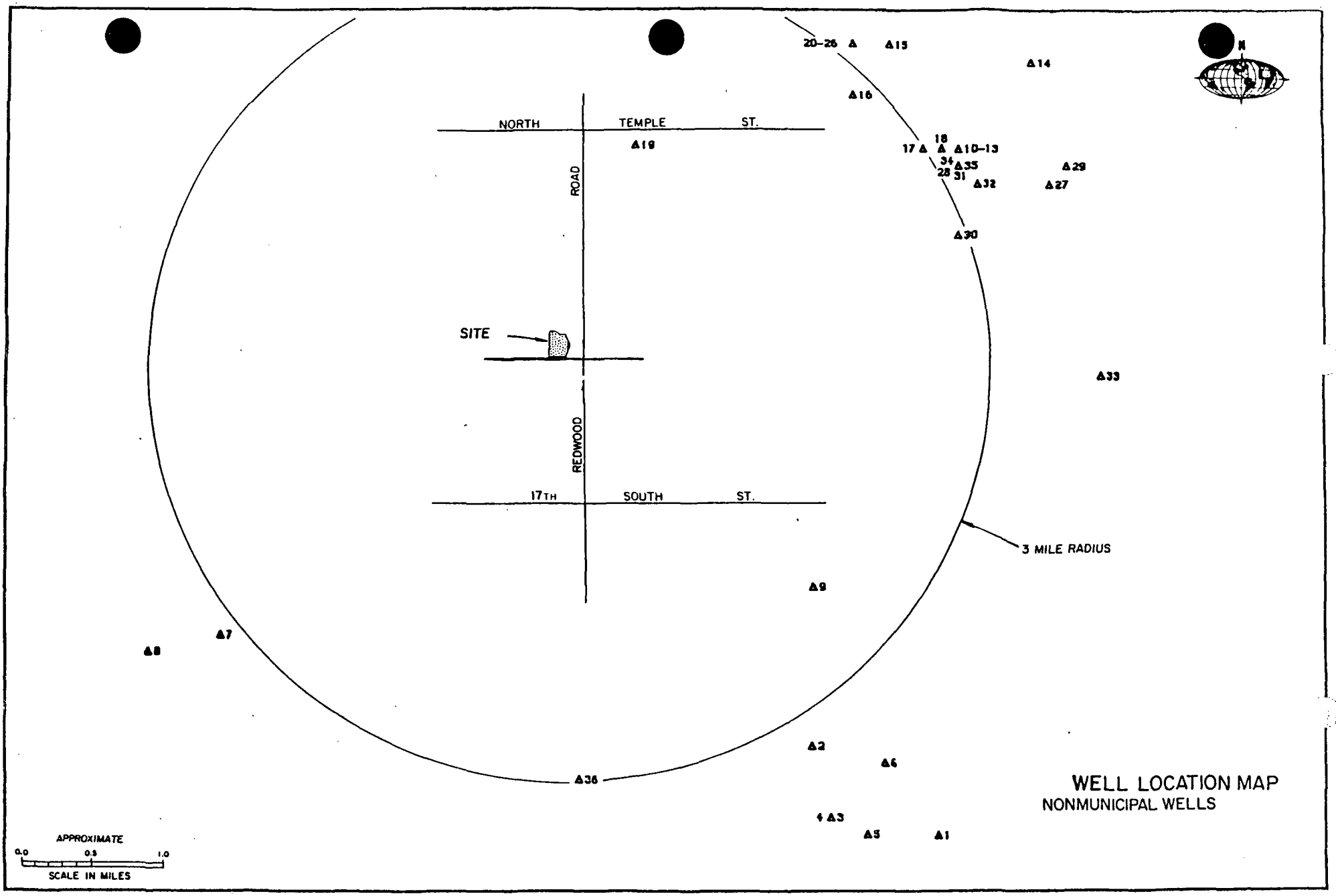
TABLE 3.7 (Continued - 4)

OFF-SITE WELL INVENTORY

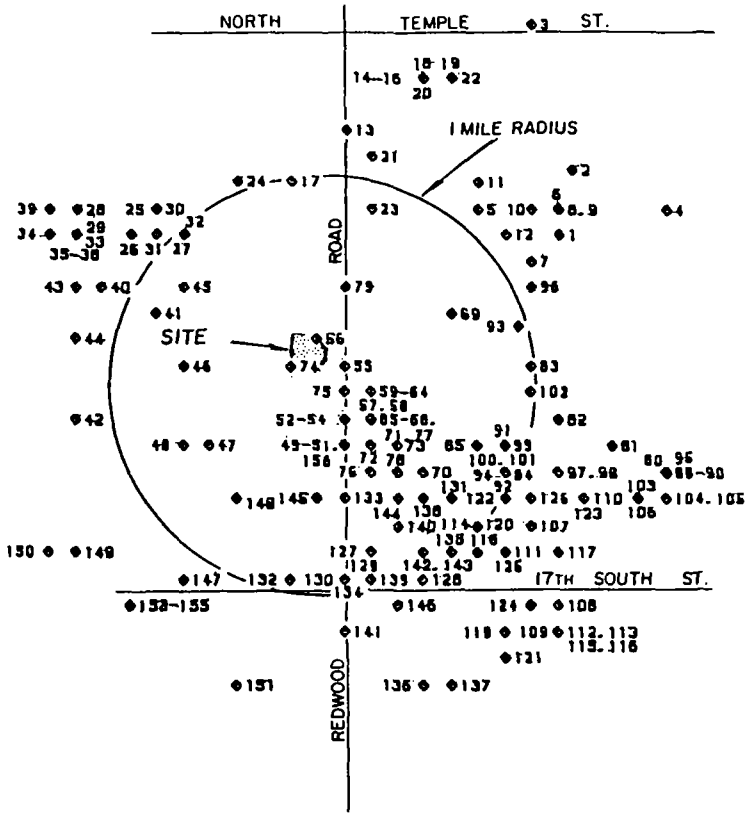
WELL NUMBER	OWNER OR NAME	APPL NUMBER	LOCATION	YEAR DRILLED	USE	YIELD (GPM)	DRAW DOWN	TYPE	DIAM (IN)	WELL DEPTH	WATER-BEARING-ZONE CHAR	DEPTH	THICK	WATER LEVEL	MONTH-YR MEASURED
151	G. CEGARD	A-16075	C-1-1 16DDD-1	1944		90			3	252	S G	230	22	+ 3	09-44
152	EIMAC CORP.	A-35511	C-1-1 16CAA-0		N			C		380		330	50		-
153	EIMAC CORP.	A-31618	C-1-1 16CAA-0	1960		75		C	10	585	S	430	35	+ 4	06-60
154	EIMAC CORP.	A-39579	C-1-1 16CAA-0	1974	N	15		C	12	800		705	27		-
155	OSTLER REFRACT	59-3753	C-1-1 16BDA-0	1920	N	6									-
156	H.& E. HANSEN	59-2637	C-1-1 10CDA-0	1931	D I	15			2	102				+ 5	03-40

* Water user claims disallowed by State Engineer as of 1979


N
NORTH TEMPLE ST.
REDWOOD ROAD
17TH SOUTH ST.
SITE
Lat: 40°45'30"
Long: 111°56'30"
3 MILE RADIUS
20
23
24
1
4 3
5
26
25
16
2
9
8
7 6
12
14
22
13 10
18
19
15
17
21
WELL LOCATION MAP
MUNICIPAL WELLS
APPROXIMATE
0.0 0.5 1.0
SCALE IN MILES



WELL LOCATION MAP
NONMUNICIPAL WELLS



WELL LOCATION MAP
OFF-SITE WELLS

APPROXIMATE
0.0 0.5 1.0
SCALE IN MILES

Ref-4

MUNICIPAL DRINKING WATER WELLS WITHIN A FOUR MILE RADIUS OF THE SITE

WATER SYSTEM	SOURCE NAME	FLOW (GPM)	LATITUDE DEG/MIN/SEC	LONGITUDE DEG/MIN/SEC
GRANGER-HUNTER	3500S 1300W #1	1,200	40 41 46.0	111 56 12.0
GRANGER-HUNTER	2400S 3600W #5	1,400	40 43 06.0	111 58 37.0
GRANGER-HUNTER	3200S 3200W #3	180	40 42 08.5	111 58 02.0
GRANGER-HUNTER	3100S 1500W #6	500	40 42 16.5	111 56 02.0
GRANGER-HUNTER	1300W 2320S #7	3,500	40 43 13.5	111 55 23.0
SALT LAKE CITY	ART. BAS. 3RD E	5,475	40 42 57.5	111 52 50.5
SALT LAKE CITY	202 CANYON RD.	3,472	40 46 27.0	111 53 06.0
SOUTH SALT LAKE	BOLANDER NO 2	500	40 43 18.0	111 54 22.0
SOUTH SALT LAKE	DAVIS	1,150	40 42 25.0	111 54 15.0
SOUTH SALT LAKE	265W 2975S	300	40 42 24.0	111 53 54.0
SOUTH SALT LAKE	2501S 300E	350	40 42 57.0	111 52 53.0
SOUTH SALT LAKE	VITRO WELL		40 42 05.0	111 54 21.0

Source: Utah Bureau of Drinking Water and Sanitation

Ref. 4

TABLE 2.11 (Continued)

OFF SITE MONITOR WELLS NORTH OF SITE 3

Sample	P-3L	P-3L	P-3L	P-3M	P-3M	P-3M
Date	02/04/89	02/21/89	03/23/89	02/04/89	02/21/89	03/24/89
Major Ions, mg/l						
Calcium	30	28.3	38.3	16.2	15.2	< 20.1
Magnesium	61.7	61	73.8	38.9	40.3	42.8
Potassium	33.9	29.7	33.1	41.5	39.5	24.5
Sodium	350	334	285	2380	2290	1570
Total Alkalinity	630	522	517	1030	302	1630
Bicarbonate as CaCO3	630	522	517	1030	302	1630
Carbonate as CaCO3	< 5	< 5	< 5	< 5	< 5	< 5
Hydroxide as CaCO3	< 5	< 5	< 5	< 5	< 5	< 5
Chloride	187	196	200	2010	1960	993
Fluoride	1.2	1.5	1.5	1.4	1.7	1.3
Sulfate	J 278	291	J 267	J 1500	1420	J 1060
Nitrate	J< 0.1	< 2.5	0.3	J< 0.1	< 2.5	0.33
Laboratory pH, units	7.5	7.6	7.8	8.3	8.4	7.7
Sp. Cond., umos/cm	2250	1980	1780	9750	9000	7100
Field pH, units	7.75	7.72	7.47	8.54	8.27	7.79
Field Sp. Cond., umhos/cm	2000	2000	2150	8600	9600	5800
TSS, mg/l	14.4	78.8	< 2	3.6	2	2.4
TDS, mg/l	1350	1320	1120	6340	6340	4660
Dissolved Metals, mg/l						
Aluminum	< 0.024	< 0.022	< 0.022	< 0.12	< 0.11	< 0.044
Arsenic	0.0099	0.0105	0.0119	J< 0.001	J< 0.001	0.033
Barium	0.0461	< 0.0374	0.0284	0.0788	0.0716	0.0455
Cadmium	J< 0.003	< 0.003	< 0.003	J< 0.015	< 0.015	< 0.006
Chromium, Tot.	< 0.004	< 0.005	< 0.005	< 0.02	< 0.025	< 0.01
Chromium, Hex.	0.01	J< 0.01	R< 0.01	< 0.01	J< 0.01	R< 0.01
Iron	< 0.017	< 0.027	< 0.027	< 0.085	< 0.135	0.258
Lead	R< 0.002	R 0.0016	R< 0.001	J 0.0105	0.012	R< 0.01
Manganese	0.088	0.0387	0.0158	0.289	0.314	0.0505
Mercury	R< 0.0002	R< 0.0002	R< 0.0002	R< 0.0002	< 0.0002	R< 0.0002
Molybdenum	0.1304	0.126	0.125	< 0.03	< 0.04	< 0.016
Zinc	< 0.002	0.0037	0.0048	0.0338	< 0.01	0.0166
Total Metals, mg/l						
Aluminum		4			0.146	
Arsenic		0.0122			J 0.0018	
Barium		J 0.0751			J 0.077	
Cadmium		J 0.0033			< 0.012	
Chromium, Tot.		0.0064			< 0.02	
Chromium, Hex.		J< 0.01			J< 0.02	
Iron		5.57			< 0.108	
Lead		J 0.0062			R< 0.01	
Manganese		0.254			0.302	
Mercury		R< 0.0002			R< 0.0002	
Molybdenum		0.124			0.046	
Zinc		0.0332			0.0155	

J-estimated; R-rejected; <= not detected at concentration indicated; equivalent to CLP "U"

Ref. 4

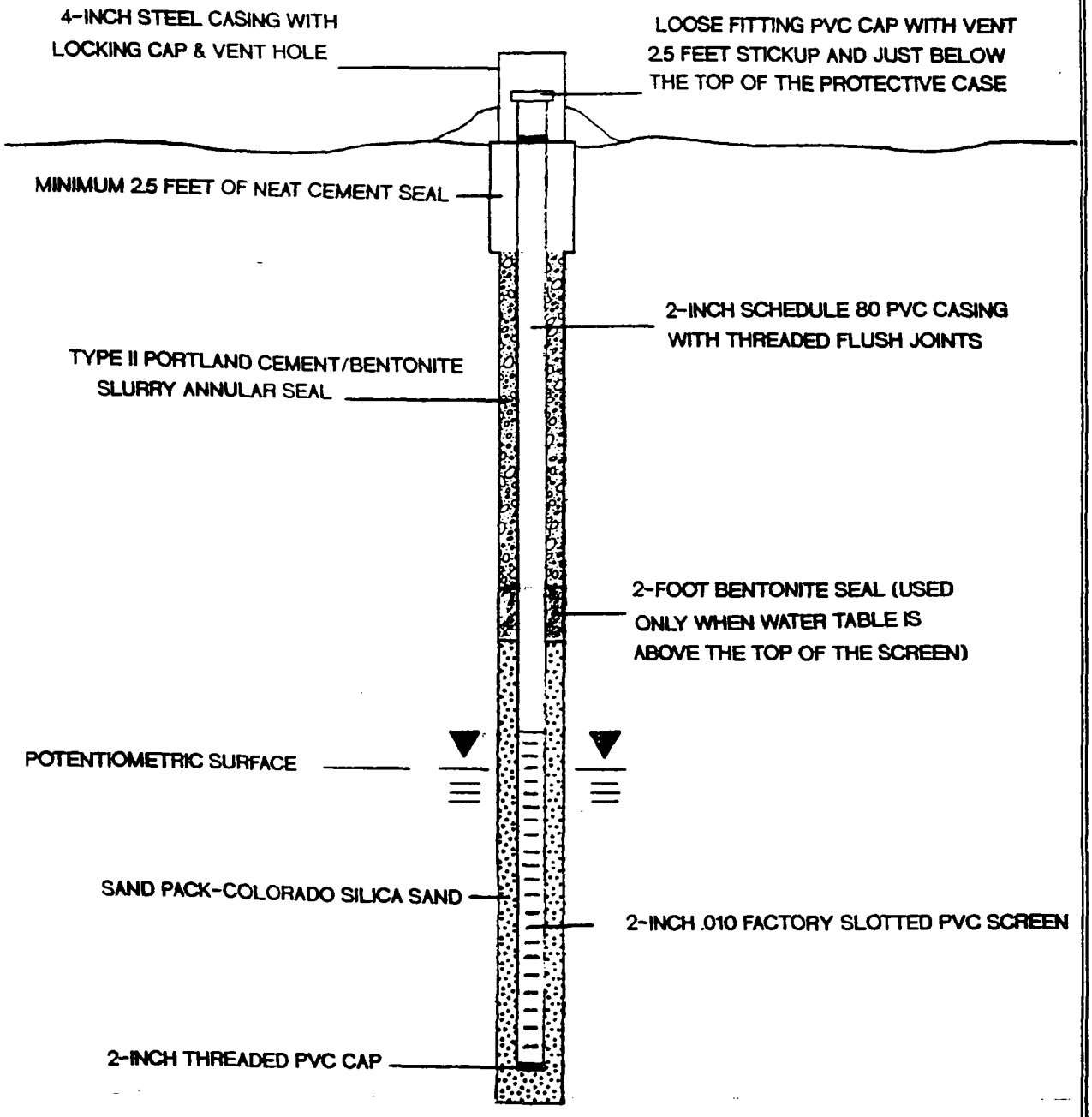
TABLE 2.11

OFF SITE MONITOR WELLS NORTH OF SITE 3

Sample	P-3F	P-3F	P-3F	P-3K	P-3K	P-3K
Date	01/28/89	02/22/89	03/23/89	02/04/89	02/21/89	03/23/89
Major Ions, mg/l						
Calcium	1.87	1.53	3.24	69.2	77	108
Magnesium	0.715	< 0.67	18.1	59.3	69.4	94.6
Potassium	8360	7230	4610	42.8	40.6	49.2
Sodium	2940	2650	1930	246	224	315
Total Alkalinity	9430	8510	6300	613	623	280
Bicarbonate as CaCO3	246	490	970	613	623	280
Carbonate as CaCO3	9180	8020	5330	< 5	< 5	< 5
Hydroxide as CaCO3	< 5	< 5	< 5	< 5	< 5	< 5
Chloride	1470	1340	925	185	198	464
Fluoride	38.9	48.9	22.4	0.75	0.88	0.83
Sulfate	6830	6720 J	4360	J 139	140	J 184
Nitrate	J< 1	14.5 <	1	J 1.8	8.7	8.3
Laboratory pH, units	10.7	10.5	10.2	7.1	7.2	7.2
Sp. Cond., umhos/cm	27300	27100	21300	1910	1820	2430
Field pH, units	10.98	10.9	10.33	7.29	7.21	7.38
Field Sp. Cond., umhos/cm	34000	30000	27000	1800	2000	2700
TSS, mg/l	10.8	6.8	13.2	2	2	< 2
TDS, mg/l	26100	26100	16100	1180	1170	1410
Dissolved Metals, mg/l						
Aluminum	< 0.24	< 0.22	< 0.11	< 0.024	< 0.022	< 0.022
Arsenic	J 2.3	1.73	1.21	0.0138	0.0182	0.0154
Barium	0.0351	< 0.02	0.0318	0.0455	0.0411	0.0578
Cadmium	J< 0.03	< 0.03	J 0.0182	J< 0.003	< 0.003	< 0.003
Chromium, Tot.	< 0.04	< 0.005	< 0.025	< 0.004	< 0.005	< 0.005
Chromium, Hex.	< 0.02	J 0.08	R 0.14	< 0	J< 0.01	R< 0.01
Iron	< 0.17	< 0.27	< 0.135	< 0.017	< 0.027	< 0.027
Lead	J 0.02	J 0.14	R< 0.01	R< 0.002	R< 0.001	R< 0.001
Manganese	< 0.06	< 0.06	< 0.03	0.0965	0.107	0.173
Mercury	R< 0.0002	R< 0.0002	R< 0.0002	R< 0.0002	R< 0.0002	R< 0.0002
Molybdenum	84.8	84.9	53.2	0.0216	0.0142	0.0186
Zinc	0.0348	< 0.02	0.0132	< 0.002	0.0028	0.0051
Total Metals, mg/l						
Aluminum	< 0.24				0.0281	
Arsenic	J 3.41				0.0173	
Barium	0.0422				J 0.0395	
Cadmium	J< 0.03				< 0.003	
Chromium, Tot.	< 0.04				< 0.005	
Chromium, Hex.	< 0.02				J< 0.01	
Iron	0.233				< 0.027	
Lead	R< 0.02				R< 0.001	
Manganese	< 0.06				0.0985	
Mercury	R< 0.0002				R< 0.0002	
Molybdenum	101				0.0155	
Zinc	0.0458				< 0.002	

(estimated; Rejected; ...

Ref. 4



UTAH DEPT. OF HEALTH *Bureau of Solid and Hazardous Waste*		
FIGURE 6 GENERALIZED MONITORING WELL DESIGN REDWOOD ROAD DUMP SALT LAKE COUNTY, UTAH		
by SJP	date 3/26/90	SCALE NOT TO SCALE

From: Ecology and Environment, Inc.,
EPA Reg.VIII Field Investigation Team

TRUSTEES:
ETHAN L. WOODBURY, CHAIRMAN
CARL O. ANDRA, TRUSTEE
CALVIN E. ANDERSON, TRUSTEE

GRANGER-HUNTER
IMPROVEMENT DISTRICT

P.O. BOX 701110
3146 WEST 3500 SOUTH
WEST VALLEY CITY, UTAH 84170

CULINARY WATER AND
SANITARY SERVICE

April 17, 1995

Macheal Lutv
Division of Envirnmental Response and Mitigation
168 North 1950 West
First Floor
Salt Lake City, Utah 84116

Dear Ms.Lutv;

Subject to your phone request, I hereby submit the following, along with our annual report to the Utah Division of Water Resources. (enclosed)

Well Number	Population served est.	Depth drilled	Gallons average	Type of use	Blended Surface Water
1	45,000	900	1100	culinary	yes
5	39,000	915	1400	culinary	yes
7	39,000	880	2500	culinary	yes
12	45,000	958	1200	culinary	yes
9	Not a Granger-Hunter well, call Benificial Real Estate Co.				

Jerry Larson
District Manager

Information jointly requested by:
Utah Division of Water Resources, 538-7264;
Division of Drinking Water, 536-4200; and
Division of Water Rights, 538-7392.

UTAH WATER USE DATA FORM

DATA FOR 1994

Return completed form to:
Utah Division of Water Rights
1636 West North Temple
Salt Lake City, UT 84116-3156

System Name: Granger-Hunter Improvement District
Address: 3146 West 3500 South
Granger, UT 84119

Population Served: 94,700 ID #: 1114/18007
Total No. Connections: 24,513 County: Salt Lake
Average Lot Size Served: 0.25 acre(s).
Estimated Percent of Lot Irrigated 100 %.

Contact Person: Gerald L. Larson, District Manager
Phone Number: (801)968-3551
Form filled out by: BEN NEILSON
Phone Number: SAME

I. STORAGE INVENTORY: Total storage capacity: 22.8 [ ] Gallons, [ ] 1000 Gallons, [X] Million Gallons, [ ] Acre-Feet Number of Tanks 9

II. SOURCE INVENTORY:

1 Source Name: S.L. County W.C.D. Type: Location: WR Number:
Method of Measurement: [X] Master Meter, [ ] Individual Meters, [ ] Estimate, [ ] Other _____
Units: [ ] Gallons, [ ] 1000 Gallons, [ ] Million Gallons, [X] Acre-Feet

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
390.75	411.69	471.95	656.12	1340.84	2633.39	3071.08	2354.27	1843.95	443.52	443.52	409.28	14434.29

2 Source Name: 3500 S. 1300 W. Well #1 Type: WE Location: Sec 27, T1S, R1W, SLB&M WR Number: 59-1203, 59-1204, 59-1207
Method of Measurement: [ ] Master Meter, [X] Individual Meters, [ ] Estimate, [ ] Other 900 Feet depth
Units: [ ] Gallons, [ ] 1000 Gallons, [ ] Million Gallons, [X] Acre-Feet Rated Pump Capacity: 1200 [X] gpm, [ ] cfs
Date of Last Pump Test _____ Yield of Well 1100 [X] gpm, [ ] cfs EST. Pop Served 45,000

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
52.45	—	—	—	111.34	162.46	141.24	151.27	146.40	106.41	0	0	886.59

3 Source Name: 4100 S. 2200 W. Well #2 Type: WE Location: Sec 32, T1S, R1W, SLB&M WR Number: 59-1203, 59-1204, 59-1207
Method of Measurement: [X] Master Meter, [ ] Individual Meters, [ ] Estimate, [ ] Other _____
Units: [ ] Gallons, [ ] 1000 Gallons, [ ] Million Gallons, [X] Acre-Feet Rated Pump Capacity: 450 [X] gpm, [ ] cfs
Date of Last Pump Test _____ Yield of Well _____ [ ] gpm, [ ] cfs

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
—	—	49.02	55.52	57.62	55.87	30.22	—	—	—	—	—	248.25

4 Source Name: 5300 S. 3600 W. Well #4 Type: WE Location: Sec 8, T1S, R1W, SLB&M WR Number: 59-1203, 59-1204, 59-1207
Method of Measurement: [X] Master Meter, [ ] Individual Meters, [ ] Estimate, [ ] Other _____
Units: [ ] Gallons, [ ] 1000 Gallons, [ ] Million Gallons, [X] Acre-Feet Rated Pump Capacity: 350 [X] gpm, [ ] cfs
Date of Last Pump Test _____ Yield of Well _____ [ ] gpm, [ ] cfs

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
29.33	36.03	41.45	40.76	42.05	40.86	42.91	42.61	39.92	—	20.44	41.89	428.28

5 Source Name: 2475 S. 3600 W. Well #5 Type: WE Location: Sec 20, T2S, R1W, SLB&M WR Number: 59-1203, 59-1204, 59-1207
Method of Measurement: [X] Master Meter, [ ] Individual Meters, [ ] Estimate, [ ] Other ~~_____~~ 915 feet depth
Units: [ ] Gallons, [ ] 1000 Gallons, [ ] Million Gallons, [X] Acre-Feet Rated Pump Capacity: 1500 [X] gpm, [ ] cfs
Date of Last Pump Test _____ Yield of Well 1400 [X] gpm, [ ] cfs => 39,000 Population Served

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
—	—	—	—	32.02	167.12	190.01	185.49	176.98	145.96	—	—	897.78

6 Source Name: 1151 W. 2320 S.- Well #7 Type: WE Location: Sec 23, T1S, R1W, SLB&M WR Number: 59-1203, 59-1204, 59-1207
Method of Measurement: [X] Master Meter, [ ] Individual Meters, [ ] Estimate, [ ] Other 880 feet depth
Units: [ ] Gallons, [ ] 1000 Gallons, [ ] Million Gallons, [X] Acre-Feet Rated Pump Capacity: 3500 [X] gpm, [ ] cfs
Date of Last Pump Test _____ Yield of Well 2500 [X] gpm, [ ] cfs Population Served 39,000 est.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
377.01	314.15	363.99	383.30	380.16	347.66	350.76	338.52	327.46	341.88	330.60	322.71	3745.35

7 Source Name: 4400 W. 2400 S.- Well #9 Type: WE Location: Sec 19, T1S, R1W, SLB&M WR Number: 59-1662
Method of Measurement: [X] Master Meter, [ ] Individual Meters, [ ] Estimate, [ ] Other _____
Units: [ ] Gallons, [ ] 1000 Gallons, [ ] Million Gallons, [X] Acre-Feet Rated Pump Capacity: 1800 [X] gpm, [ ] cfs
Date of Last Pump Test _____ Yield of Well _____ [ ] gpm, [ ] cfs

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
—	—	—	—	—	—	—	—	—	—	—	—	.00

** If you are using other sources which are not shown above, please enter the appropriate data in the space provided below. **

8 Source Name: 1000 W. 3500 S well #8 Type: Location: ~~SEC~~ 35 T1S R1W WR Number: 59-1203, 59-1204, 59-1207
Method of Measurement: [X] Master Meter, [ ] Individual Meters, [ ] Estimate, [ ] Other _____
Units: [ ] Gallons, [ ] 1000 Gallons, [ ] Million Gallons, [X] Acre-Feet Rumored capacity 1500 GPM

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
—	—	—	—	—	—	55.57	175.11	164.87	102.68	115.57	45.13	686.93

9 Source Name: 15CC N. 3550 S. Well 12 Type: Location: Sec 27 T1S R1W SLB WR Number: 59-1203, 59-1204, 59-1207
Method of Measurement: [X] Master Meter, [ ] Individual Meters, [ ] Estimate, [ ] Other 958 feet depth
Units: [ ] Gallons, [ ] 1000 Gallons, [ ] Million Gallons, [X] Acre-Feet Pump capacity 2000 GPM 45,000 Population Served Est.
Ave. GPM 1200

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
—	—	—	—	—	—	—	—	—	—	—	—	—

10 Source Name: Type: Location: WR Number:
Method of Measurement: [ ] Master Meter, [ ] Individual Meters, [ ] Estimate, [ ] Other _____
Units: [ ] Gallons, [ ] 1000 Gallons, [ ] Million Gallons, [ ] Acre-Feet

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

11 Source Name: Type: Location: WR Number:
Method of Measurement: [ ] Master Meter, [ ] Individual Meters, [ ] Estimate, [ ] Other _____
Units: [ ] Gallons, [ ] 1000 Gallons, [ ] Million Gallons, [ ] Acre-Feet

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

12 Source Name: Type: Location: WR Number:
Method of Measurement: [ ] Master Meter, [ ] Individual Meters, [ ] Estimate, [ ] Other _____
Units: [ ] Gallons, [ ] 1000 Gallons, [ ] Million Gallons, [ ] Acre-Feet

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

13 Source Name: Type: Location: WR Number:
Method of Measurement: [ ] Master Meter, [ ] Individual Meters, [ ] Estimate, [ ] Other _____
Units: [ ] Gallons, [ ] 1000 Gallons, [ ] Million Gallons, [ ] Acre-Feet

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

SOURCE COMMENTS: Water supply conditions were: [ ] Above normal, [ ] Normal, [ ] Below normal

Note attached.

III. WATER USE BREAKDOWN: (If quantities are not known, please estimate percentages. See instructions for definition of uses shown in bold.)

Units: [ ] Gallons, [ ] 1000 Gallons, [ ] Million Gallons, [ ] Acre-Feet Source of data: [ ] Individual connections [ ] Estimated

Residential: Annual quantity of water delivered for residential purposes - See attached. Total number of residential connections See attached Print out.

Commercial: Annual quantity of water delivered for commercial purposes - Print out. Total number of commercial connections "

Industrial: Annual quantity of water delivered for industrial purposes - 4a-b-c. Total number of industrial connections "

Institutional: Annual quantity of water delivered for institutional purposes - " . Total number of institutional connections "

Stockwatering: Annual quantity of water delivered for stockwatering purposes - " . Total number of stockwatering connections "

Wholesale: Annual quantity of water delivered to other systems - " . Please attach a listing of those supplied.

Other Uses: Annual quantity of water delivered for other purposes - " . Total number of other connections "

Describe other uses _____

IV. IRRIGATION SYSTEM (Separate lawn and garden irrigation system, whether controlled by the drinking water supplier or not)

Is your area served by a separate irrigation water system? [X] Yes, [ ] No If yes, please provide the following information:

What percent of your water customers are served by a separate irrigation system? N/A % How is the water delivered? [X] Ditch, [ ] Pressurized system

If system is operated by another entity, please give name of company, contact person & phone number: UTA and Salt Lake, North Jordan, Brighton, South Jordan

Number of stock holders: ? Total shares of stock: ? Total acres irrigated: ?

Please enter quantity of water delivered by the irrigation system: Institutional acreage ? Quantity of water ?

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
			information requested is not available to this Company									

Do these quantities reflect water delivered to the municipal service area only? [ ] Yes, [ ] No If no, percent delivered to municipal service area? _____

V. ADDITIONAL INFORMATION:

Which of the following maps are available? [X] Service area, [ ] Zoning, [X] Distribution systems (pipes and ditches)
Can a listing of businesses served by the water system be provided? [X] Yes, [ ] No

VI. REVENUE SURVEY: (For fiscal or calendar year 1994)

What was the revenue for 1994 to your culinary water system from water sales to retail customers? $ 5,227,158.04 To wholesale customers? 0

What was the revenue for 1994 to your culinary water system from taxes, including mill levies? 725,916.50

What was the revenue for 1994 to your culinary water system from connection or impact fees for new customers? 449,831.55

Please attach a copy of your water rate structure.

What statement best describes the finanical condition of your water system?

[ ] We meet the usual operation and maintenance expenses of our system from water bill revenues. Our budget is balanced.

[ ] Usually, we collect significant excess funds. These funds are put to other uses (e.g. transferred to the sewer system account, trash pickup account, etc.) or saved for future water system needs.

[X] Usually, we collect significant funds which are held in reserve for future inprovements or replacement of aging system components.

[ ] Usually, we are in the red. However, we do transfer funds from other activities (e.g. electrical generation, sewer fund, etc.) and this balances the water system budget.

[ ] Usually, we are in the red. Thus, we intend to raise our water rates.

WATER HISTORY SUMMARY REPORT

SBPHIST — CONSUMPTION SHOWN IN UNITS ONLY — TIME 8:50 — DATE JAN 31, 1995 — PAGE 0445

	WC	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL CONSUM	NO PD	AVERAGE USE
CONSUM	B	53,418	123,372	188,765	162,883	83,135	44,714	47,071	84,531	117,119	97,755	53,428	54,129	1,110,320	12	92,526
AVERAGE		81	176	233	197	107	91	81	145	199	165	87	89			
ACCOUNTS		661	699	811	828	774	491	579	581	589	591	616	609			
CONSUM	C	7,371	38,742	57,177	33,709	3,353	1,751	6,491	26,967	42,334	27,978	3,524	1,265	250,662	12	20,888
AVERAGE		108	531	762	456	51	38	101	402	632	411	53	23			
ACCOUNTS		68	73	75	74	66	46	64	67	67	68	67	56			
CONSUM	D	75,820	51,615	85,534	58,630	2,299	1,531	79,288	42,940	65,710	49,781	1,888	1,049	516,085	12	43,007
AVERAGE		85	58	95	65	34	34	90	49	75	57	36	26			
ACCOUNTS		889	890	903	902	67	45	877	874	874	874	53	40			
CONSUM	E	3,726	2,270	2,465	2,260	472	877	3,651	1,857	2,164	1,900	654	538	22,854	12	1,904
AVERAGE		287	189	164	141	94	146	281	143	168	146	109	108			
ACCOUNTS		13	12	15	16	5	6	13	13	13	13	6	5			
CONSUM	F	58,931	33,791	47,104	37,915	3,177	2,536	61,656	30,491	41,817	32,609	2,533	1,815	354,375	12	29,531
AVERAGE		166	95	129	104	99	110	176	88	119	93	97	113			
ACCOUNTS		354	357	364	363	32	23	351	348	351	350	26	16			
CONSUM	G	7,191	6,968	10,264	8,373	2,032	1,635	6,504	6,196	8,019	7,617	2,216	1,639	68,054	12	5,671
AVERAGE		136	124	168	133	78	82	118	113	149	141	106	65			
ACCOUNTS		53	56	61	63	26	20	55	55	54	54	21	16			
CONSUM	H	350	470	670	490	320	420	390	650	540	500	340	300	5,440	12	453
AVERAGE		350	470	670	490	320	420	390	650	540	500	340	300			
ACCOUNTS		1	1	1	1	1	1	1	1	1	1	1	1			
CONSUM	I	11,132	16,018	12,720	13,086	9,659	11,159	3,099	4,128	4,348	4,695	3,421	9,400	102,865	12	8,572
AVERAGE		696	942	795	818	604	930	258	318	311	335	214	723			
ACCOUNTS		16	17	16	16	16	12	12	13	14	14	16	13			
CONSUM	J	387	1,513	2,132	1,545	522	332	475	1,135	2,069	1,696	447	298	12,555	12	1,046
AVERAGE		97	378	533	386	131	83	120	284	517	424	112	75			
ACCOUNTS		4	4	4	4	4	4	4	4	4	4	4	4			
CONSUM	K	1,176	1,905	3,348	3,213	1,325	1,266	1,207	2,089	3,056	2,823	1,493	1,251	24,152	12	2,012
AVERAGE		147	238	419	402	166	158	151	261	382	353	187	156			
ACCOUNTS		8	8	8	8	8	8	8	8	8	8	8	8			
CONSUM	L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AVERAGE		0	0	0	0	0	0	0	0	0	0	0	0			
ACCOUNTS		0	0	0	0	0	0	0	0	0	0	0	0			
CONSUM	M	590	2,820	3,370	1,612	679	847	680	1,960	1,430	1,070	580	460	16,098	12	1,341
AVERAGE		148	564	674	322	170	212	227	653	477	357	193	153			
ACCOUNTS		4	5	5	5	4	4	3	3	3	3	3	3			

WATER HISTORY SUMMARY REPORT

SBPHIST — CONSUMPTION SHOWN IN UNITS ONLY — TIME 8:50 — DATE JAN 31, 1995 — PAGE 0446

	WC	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL CONSUM	NO PD	AVERAGE USE
CONSUM	N	22,586	49,867	78,648	51,525	29,193	21,384	24,161	36,568	51,431	42,900	27,549	21,181	456,993	12	38,082
AVERAGE		269	573	803	520	307	334	318	475	651	557	353	265			
ACCOUNTS		84	87	98	99	95	64	76	77	79	77	78	80			
CONSUM	O	2,301	2,685	4,132	3,525	1,625	2,526	2,118	2,516	3,355	3,280	2,287	1,500	31,850	12	2,654
AVERAGE		384	384	590	504	325	421	353	419	559	547	381	300			
ACCOUNTS		6	7	7	7	5	6	6	6	6	6	6	5			
CONSUM	P	574	735	1,514	939	510	388	462	552	512	391	306	50	6,933	12	577
AVERAGE		115	123	252	157	85	78	92	138	128	98	77	50			
ACCOUNTS		5	6	6	6	6	5	5	4	4	4	4	1			
CONSUM	Q	632	873	1,539	946	641	323	516	1,081	1,311	1,004	1,682	620	11,168	12	930
AVERAGE		158	218	385	237	160	81	129	270	328	251	421	155			
ACCOUNTS		4	4	4	4	4	4	4	4	4	4	4	4			
CONSUM	R	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AVERAGE		0	0	0	0	0	0	0	0	0	0	0	0			
ACCOUNTS		0	0	0	0	0	0	0	0	0	0	0	0			
CONSUM	S	6,010	23,205	43,679	67,305	2,653	1,347	26,922	19,927	23,844	54,875	4,603	1,740	276,110	12	23,009
AVERAGE		240	1,547	2,912	4,207	190	112	2,244	1,812	1,987	4,221	384	134			
ACCOUNTS		25	15	15	16	14	12	12	11	12	13	12	13			
CONSUM	T	6,000	7,400	7,200	6,600	5,200	5,300	5,700	6,900	5,900	6,300	5,600	5,000	73,100	12	6,091
AVERAGE		6,000	7,400	7,200	6,600	5,200	5,300	5,700	6,900	5,900	6,300	5,600	5,000			
ACCOUNTS		1	1	1	1	1	1	1	1	1	1	1	1			
CONSUM	U	350	650	920	840	410	344	320	480	870	680	450	350	6,664	12	555
AVERAGE		175	325	460	420	205	172	160	240	435	340	225	175			
ACCOUNTS		2	2	2	2	2	2	2	2	2	2	2	2			
CONSUM	V	1,794	1,046	2,119	1,718	293	90	1,817	892	1,197	914	172	80	12,132	12	1,011
AVERAGE		199	116	193	156	59	90	202	99	133	102	57	40			
ACCOUNTS		9	9	11	11	5	1	9	9	9	9	3	2			
CONSUM	W	30,292	158,922	615,315	883,252	31,354	4,708	998,131	920,925	310,156	792,573	27,059	6,515	4,779,202	12	98,266
AVERAGE		2	8	31	44	23	16	53	48	16	41	23	19			
ACCOUNTS		19,328	19,867	20,022	20,038	1,377	295	18,933	19,333	19,376	19,377	1,184	335			
CONSUM	X	19,546	41,790	59,133	31,333	15,072	9,634	13,958	37,761	28,028	33,343	10,221	11,441	311,260	12	25,938
AVERAGE		416	606	768	448	484	741	279	687	519	556	330	763			
ACCOUNTS		47	69	77	70	31	13	50	55	54	60	31	15			
CONSUM	Y	1,990	33,780	5,410	5,220	3,250	2,590	3,030	2,590	3,990	3,450	2,184	1,930	69,414	12	5,784
AVERAGE		221	3,753	451	435	271	288	337	288	443	383	243	214			
ACCOUNTS		9	9	12	12	12	9	9	9	9	9	9	9			

WATER HISTORY SUMMARY REPORT

SBPHIST CONSUMPTION SHOWN IN UNITS ONLY TIME 8:50 DATE JAN 31, 1995 PAGE 0447

	WC	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL CONSUM	NO PD	AVERAGE USE
CONSUM	Z	27,539	13,528	207,893	80,000	4,295	2,364	37,794	82,892	21,406	25,774	5,119	2,797	511,401	12	42,616
AVERAGE		1,197	615	9,039	3,200	307	169	787	1,658	1,070	1,227	269	186			
ACCOUNTS		23	22	23	25	14	14	48	50	20	21	19	15			
CONSUM		339,706	613,965	441,051	456,919	201,469	118,066	325,445	316,028	740,626	193,908	157,756	124,748	9,029,687	12	52,474
AVERAGE		16	28	64	65	78	109	63	61	34	55	73	100			
ACCOUNTS		21,614	22,220	22,541	22,571	2,569	1,086	21,122	21,528	21,554	21,563	2,174	1,253			

ACCOUNTS WITH AN INVALID WATER CODE 0

*** END OF REPORT ***

R A T E T A B L E

SERVICE CODE	RATE CODE	TYPE CODE	DESCRIPTION	RATE A MESSAGE
WATR	A		NO SERVICE	*** NO SERVICE -- NO CALCULATION

SERVICE CODE	RATE CODE	TYPE CODE	DESCRIPTION	BASE RATE	MINIMUM UNITS	ADDITIONAL USE RATE
WATR	A	1	NO SERVICE	.00	0	.00
WATR	B	1	BUSINESS	15.00	18	.75
WATR	C	1	CHURCH	15.00	18	.75
WATR	D	1	TWO UNITS	22.50	27	.75
WATR	E	1	EIGHT UNITS	67.50	81	.75
WATR	F	1	FOUR UNITS	37.50	45	.75
WATR	G	1	THREE UNITS	30.00	36	.75
WATR	H	1	TWENTY-SIX UNITS	202.50	243	.75
WATR	I	1	INDUSTRIAL	15.00	18	.75
WATR	J	1	SEVEN UNITS	60.00	72	.75
WATR	K	1	TWELVE UNITS	97.50	117	.75
WATR	L	1	THIRTEEN UNITS	105.00	126	.75
WATR	M	1	TEN UNITS	82.50	99	.75
WATR	N	1	VARIABLE UNITS	.00	0	.75
WATR	O	1	SIXTEEN UNITS	127.50	153	.75
WATR	P	1	NINE UNITS	75.00	90	.75
WATR	Q	1	TWENTY UNITS	157.50	189	.75
WATR	R	1	GLEN C BILLS (169)	.00	0	.82
WATR	S	1	SCHOOLS	15.00	18	.75
WATR	T	1	KAREN LEE APT (178)	1342.50	1611	.75
WATR	U	1	FIFTEEN UNITS	120.00	144	.75
WATR	V	1	SIX UNITS	52.50	63	.75
WATR	W	1	RESIDENTIAL	15.00	18	.75
WATR	X	1	OUTSIDE WATERING	.00	0	.75
WATR	Y	1	TWENTY FOUR UNITS	187.50	225	.75
WATR	Z	1	DBL & TRIPLE METERS	.00	0	.00

*** END OF REPORT ***

VII. SURVEY OF CURRENT AND FUTURE WATER SYSTEM:

Generally how would you assess the physical condition of you water system?

[ ] Currently inadequate, worn out or with significant immediate problems.
[ ] Adequate for at least 3 more years
[ ] Adequate for at least 5 more years
[ ] Adequate for at least 10 more years
[ ] Adequate for at least 15 more years
[X] Adequate for at least 25 more years

Estimated maximum number of connections you can serve based on present water supply: _____ Estimated number of connections you will need to serve in: 2000 _____ 2005 _____ 2010 _____

What statement best describes the condition of your distribution system with respect to fire protection?

[X] Fire protection is good. All of the distribution system maintains a minimum of 20 psi under peak and fire flow conditions.
[ ] Fire protection is fair. Most of the distribution system maintains a minimum of 20 psi under peak and fire flow conditions, but part of the system drops below 20 psi or is unable to sustain fire flows.
[ ] Fire protection is poor. Most of the distribution system can not maintain 20 psi under peak and fire flow conditions.

What statement best describes the condition of your distribution system with respect to leakage?

[ ] All of the system is in excellent shape. Very few leaks.
[ ] Most of the system is in excellent shape. However, there are some areas of the system with excess leakage.
[X] The system is in fair shape. We regularly have leaks to repair but the situation is manageable.
[ ] The system is in bad shape. We are kept busy repairing leaks and there is evidence of deterioration.

Do you have a current water management/conservation plan for your system? [ ] Yes, [ ] No, [ ] Being prepared

Do you contemplate a major improvement project to your culinary water system within the next 3 years? [X] Yes [ ] No If yes, please describe briefly:

Anticipated Construction Year	Project Description	Estimated Cost
	See attached pages 5-2-5b-5c	

How do you plan to finance these projects? [X] Cash on hand, [ ] Borrow money from the public bond market, [ ] Apply for federal or state financial assistance

Please indicate which agencies you intend to apply to and, if known the estimated amount.

		For information contact	
Utah Drinking Water Board	$	(801)536-4197	Michael Georgeson
Utah Board of Water Resources	$	(801)538-7294	Steve Wilde
Community Impact Board	$	(801)538-8726	Shirl Clarke
Community Development Block Grant Program	$	(801)538-8730	Richard Walker
Farmer's Home Administration	$	(801)524-3244	Duane Olson

For additional information and he[illegible]ee the enclosed yellow example.

A	B	C	D		E		F
Needs *(List capital needs by project for 1995 through 2014.)*	**Type of Need** *(Why does your system need this project? List the code[s] from Table 1 that best describe the project.)*	**Documentation of Need** *(What type of documentation supports this project? List all codes from Table 2 that apply. Attach only the appropriate portion of each document used to justify need [e.g., Executive Summary, Conclusion].)*	**Treatment and Design Capacity** *(Treatment: if the project involves treatment, refer to Table 3 and enter the treatment code[s] that apply. If the project does not involve treatment, enter "None.")* *(Design Capacity: enter design capacity when applicable—e.g., MGD for treatment and pumping, or millions of gallons for storage.)*		**Cost of Project (Capital cost only. Do not include O & M.)** *(Enter the cost estimate [if known] for this project and the dollar month and year of the estimate.)*		**Source of Cost Estimate** *(If documentation for cost exists, list all codes from Table 4 that apply. Attach only the appropriate portion of each document used to justify cost [e.g., Executive Summary, Conclusion]. If documentation for cost does not exist, enter code 7.)*
			Treatment	Design Capacity	Cost Estimate	Month/Year	
GHID OFFICE COMPLEX			—	—	$4.9M	JAN/95	
WWTP STORAGE					$235,000	JAN/95	
SCADA SYSTEM					$25,000	JAN/95	
OFFICE - WAREHOUSE					$		

Please turn the page and go to Question 2.

For additional information and he[illegible]see the enclosed yellow example.

A	B	C	D		E		F
Needs *(List capital needs by project for 1995 through 2014.)*	**Type of Need** *(Why does your system need this project? List the code[s] from Table 1 that best describe the project.)*	**Documentation of Need** *(What type of documentation supports this project? List all codes from Table 2 that apply. Attach only the appropriate portion of each document used to justify need [e.g., Executive Summary, Conclusion].)*	**Treatment and Design Capacity** *(Treatment: if the project involves treatment, refer to Table 3 and enter the treatment code[s] that apply. If the project does not involve treatment, enter "None.")* *(Design Capacity: enter design capacity when applicable—e.g., MGD for treatment and pumping, or millions of gallons for storage.)*		**Cost of Project (Capital cost only. Do not include O & M.)** *(Enter the cost estimate [if known] for this project and the dollar month and year of the estimate.)*		**Source of Cost Estimate** *(If documentation for cost exists, list all codes from Table 4 that apply. Attach only the appropriate portion of each document used to justify cost [e.g., Executive Summary, Conclusion]. If documentation for cost does not exist, enter code 7.)*
			Treatment	Design Capacity	Cost Estimate	Month/Year	
MAIN WATER TRANS LINE				36" ϕ	$13.2 m	JAN 95	
~~MAIN WATER TRANS LINE~~ (DISTRIBUTION TREATMENT)				VAR.	$1060,000	JAN 95	
NEW WELLS (3)				6000gpm	$2.75m	JAN 95	
TREATMENT					$10.0 m	JAN 95	
STORAGE "ZONE "C"				2mg	$2.0m	JAN 95	
STORAGE "ZONE "1"				2mg	$2.0m	JAN 95	
STORAGE ~~BREEZE~~ "BREEZE ZONE "4"				4.4 mg	$~~4.5~~ 1.5 m	JAN 95	

Please turn the page and go to Question 2.

Page 5-b

For additional information and h[illegible] see the enclosed yellow example.

A	B	C	D		E		F
Needs *(List capital needs by project for 1995 through 2014.)*	**Type of Need** *(Why does your system need this project? List the code[s] from Table 1 that best describe the project.)*	**Documentation of Need** *(What type of documentation supports this project? List all codes from Table 2 that apply. Attach only the appropriate portion of each document used to justify need [e.g., Executive Summary, Conclusion].)*	**Treatment and Design Capacity** *(Treatment: if the project involves treatment, refer to Table 3 and enter the treatment code[s] that apply. If the project does not involve treatment, enter "None.")* *(Design Capacity: enter design capacity when applicable—e.g., MGD for treatment and pumping, or millions of gallons for storage.)*		**Cost of Project (Capital cost only. Do not include O & M.)** *(Enter the cost estimate [if known] for this project and the dollar month and year of the estimate.)*		**Source of Cost Estimate** *(If documentation for cost exists, list all codes from Table 4 that apply. Attach only the appropriate portion of each document used to justify cost [e.g., Executive Summary, Conclusion]. If documentation for cost does not exist, enter code 7.)*
			Treatment	Design Capacity	Cost Estimate	Month/Year	
2700 South Sewer				36"ϕ	$6.6m	Jan 95	
3100 South Sewer				48"ϕ	$12.0m	Jan 95	
Collection improvements				Var	$ 2.5m	Jan 95	
Warner Sewer Syst				—	$ 3.5m	Jan 95	
Cathodic Protection				—	$ 100,000	Jan 95	
Central Valley							

Please turn the page and go to Question 2.

8-16-95
9:20 Am
will call me back.

8-21-95 use
1:45 pm

done ERD

all

Department of Environmental Quality
Division of Environmental Response and Remediation
CERCLA Branch
Site Assessment Section
Phone Log

To: Gerald Larson — Date/ Time: 4/4/95
Number: 968-3551 — Address: Granger-Hunter Imp. District
From: Michelle Lutz — P.O. Box 701110 West Valley, UT 84170
Subject/Site: Well #'s

3500 S 1300 W #1, 2400 S 3600 W #5, Abandoned #3, #6, Beginning
-4400 W 2400 S #9, 1300 W 2320 S #7 #12

Population Served

can estimate population or household served.

# of Connections — will be hard to do because so many connections.

3500 So. 1300 W. Well #1 · Serves 85,000
4% - 1994 of total = 3400
775' deep capacity 1200 gal/min
not contaminated

Well Depth

Withdrawel Capacity

2400 So. 3600 W. well #5 · Serves 85,000
4% of total usage = 340C
916' deep 1400 gal/min
not contaminated

Well Use

4400 W. 2400 So. well #9 — Not in their system rented for awhile.

Any High Levels of Inorganics in Water

Is Surface Water Blended

1300 W. 2320 So. #7 · Serves 85,000
17% of population = 14,45C
1036' deep 3500 gal/min
uncontaminated

If so # of wells used.

#8 -1000 W. 3800 So. replaces #3 · #3 served 85,000
3% of population served = 2550
July + Aug. 980 feet 1500 gal/min.

12 — brand new well — #~~8~~ same as 1500 W 3050 So. replaces #6 · #6 served 85,000 10,200 people
Just turning it on — last week 2000 gal/min, 900-1000' deep
Estimate 12%

What percent does this well contribute to system?
or # of people served in system ÷ # of wells in system.

or # of residential connections times # of commercial connections times 3.2 people per connection.

computer RRD

done

Department of Environmental Quality
Division of Environmental Response and Remediation
CERCLA Branch
Site Assessment Section
Phone Log

To: Floyd Nielson
Number: 968-9081
From: Michelle Lutz
Subject/Site: Well #'s
Rawson Well,
Active DW Well ✓

Date/ Time: 4/4/95 10:15 am
Address: Taylorsville-Bennion WID
1800 W 4700 S, SLC UT 84118

Aquifer formation 800 ft

Population Served 2,900

# of Connections

Well Depth 800 ft

Withdrawal Capacity 1000 gal/min

Well Use DW

Any High Levels of Inorganics in Water - No lead levels elevated
Talk to Kevin Fitz
< .005 mg/L TDS - 853 mg/L
Antimony .006 mg/L. As - .006 mg/L

Is Surface Water Blended - with water from SL Conserv District

If so # of wells used. 18

52,000 ÷ 18 wells ≐ 2,900 per well
People served (2,889)

Complete

RRD

done

Department of Environmental Quality
Division of Environmental Response and Remediation
CERCLA Branch
Site Assessment Section
Phone Log

To: Leroy Haden
Number: 403-6768
From: Michelle Lutz
Subject/Site: Well #'s 202 Canyon Rd.

Date/ Time: 4/4/95 10:35
Address: 1530 S W. Temple SLC UT 84115
SLC Water System

Population Served ~ 50,000 ~ 5,648 High Producing Well down town Area

# of Connections ~ comingled hard to tell

Well Depths - 464 ft deep

Withdrawel Capacity -

Well use - DW

Any High Levels of Inorganics in Water - n

Is Surface Water Blended yes

If so # of wells used.

Annual Basis -
per capita use 17765 connections ← water delivered
X 3.2 per connections ÷ per capita consumption
5,648 annual population served

What percent does this well contribute to system?
if Know population served, residential connections
two times it by commercial "

to get population, subtract commercial conn's.

Complete

done

KRD
4-4-95 11 AM Michelle Lutz spoke w/ Dean Stock

8-18-95 8:30 AM Eg talked to Marvin Taylor

Department of Environmental Quality
Division of Environmental Response and Remediation
CERCLA Branch
Site Assessment Section
Phone Log

Liz 2. Marvin ~~Taylor~~

To: Dean Stock Date/ Time: 4/4/95 1100

Number: 483-6014 Address: South SLC Water

From: Michelle Lutz / Elizabeth Yeomans 220 E. Morris Ave. South SL, UT 84115

Subject/Site: Well #'s

Bolinder #2, Davis, 265 W 2975 S, 2501 S. 300 E., Vitro Well
abandoned

Population Served 10,272 ~~daytime~~ residents / 50,000 ~~nighttime~~ daytime

# of Connections

Well Depth > 900 ft

Withdrawel Capacity Varies from 200 gal/min — 1,100 gal/min

Well Use - DW

Any High Levels of Inorganics in Water - none above MCL's

Is Surface Water Blended - no

If so # of wells used. 5 wells used.

3,000 Bolinder 200 gal/min, DW, SSLC - business 80% = 2,054 to 10,000
1088 ft deep no metals - blended system 5 wells 10,272 residential Popula
close to 15,000 45,000-50,000 ~~night~~ daytime use (conservative)

3,000 Davis 1,100 gal/min, year round DW, No metals
going thru
1000 ft deep blended system · Still in use Population: w/ study
265 abandoned GW: 100% System has 5 wells

3,000 2501 S 300 E 450 gal/min, Spring, Summer & Fall 75% DW no metals
948 well depth blended system 1 of 5 wells

0 Vitro Well not developed -
undeveloped · don't know if will do ~ 6,000 per well

V3
18,09

from Dames & Moore
Job No. 12818-011-031
— Reference #2 —

HOUSE-TO-HOUSE SURVEY RESULTS

A summary of canvas results is presented in Table A-32. A total of 226 surveys were completed over a six day period for the water well inventory survey. Two hundred and nine of these were completed in person. Of these 226 surveys 173 respondents said they did not have a well on their property while 41 respondents did not know if there was ever a water well on their property. Eleven respondents did indicate that there was a well on their property; information given is summarized in Table A-33. Six of these respondents indicated that their well was either not used or capped. Two wells were used only in summer for irrigation and three used year round for irrigation or stockwater. One well is used for hazardous waste monitoring.

VERIFICATION OF STATE ENGINEER'S RECORDS

During the week of April 10, Dames & Moore attempted to identify the existence of wells and the uses of water from those wells of property owners on record with the State Engineer's office and within the field survey area. These wells or water rights are listed on Tables A-34 and A-35. Only wells that Dan Jones & Associates Inc., was unable to confirm were investigated. A total of 43 wells within the field survey area were on record with the State Engineer's office. Three of these wells are EPA monitor wells in or near the City Landfill situated northwest of the Site.

INVESTIGATION METHODS

Dames & Moore personnel attempted to contact listed owners in the water rights and well log files by telephone. Many of the records were outdated and no telephone numbers for the owners were listed. Addresses from these lists were then used to locate wells on a parcel map provided by the Salt Lake County Recorder's office. Parcel numbers where water wells were plotted on the map were used to identify property owners using the Assessment File by Parcel Number list also provided by the County Recorder's office. An attempt

was made to reach these property owners with listed phone numbers by telephone to confirm listed water wells. For property owners with unlisted phone numbers a field visit was made to the property sites to look for visible signs of a well, or other information which would indicate property owner's phone number. When and if property owners were finally reached, the water well inventory survey was conducted over the telephone.

VERIFICATION RESULTS

A total of 25 well verification surveys were completed over a one-week period of property owners within the defined area. Nineteen of these were completed by telephone and 6 were completed by a field survey. Of the 19 surveys completed by telephone, 7 respondents did not know if there was ever a well on their property. Of the 6 field surveys there was no evidence of any wells.

Nine property owners responded that they have a well or wells on their property, Mr. Hansen has 3 wells and Nina Dawson's property has 2 wells. From the 9 respondents 12 wells were verified and are summarized on Table A-36. Of the 12 wells verified 2 have been abandoned, 2 are used only in the summer for irrigation purposes and 8 wells are no longer used for any purpose. These 12 wells were drilled between 1921 and 1976. They range in depth from 105 feet deep to 136 feet deep, and all are 2 inches in diameter.

FIELD SURVEY RESULTS SUMMARY

A total of 251 surveys were conducted by both Dan Jones & Associates and Dames & Moore for the defined area around the Lone Star waste cement kiln dust site on Redwood Road. Of these 251 surveys 20 respondents indicated that there were water wells located on their property. These 20 respondents verified the existence of 23 wells within the field survey area. Dan Jones & Associates verified 11 wells, 6 of which are not found in the State Engineer's records and Dames & Moore verified 12 wells all of which are found in the

State Engineer's records. This leaves 26 wells from the State Engineer's records unverified. The 17 wells verified from the State Engineer's records are presently used only for irrigation, stockwater and 1 is used for the single intention of monitoring possible hazardous waste.

COMPILATION OF STATE ENGINEER'S RECORDS

A listing of all water wells within a three-mile radius of the sites was compiled from two sources provided by the Utah State Department of Natural Resources, Water Rights Division. The first source was from the Water Rights Division's computer files for wells drilled for the purpose of diverting ground water for all beneficial uses, including domestic, municipal, irrigation, stock watering and other usage. The second source of information was compiled from driller's well logs on file with the State Engineer not found in the computer files. These records were compiled on a section-by-section basis according to type of use in Tables A-37 through A-41, and well location are plotted on Plates 31 through 36d.

The computer files obtained from the Water Rights Division were appended into a database for the purpose of listing these wells in a tabular form. This data was then further broken down according to the purpose for which the ground water will be used. Tables A-37 through A-41 presents, in tabular form, wells drilled for the purpose of diverting ground water for domestic, municipal, irrigation, stock watering and other usage, respectively.

Well positions were plotted by the Water Rights Division from their computer files for each township, range and section that falls within or is intersected by the three-mile radius from the sites. Well position plots were obtained for each of the five usage categories as well as for the total water rights inventory as compiled from the computer files.

The water rights inventory area was divided into four quadrants for convenience in presenting this data. Each water rights category well positioning plot is presented on four plates, each plate corresponding to one of the four quadrants. Plate 31 presents well position plots for the total water rights inventory. Plates 32a through 32d are well position plots for domestic wells; Plates 33a through 33d are well position plots for municipal wells; Plates 34a through 34d are well position plots for irrigation wells; Plates 35a through 35d are well position plots for stock watering wells and Plates 36a through 36d are well position plots for other usage wells.

The well inventory data compiled from the driller's well logs which were not found in the Water Rights Division computer files is presented in tabular form in Table A-42. This data is presented by township, range and section and was included in the well inventory for the sake of completeness.

A comparison was made between the First Report Well Inventory and the Phase II RIFS Report Well Inventories for wells used for domestic purposes that are located within a one-mile radius of the sites. Three wells listed in the First Report Well Inventory as being used for domestic purposes are listed as being used for irrigation purposes in the Phase II RI/FS Well Inventory, according to the Water Rights Division records there are also two wells in the First Report Well Inventory listed as being used for domestic purposes which were not found in the Phase II RI/FS well inventories. The first well (Water Rights Number 59-3742) is located southeast of the site and is on the south side of the Surplus Canal. The second well (Application Number A-5818) is also located southeast of the site and is situated on the east side of the Jordan River.

All wells have been drilled to a total depth greater than 90 feet based on the information obtained from the Water Rights Division computer files for domestic wells which have recorded total depths and well diameters. The well diameters range from 1 inch to 4 inches, with one well having a diameter of 12 inches. This well is located T1S R1W Sec 15 DBA which is southwest of the sites and the Surplus Canal.

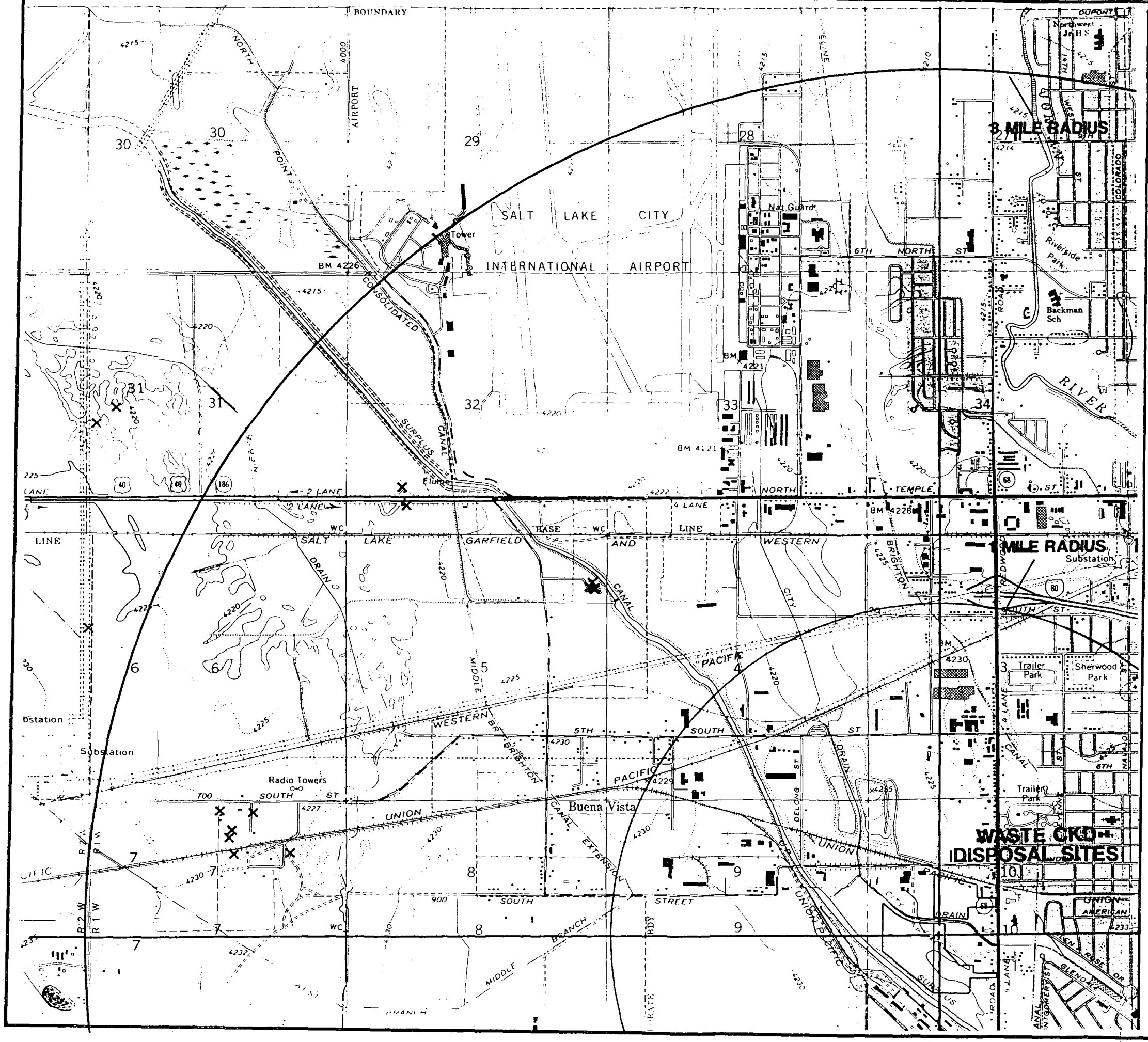
No municipal wells were found in the First Report Well Inventory or the Phase II RIFS Well Inventories to be located within the one-mile radius of the sites. The nearest municipal wells were approximately 2.5 miles southeast from the sites.

The nearest well northwest of the site is located in the NE¼ of the NW¼ of the NE¼ of Section 9, Township 1 south, Range 1 west. It is situated approximately 100 feet north of the Union Pacific mainline and approximately 300 feet west of the Surplus Canal. The well is owned by Mr. R.C. Skola and was drilled in 1920 to an unknown depth and has a diameter of 1-1/2 inches. It is used for domestic and irrigation purposes and yields approximately 7 gpm. This well corresponds to well number 45 from Table 37 in the First Report well inventory.

HYPOTHETICAL SCENARIO FOR CITY DRAIN WATER QUALITY

Hydrologic data collected during Phase I of the RI indicates that shallow ground water at the waste CKD Disposal Site discharges to the City Drain. The City Drain is a storm sewer which bisects the Site and receives industrial wastes and influent from uncontrolled sources upstream of the waste CKD Site. Analytical results from Phase I are presented in the Geohydrological Report (Dames & Moore, 1986) found it to contain poor quality water and that there was no statistically significant increase in parameter concentrations at the first potential point of exposure off-site. Additional sampling during Phase II of the RI was performed in the City Drain to further characterize observed effects, and results of this sampling event are presented above.

The State has expressed concern regarding potential exposure to waste CKD via the City Drain and increased health risks resulting thereof. Since no seasonal sampling or flow rate data has been obtained (due to the constraints of the RI/FS schedule), there is no data available to evaluate seasonal effects on the City Drain water quality. To address potential short term exposure, a "worst case" scenario was defined and the possible impacts to the City



REFERENCE

U.S.G.S. 7.5 MIN. QUADRANGLES ENTITLED-

1) MAGNA, UTAH - 1952, PR 1969 & 1975
2) MAGNA, UTAH - 1972
3) SALT LAKE CITY NORTH, UTAH - 1963, PR 1969 & 1975
4) SALT LAKE CITY SOUTH, UTAH - 1963, PR 1969 & 1975

WATER RIGHTS WELL LOCATIONS FOR OTHER USAGE NORTHWEST QUADRANT

Dames & Moore

PLATE A-36d

DATE _____ CHECKED BY _____ DATE _____

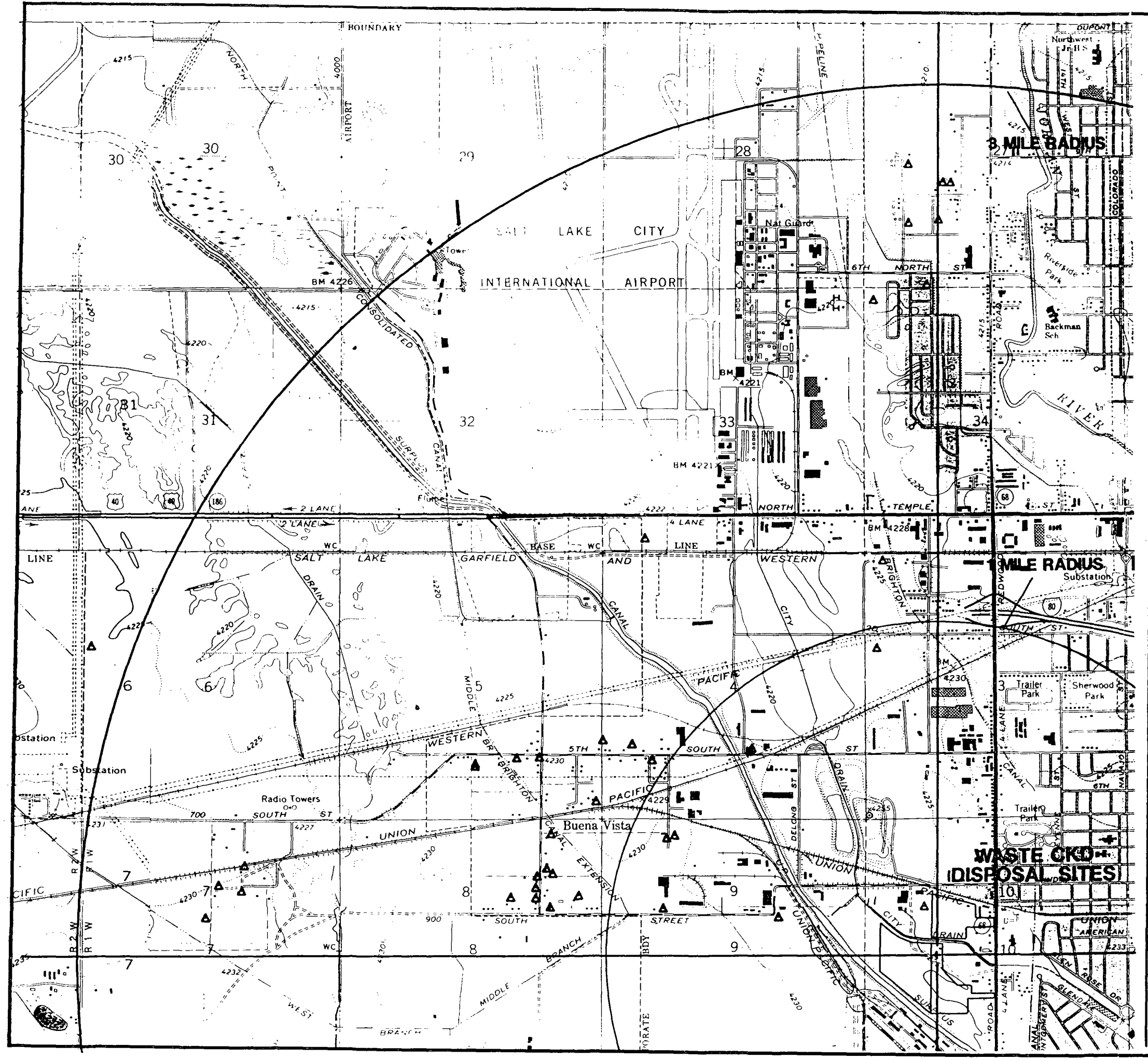
FILE (218-01-5003) BY _____

46612 (11-82)

DRAWN BY _____ DATE _____ CHECKED BY _____ DATE _____

FILE 12818-011-5003 BY _____

466.12 (11-82)



REFERENCE

U.S.G.S. 7.5 MIN. QUADRANGLES ENTITLED-

1) MAGNA, UTAH - 1952, PR 1969 & 1975
2) MAGNA, UTAH - 1972
3) SALT LAKE CITY NORTH, UTAH - 1963, PR 1969 & 1975
4) SALT LAKE CITY SOUTH, UTAH - 1963, PR 1969 & 1975

WATER RIGHTS WELL LOCATIONS FOR STOCK USAGE NORTHWEST QUADRANT

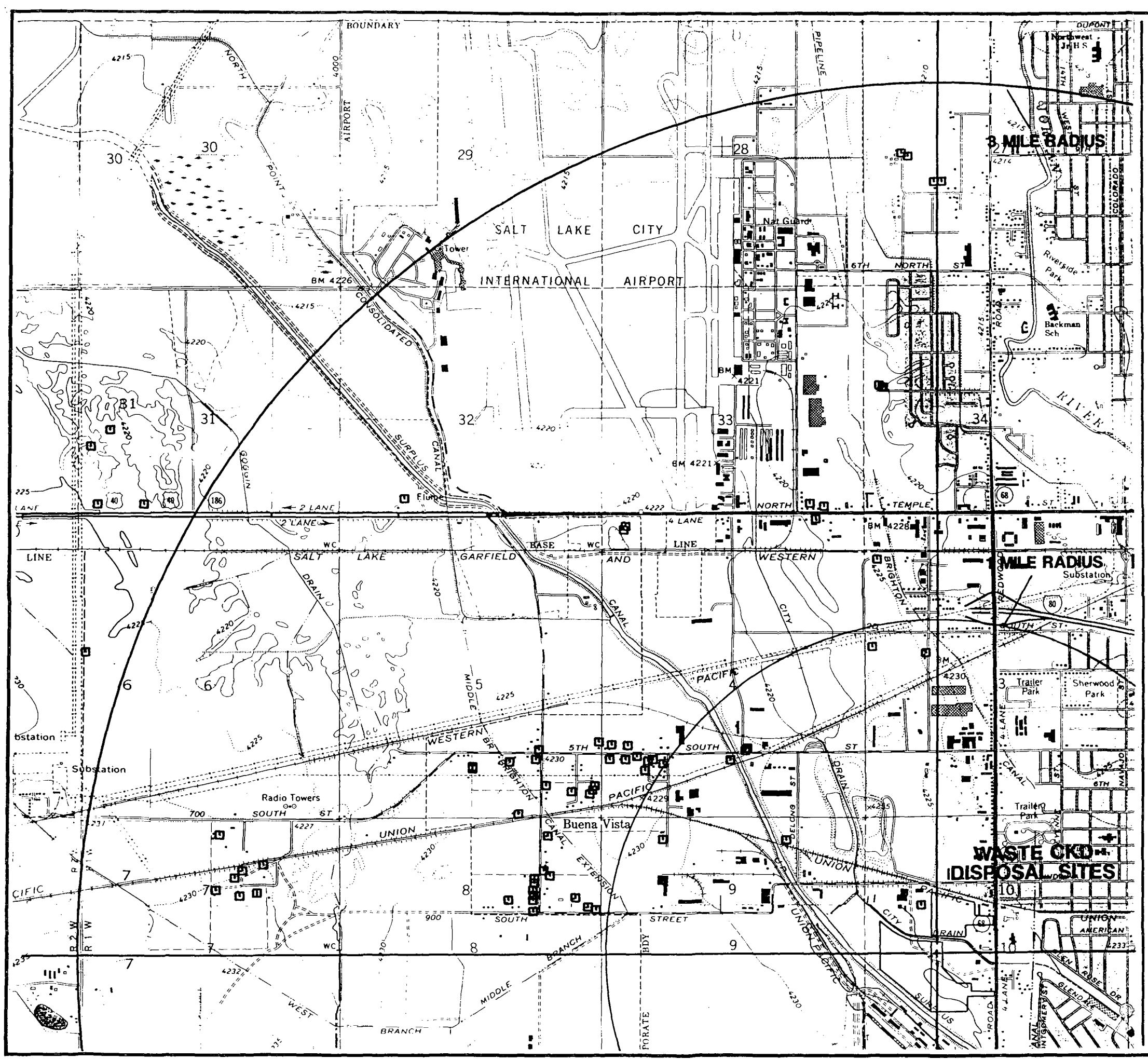
Dames & Moore

PLATE A-35d

DATE _____ CHECKED BY _____ DATE _____

FILE [illegible]-011-5003 BY

466.12 (11-82)



REFERENCE

U.S.G.S. 7.5 MIN. QUADRANGLES ENTITLED-

1) MAGNA, UTAH - 1952, PR 1969 & 1975
2) MAGNA, UTAH - 1972
3) SALT LAKE CITY NORTH, UTAH - 1963, PR 1969 & 1975
4) SALT LAKE CITY SOUTH, UTAH - 1963, PR 1969 & 1975

WATER RIGHTS WELL LOCATIONS FOR IRRIGATION USAGE NORTHWEST QUADRANT

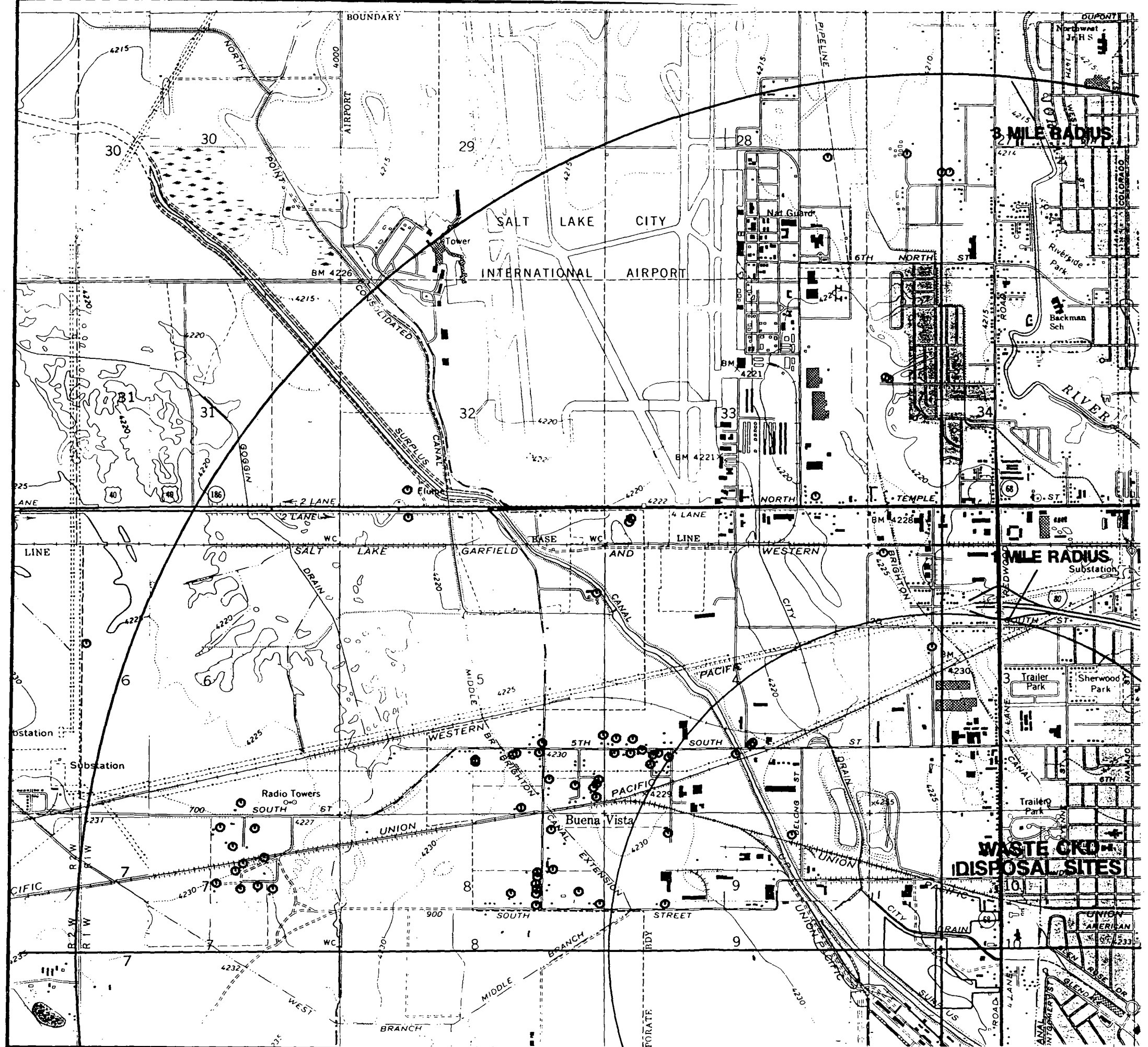
Dames & Moore

PLATE A-34d

DATE _____ CHECKED BY _____ DATE _____

FILE (218-101-5003 BY

466.12 (11-82)



REFERENCE

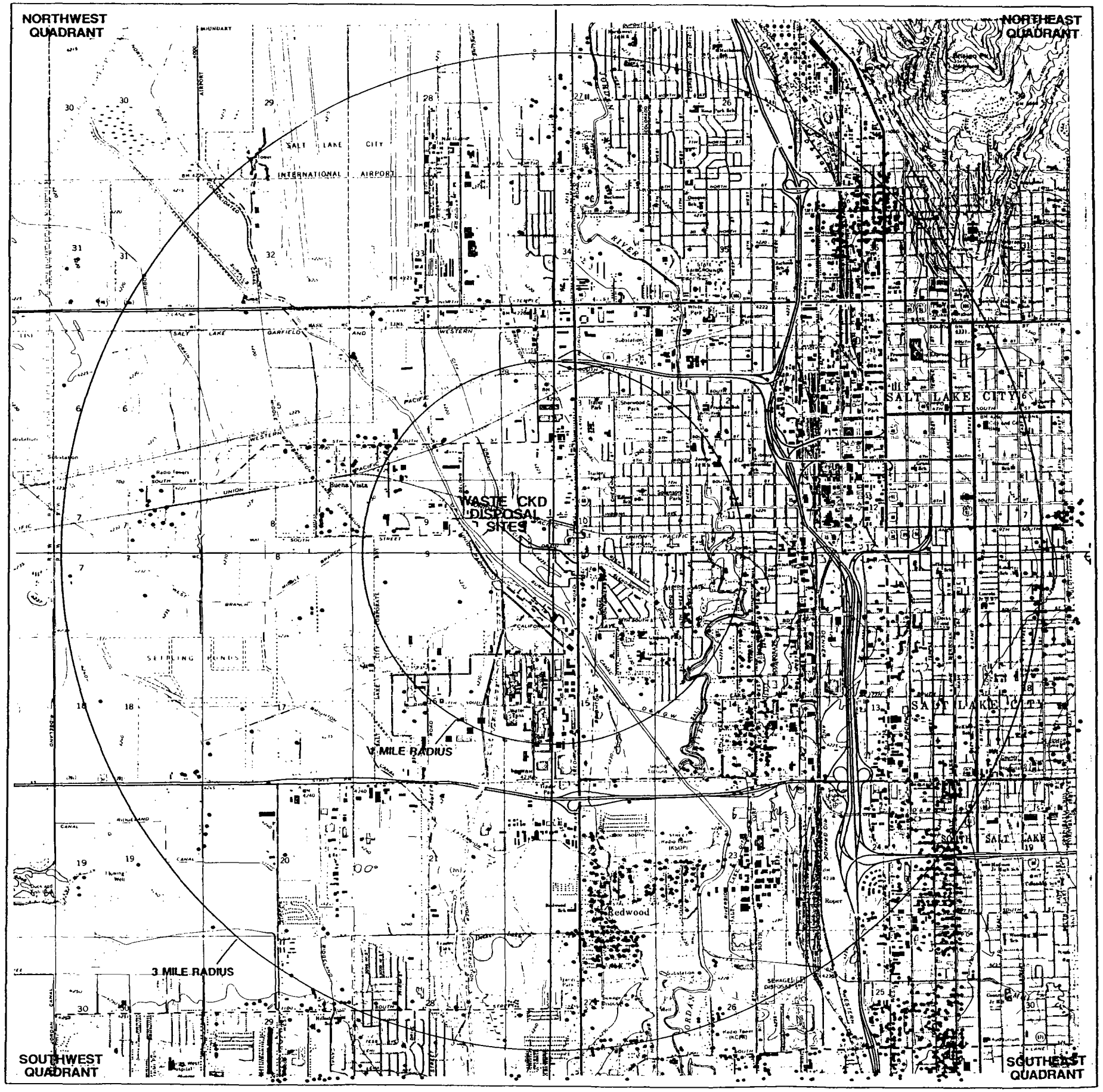
U.S.G.S. 7.5 MIN. QUADRANGLES ENTITLED-

1) MAGNA, UTAH - 1952, PR 1969 & 1975
2) MAGNA, UTAH - 1972
3) SALT LAKE CITY NORTH, UTAH - 1963, PR 1969 & 1975
4) SALT LAKE CITY SOUTH, UTAH - 1963, PR 1969 & 1975

WATER RIGHTS WELL LOCATIONS FOR DOMESTIC USAGE NORTHWEST QUADRANT

Dames & Moore

PLATE A-32d



N

2000 0 2000 4000

SCALE IN FEET

U.S.G.S. 7.5 MIN. QUADRANGLES ENTITLED-
1) MAGNA, UTAH - 1952, PR 1969 & 1975
2) MAGNA, UTAH - 1972
3) SALT LAKE CITY NORTH, UTAH - 1963, PR 1969 & 1975
4) SALT LAKE CITY SOUTH, UTAH - 1963, PR 1969 & 1975

WATER RIGHTS WELL LOCATIONS FOR WELL INVENTORY

Dames & Moore

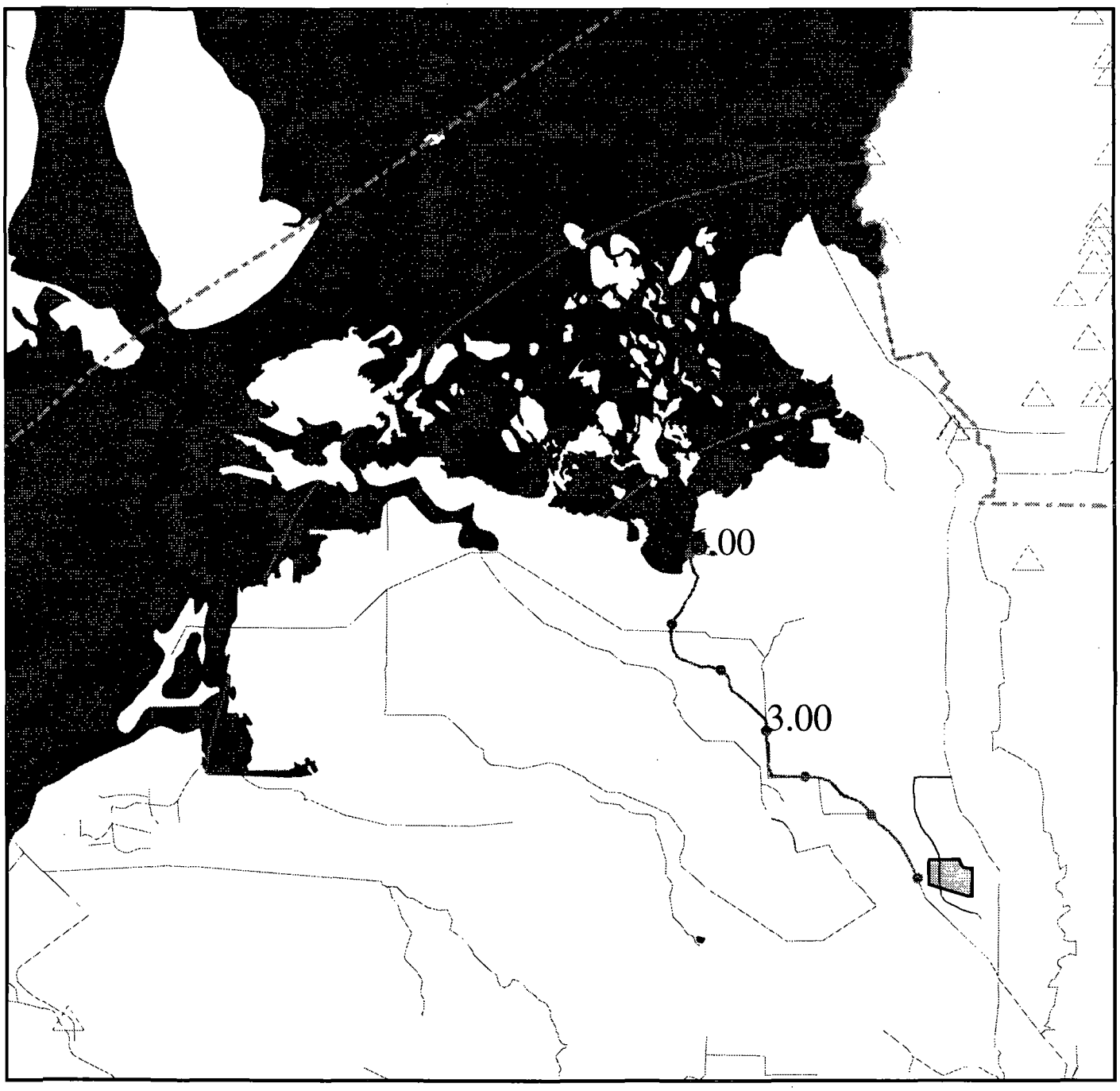
PLATE A-31

REVISIONS
BY DATE
BY DATE
BY DATE
PLATE OF

FILE 12818 - 011 - 5003
BY DATE
CHECKED BY DATE

APPENDIX G

Surface Water Targets



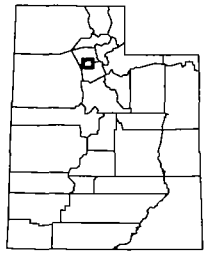
Redwood Rd. Dump – 15 Mi Downstream Water Rights Surface Municipal

N

Scale
1" = 1.91 Miles

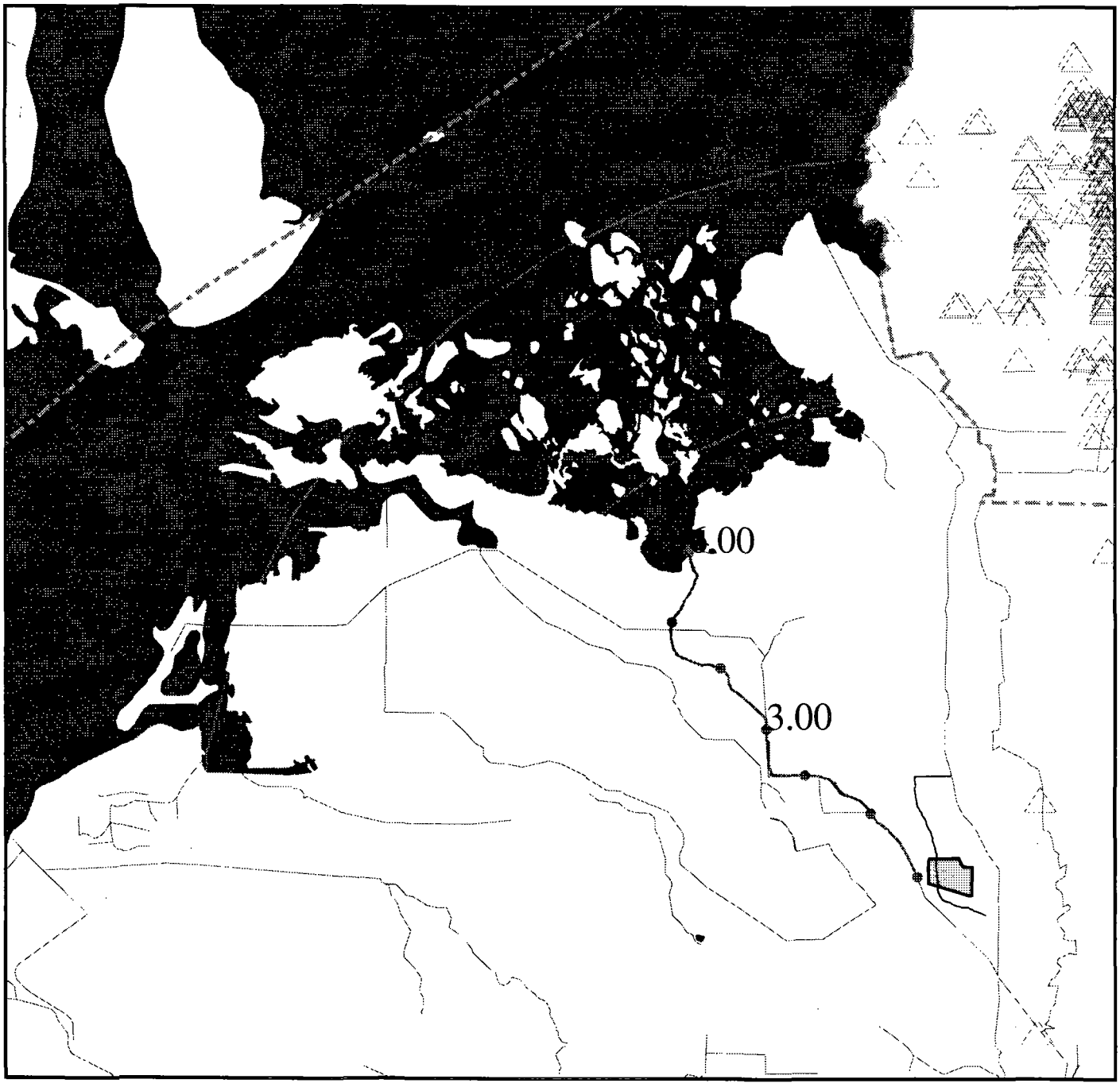
Legend

- Site
- Hydrography
- County boundaries
- Surface POD
- 15 Mile Downstream Influence



UDEQ
Division of Environmental Response and Remediation

file: redrdwrmun created by: hsandbec on 03/24/95



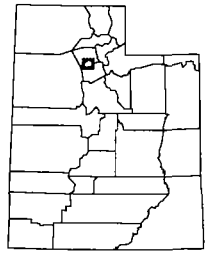
Redwood Rd Dump–15 Mi Downstream Water Rights Surface Domestic

N

Scale
1" = 1.91 Miles

Legend

- Site
- Hydrography
- County boundaries
- Surface POD
- 15 Mile Downstream Influence

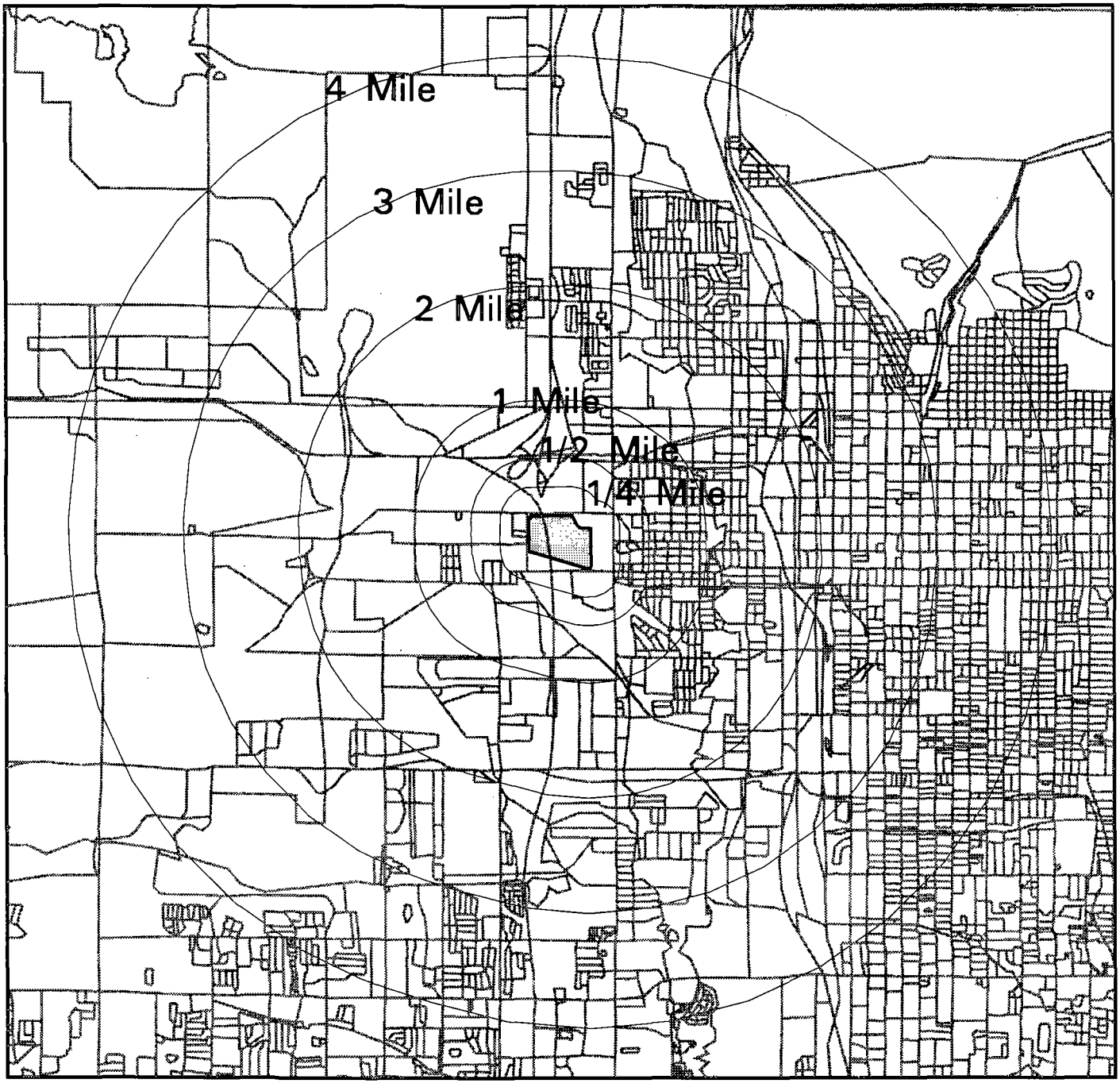


UDEQ
Division of Environmental Response and Remediation

file: redrdwrdom created by: hsandbec on 03/24/95

APPENDIX H

GIS Population Study by Block



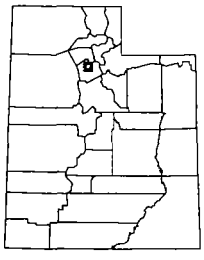
Redwood Road Dump
4 Mile Population Radius – Block Level

N

Scale
1" = 1.33 Miles

Legend

- Site
- Concentric bands
- County boundaries
- Census Blocks



UDEQ
Division of Environmental
Response and Remediation

file: redrdcen created by: hsandbec on 03/22/95

Population by Concetric Bands
Calculated from Census Blocks
Site Theme: cercla
Site Name: redwoodrdpoly
Created By: hsandbec
Created On: 03/22/95

Total 1/4 mile	319.000000
Total 1/2 mile	1,833.000000
Total 1 mile	8,289.000000
Total 2 mile	25,291.000000
Total 3 mile	50,358.000000
Total 4 mile	102,541.000000

Population by Census Block and Concetric Bands
Site Theme: cercla
Site Name: redwoodrdpoly
Created By: hsandbec
Created On: 03/22/95

Block	1/4 MILE		1/2 MILE		1 MILE		2 MILES		3 MILES		4 MILES	
	PCT	POP	PCT	POP	PCT	POP	PCT	POP	PCT	POP	PCT	POP
03522121027 310	47	219	100	464	100	464	100	464	100	464	100	464
03522221027 322	50	26	100	53	100	53	100	53	100	53	100	53
0352001100302126	100	18	100	18	100	18	100	18	100	18	100	18
03522221027 311	54	17	100	31	100	31	100	31	100	31	100	31
03522221027 323	65	17	100	26	100	26	100	26	100	26	100	26
03522221027 335	51	11	100	21	100	21	100	21	100	21	100	21
03522221027 320	22	8	100	40	100	40	100	40	100	40	100	40
03522021027 136	1	2	97	206	100	213	100	213	100	213	100	213
0352001100302127	68	1	100	1	100	1	100	1	100	1	100	1
03522021027 137	0	0	57	141	100	245	100	245	100	245	100	245
03522121027 309	0	0	100	80	100	80	100	80	100	80	100	80
03522221027 319	0	0	100	72	100	72	100	72	100	72	100	72
03522121027 308	0	0	100	62	100	62	100	62	100	62	100	62
03522121027 301	0	0	88	50	100	56	100	56	100	56	100	56
03522221027 332	0	0	100	49	100	49	100	49	100	49	100	49
03522121027 307	0	0	31	48	100	156	100	156	100	156	100	156
03522441028 311	0	0	67	45	100	67	100	67	100	67	100	67
03522221027 334	0	0	100	45	100	45	100	45	100	45	100	45
03522221027 327	0	0	48	40	100	83	100	83	100	83	100	83
03522221027 326	0	0	100	38	100	38	100	38	100	38	100	38
03522221027 316	0	0	44	32	100	73	100	73	100	73	100	73
03522221027 313	0	0	50	25	100	49	100	49	100	49	100	49
03522221027 338	0	0	97	25	100	25	100	25	100	25	100	25
03522221027 318	0	0	51	24	100	46	100	46	100	46	100	46
03522021027 135	0	0	5	23	100	504	100	504	100	504	100	504
03522221027 324	0	0	100	18	100	18	100	18	100	18	100	18
03522221027 312	0	0	100	13	100	13	100	13	100	13	100	13
03522221027 333	0	0	100	7	100	7	100	7	100	7	100	7
03522221027 321	0	0	100	6	100	6	100	6	100	6	100	6
03522221027 331	0	0	11	4	100	38	100	38	100	38	100	38
03522221027 337	0	0	100	2	100	2	100	2	100	2	100	2
03522221027 325	0	0	100	1	100	1	100	1	100	1	100	1
03522041027 106	0	0	0	0	100	340	100	340	100	340	100	340
03522461028 212	0	0	0	0	100	132	100	132	100	132	100	132
03522041027 107	0	0	0	0	100	131	100	131	100	131	100	131
03522441028 307	0	0	0	0	100	128	100	128	100	128	100	128
03522421028 318	0	0	0	0	100	126	100	126	100	126	100	126
03522461028 211	0	0	0	0	99	119	100	119	100	119	100	119
03522041027 124	0	0	0	0	100	112	100	112	100	112	100	112
0352050100304410	0	0	0	0	21	111	100	531	100	531	100	531
03522141027 131	0	0	0	0	100	97	100	97	100	97	100	97
03522041027 129	0	0	0	0	100	96	100	96	100	96	100	96
0352202100304501	0	0	0	0	100	91	100	91	100	91	100	91
03522441028 308	0	0	0	0	100	91	100	91	100	91	100	91
03522241028 203	0	0	0	0	100	90	100	90	100	90	100	90
03522141027 130	0	0	0	0	100	89	100	89	100	89	100	89
03522241027 223	0	0	0	0	100	89	100	89	100	89	100	89
03522041027 128	0	0	0	0	97	85	100	87	100	87	100	87
03522121027 305	0	0	0	0	100	83	100	83	100	83	100	83
03522041027 123	0	0	0	0	100	81	100	81	100	81	100	81
03522141027 133	0	0	0	0	100	81	100	81	100	81	100	81
03522421028 317	0	0	0	0	100	77	100	77	100	77	100	77

03522041027	122	0	0	0	0	100	74	100	74	100	74	100	74
03522141027	217	0	0	0	0	100	73	100	73	100	73	100	73
03522461028	210	0	0	0	0	77	72	100	93	100	93	100	93
03522241027	224	0	0	0	0	100	72	100	72	100	72	100	72
03522041027	118	0	0	0	0	100	70	100	70	100	70	100	70
03522421028	316	0	0	0	0	100	69	100	69	100	69	100	69
03522241027	218	0	0	0	0	100	68	100	68	100	68	100	68
03522441028	309	0	0	0	0	100	68	100	68	100	68	100	68
03522141027	205	0	0	0	0	100	65	100	65	100	65	100	65
03522221027	317	0	0	0	0	100	65	100	65	100	65	100	65
03522421028	320	0	0	0	0	100	64	100	64	100	64	100	64
03522121027	306	0	0	0	0	100	62	100	62	100	62	100	62
03522141027	215	0	0	0	0	100	62	100	62	100	62	100	62
03522441028	310	0	0	0	0	100	60	100	60	100	60	100	60
03522421028	321	0	0	0	0	52	59	100	112	100	112	100	112
03522141027	216	0	0	0	0	100	59	100	59	100	59	100	59
03522141027	134	0	0	0	0	100	58	100	58	100	58	100	58
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0352202100304509		0	0	0	0	100	56	100	56	100	56	100	56
03522141027	214	0	0	0	0	100	56	100	56	100	56	100	56
03522241027	219	0	0	0	0	100	55	100	55	100	55	100	55
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03522221027	328	0	0	0	0	100	52	100	52	100	52	100	52
03522241027	221	0	0	0	0	100	52	100	52	100	52	100	52
03522461028	209	0	0	0	0	34	51	100	148	100	148	100	148
03522121027	302	0	0	0	0	100	51	100	51	100	51	100	51
03522521028	422	0	0	0	0	54	50	100	92	100	92	100	92
03522241027	212	0	0	0	0	100	50	100	50	100	50	100	50
03522121027	303	0	0	0	0	100	48	100	48	100	48	100	48
03522221027	315	0	0	0	0	100	48	100	48	100	48	100	48
03522241027	222	0	0	0	0	100	48	100	48	100	48	100	48
03522141027	220	0	0	0	0	100	47	100	47	100	47	100	47
03522421028	313	0	0	0	0	100	47	100	47	100	47	100	47
03522421028	315	0	0	0	0	100	47	100	47	100	47	100	47
03522481028	322	0	0	0	0	47	46	100	98	100	98	100	98
03522041027	111	0	0	0	0	100	43	100	43	100	43	100	43
03522141027	206	0	0	0	0	100	43	100	43	100	43	100	43
03522221027	329	0	0	0	0	100	40	100	40	100	40	100	40
03522421028	314	0	0	0	0	100	40	100	40	100	40	100	40
03522441028	304	0	0	0	0	100	39	100	39	100	39	100	39
03522241027	207	0	0	0	0	74	36	100	48	100	48	100	48
03522041027	112	0	0	0	0	100	35	100	35	100	35	100	35
03522221027	330	0	0	0	0	100	35	100	35	100	35	100	35
03522141027	202	0	0	0	0	92	34	100	36	100	36	100	36
03522221027	341	0	0	0	0	100	33	100	33	100	33	100	33
0352001100302155		0	0	0	0	61	32	100	53	100	53	100	53
03522241027	235	0	0	0	0	100	32	100	32	100	32	100	32
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03522141027	201	0	0	0	0	100	31	100	31	100	31	100	31
03522421028	324	0	0	0	0	58	30	100	51	100	51	100	51
03522241027	203	0	0	0	0	100	30	100	30	100	30	100	30
03522441028	305	0	0	0	0	100	30	100	30	100	30	100	30
03522121027	304	0	0	0	0	100	27	100	27	100	27	100	27
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03522241027 233	0	0	0	0	100	18	100	18	100	18	100	18
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03522521028 423	0	0	0	0	9	16	100	180	100	180	100	180
03522241027 228	0	0	0	0	56	14	100	25	100	25	100	25
0352050100304506	0	0	0	0	7	12	100	172	100	172	100	172
03522241028 204	0	0	0	0	38	12	100	32	100	32	100	32
03522481028 213	0	0	0	0	17	9	100	55	100	55	100	55
03522521028 421	0	0	0	0	89	9	100	10	100	10	100	10
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03522041027 121	0	0	0	0	68	7	100	10	100	10	100	10
03522241027 232	0	0	0	0	51	5	100	10	100	10	100	10
0352001100303145	0	0	0	0	100	5	100	5	100	5	100	5
0352202100304510	0	0	0	0	100	5	100	5	100	5	100	5
03522041027 110	0	0	0	0	100	5	100	5	100	5	100	5
03522041027 113	0	0	0	0	100	5	100	5	100	5	100	5
03522241027 211	0	0	0	0	100	5	100	5	100	5	100	5
03522241028 207	0	0	0	0	7	3	100	45	100	45	100	45
03522441028 303	0	0	0	0	100	3	100	3	100	3	100	3
0352001100302140	0	0	0	0	96	1	100	1	100	1	100	1
03522041027 109	0	0	0	0	98	1	100	1	100	1	100	1
03522521028 426	0	0	0	0	0	0	100	787	100	787	100	787
03520511006 402	0	0	0	0	0	0	100	444	100	444	100	444
03520511006 401	0	0	0	0	0	0	100	437	100	437	100	437
03522521028 420	0	0	0	0	0	0	100	325	100	325	100	325
0352050100304408	0	0	0	0	0	0	100	283	100	283	100	283
0352049100304320	0	0	0	0	0	0	100	282	100	282	100	282
0352050100304404	0	0	0	0	0	0	100	270	100	270	100	270
0352049100304309	0	0	0	0	0	0	100	237	100	237	100	237
0352042100304108	0	0	0	0	0	0	100	236	100	236	100	236
03520521006 306	0	0	0	0	0	0	100	236	100	236	100	236
03522561028 508	0	0	0	0	0	0	100	192	100	192	100	192
0352050100304402	0	0	0	0	0	0	100	189	100	189	100	189
03522561028 507	0	0	0	0	0	0	100	181	100	181	100	181
03522061026 115	0	0	0	0	0	0	100	176	100	176	100	176
03522561028 114	0	0	0	0	0	0	100	166	100	166	100	166
03520521006 314	0	0	0	0	0	0	100	163	100	163	100	163
03522261026 301	0	0	0	0	0	0	100	160	100	160	100	160
0352050100304403	0	0	0	0	0	0	100	157	100	157	100	157
0352050100304505	0	0	0	0	0	0	100	154	100	154	100	154
0352049100304313	0	0	0	0	0	0	100	147	100	147	100	147
0352003100304103	0	0	0	0	0	0	66	146	100	221	100	221
03522261026 315	0	0	0	0	0	0	100	136	100	136	100	136
03520721006 503	0	0	0	0	0	0	98	135	100	138	100	138
03522541028 418	0	0	0	0	0	0	100	132	100	132	100	132
03520721006 504	0	0	0	0	0	0	100	131	100	131	100	131
03522161026 212	0	0	0	0	0	0	100	125	100	125	100	125
03522481028 219	0	0	0	0	0	0	100	125	100	125	100	125
03522281028 109	0	0	0	0	0	0	100	121	100	121	100	121
0352049100304324	0	0	0	0	0	0	100	117	100	117	100	117
03522521028 436	0	0	0	0	0	0	100	117	100	117	100	117
03522541028 404	0	0	0	0	0	0	100	117	100	117	100	117
03520421006 315	0	0	0	0	0	0	100	115	100	115	100	115
03522061026 112	0	0	0	0	0	0	100	115	100	115	100	115
0352049100304325	0	0	0	0	0	0	100	114	100	114	100	114
03522561028 121	0	0	0	0	0	0	100	113	100	113	100	113
0352050100304504	0	0	0	0	0	0	100	112	100	112	100	112
03522161026 202	0	0	0	0	0	0	100	108	100	108	100	108
0352003100304301	0	0	0	0	0	0	40	107	100	269	100	269
03522261026 317	0	0	0	0	0	0	100	107	100	107	100	107

0352049100304317	0	0	0	0	0	0	100	106	100	106	100	106
03522161026 213	0	0	0	0	0	0	100	105	100	105	100	105
0352050100304503	0	0	0	0	0	0	100	104	100	104	100	104
03522161026 203	0	0	0	0	0	0	100	101	100	101	100	101
0352050100304407	0	0	0	0	0	0	100	97	100	97	100	97
03520561006 213	0	0	0	0	0	0	100	97	100	97	100	97
03522561028 509	0	0	0	0	0	0	100	97	100	97	100	97
03522261026 318	0	0	0	0	0	0	100	91	100	91	100	91
03520521006 310	0	0	0	0	0	0	100	90	100	90	100	90
03522161026 311	0	0	0	0	0	0	100	90	100	90	100	90
03522161026 313	0	0	0	0	0	0	100	90	100	90	100	90
0352049100304314	0	0	0	0	0	0	100	88	100	88	100	88
03522541028 414	0	0	0	0	0	0	100	88	100	88	100	88
03520421006 303	0	0	0	0	0	0	100	87	100	87	100	87
03520561006 215	0	0	0	0	0	0	100	87	100	87	100	87
03520721006 506	0	0	0	0	0	0	100	87	100	87	100	87
03522261026 310	0	0	0	0	0	0	100	83	100	83	100	83
03522061026 113	0	0	0	0	0	0	100	82	100	82	100	82
03520421006 304	0	0	0	0	0	0	100	81	100	81	100	81
0352049100304318	0	0	0	0	0	0	100	80	100	80	100	80
03520561006 212	0	0	0	0	0	0	100	79	100	79	100	79
03520401005 401	0	0	0	0	0	0	53	78	100	147	100	147
03522561028 505	0	0	0	0	0	0	79	77	100	97	100	97
03520421006 301	0	0	0	0	0	0	99	77	100	77	100	77
03522261026 309	0	0	0	0	0	0	100	77	100	77	100	77
03520521006 309	0	0	0	0	0	0	100	76	100	76	100	76
03522461028 223	0	0	0	0	0	0	100	76	100	76	100	76
03522461028 224	0	0	0	0	0	0	100	76	100	76	100	76
03522541028 403	0	0	0	0	0	0	100	76	100	76	100	76
03522541028 411	0	0	0	0	0	0	100	76	100	76	100	76
03520561006 206	0	0	0	0	0	0	100	74	100	74	100	74
03520561006 211	0	0	0	0	0	0	100	73	100	73	100	73
03522161026 201	0	0	0	0	0	0	100	73	100	73	100	73
03522541028 401	0	0	0	0	0	0	100	73	100	73	100	73
03522541028 412	0	0	0	0	0	0	100	72	100	72	100	72
03522541028 415	0	0	0	0	0	0	100	72	100	72	100	72
03522161026 211	0	0	0	0	0	0	100	71	100	71	100	71
03520561006 210	0	0	0	0	0	0	100	70	100	70	100	70
03522261026 314B	0	0	0	0	0	0	100	70	100	70	100	70
03522281028 118	0	0	0	0	0	0	100	70	100	70	100	70
0352050100304409	0	0	0	0	0	0	100	69	100	69	100	69
03520521006 313	0	0	0	0	0	0	100	68	100	68	100	68
03522281026 324	0	0	0	0	0	0	100	68	100	68	100	68
03522281028 104	0	0	0	0	0	0	100	68	100	68	100	68
03522561028 122	0	0	0	0	0	0	100	68	100	68	100	68
03522061026 122	0	0	0	0	0	0	100	67	100	67	100	67
03522461028 222	0	0	0	0	0	0	100	67	100	67	100	67
03520421006 305	0	0	0	0	0	0	100	66	100	66	100	66
03520561006 207	0	0	0	0	0	0	99	66	100	66	100	66
03520421006 302	0	0	0	0	0	0	100	65	100	65	100	65
0352049100304319	0	0	0	0	0	0	100	65	100	65	100	65
03522161026 204	0	0	0	0	0	0	100	65	100	65	100	65
03522161026 312	0	0	0	0	0	0	100	65	100	65	100	65
03522261026 308	0	0	0	0	0	0	100	65	100	65	100	65
03520561006 208	0	0	0	0	0	0	77	64	100	83	100	83
03520721006 508	0	0	0	0	0	0	76	63	100	83	100	83
03520561006 112	0	0	0	0	0	0	93	63	100	68	100	68
03520521006 311	0	0	0	0	0	0	100	63	100	63	100	63
03522261026 307	0	0	0	0	0	0	100	63	100	63	100	
03522281026 306	0	0	0	0	0	0	100	63	100	63	100	

03522541028	417	0	0	0	0	0	0	100	63	100	63	100	63
03522161026	206	0	0	0	0	0	0	100	62	100	62	100	62
0352003100304306		0	0	0	0	0	0	54	60	100	112	100	112
03522481028	214	0	0	0	0	0	0	100	60	100	60	100	60
03520561006	214	0	0	0	0	0	0	100	59	100	59	100	59
03520521006	308	0	0	0	0	0	0	100	58	100	58	100	58
03522541028	410	0	0	0	0	0	0	100	58	100	58	100	58
03522541028	416	0	0	0	0	0	0	100	58	100	58	100	58
03522541028	413	0	0	0	0	0	0	100	57	100	57	100	57
03522561028	105	0	0	0	0	0	0	100	57	100	57	100	57
03522061026	118	0	0	0	0	0	0	100	56	100	56	100	56
03522281028	120	0	0	0	0	0	0	100	56	100	56	100	56
0352003100304311		0	0	0	0	0	0	87	55	100	63	100	63
03520521006	307	0	0	0	0	0	0	100	55	100	55	100	55
0352003100304310		0	0	0	0	0	0	89	53	100	59	100	59
03522241028	205	0	0	0	0	0	0	100	53	100	53	100	53
03522541028	402	0	0	0	0	0	0	100	53	100	53	100	53
03522281026	304	0	0	0	0	0	0	100	52	100	52	100	52
03522541028	409	0	0	0	0	0	0	100	52	100	52	100	52
03520401005	412	0	0	0	0	0	0	68	51	100	76	100	76
03522061026	114	0	0	0	0	0	0	100	51	100	51	100	51
03522161026	210	0	0	0	0	0	0	100	51	100	51	100	51
03522481028	215	0	0	0	0	0	0	100	51	100	51	100	51
03522481028	217	0	0	0	0	0	0	100	51	100	51	100	51
0352049100304323		0	0	0	0	0	0	100	50	100	50	100	50
03522281026	305	0	0	0	0	0	0	100	50	100	50	100	50
03520401005	307	0	0	0	0	0	0	51	49	100	96	100	96
03522161026	205	0	0	0	0	0	0	100	48	100	48	100	48
03522481028	218	0	0	0	0	0	0	100	47	100	47	100	47
03522561028	124	0	0	0	0	0	0	100	46	100	46	100	46
03522261026	319	0	0	0	0	0	0	100	45	100	45	100	45
03522161026	208	0	0	0	0	0	0	100	44	100	44	100	44
0352049100304322		0	0	0	0	0	0	100	43	100	43	100	43
03522261026	321	0	0	0	0	0	0	100	43	100	43	100	43
03522281028	108	0	0	0	0	0	0	100	42	100	42	100	42
03522281026	323	0	0	0	0	0	0	100	41	100	41	100	41
03522281028	115	0	0	0	0	0	0	100	41	100	41	100	41
03522541028	408	0	0	0	0	0	0	100	41	100	41	100	41
03520721006	509	0	0	0	0	0	0	100	39	100	39	100	39
03522261026	320	0	0	0	0	0	0	100	39	100	39	100	39
0352049100304321		0	0	0	0	0	0	100	38	100	38	100	38
03522541028	407	0	0	0	0	0	0	100	38	100	38	100	38
03522161026	214	0	0	0	0	0	0	100	37	100	37	100	37
03522281028	107	0	0	0	0	0	0	100	37	100	37	100	37
03522281028	116	0	0	0	0	0	0	100	37	100	37	100	37
03522061026	103	0	0	0	0	0	0	100	36	100	36	100	36
03520581006	113	0	0	0	0	0	0	52	35	100	67	100	67
0352050100304405		0	0	0	0	0	0	100	35	100	35	100	35
03522481028	216	0	0	0	0	0	0	100	35	100	35	100	35
03520401005	303	0	0	0	0	0	0	39	34	100	87	100	87
03522061026	104	0	0	0	0	0	0	100	34	100	34	100	34
03522061026	105	0	0	0	0	0	0	100	33	100	33	100	33
03522241027	229	0	0	0	0	0	0	100	33	100	33	100	33
03522521028	435	0	0	0	0	0	0	100	33	100	33	100	33
03522541028	405	0	0	0	0	0	0	100	33	100	33	100	33
03522561028	506	0	0	0	0	0	0	100	33	100	33	100	33
0352003100304329		0	0	0	0	0	0	100	31	100	31	100	31
03522161026	209	0	0	0	0	0	0	100	31	100	31	100	31
03522561028	504	0	0	0	0	0	0	100	31	100	31	100	31
03520561006	209	0	0	0	0	0	0	38	30	100	80	100	80

03520521006	312	0	0	0	0	0	0	100	28	100	28	100	28
03522241027	209	0	0	0	0	0	0	100	28	100	28	100	28
03522201025	128	0	0	0	0	0	0	100	26	100	26	100	26
03522561028	123	0	0	0	0	0	0	100	26	100	26	100	26
03522281028	119	0	0	0	0	0	0	100	25	100	25	100	25
0352003100304327		0	0	0	0	0	0	74	24	100	32	100	32
0352003100304326		0	0	0	0	0	0	82	24	100	29	100	29
03522061026	106	0	0	0	0	0	0	100	23	100	23	100	23
03522241027	231	0	0	0	0	0	0	100	23	100	23	100	23
0352001100302180		0	0	0	0	0	0	100	22	100	22	100	22
03522061026	101	0	0	0	0	0	0	100	22	100	22	100	22
0351310113305101		0	0	0	0	0	0	18	21	100	122	100	122
03522241027	230	0	0	0	0	0	0	100	21	100	21	100	21
0352050100304406		0	0	0	0	0	0	100	20	100	20	100	20
03522061026	121	0	0	0	0	0	0	100	20	100	20	100	20
03522461028	220	0	0	0	0	0	0	100	20	100	20	100	20
03522281028	117	0	0	0	0	0	0	100	18	100	18	100	18
03520401005	302	0	0	0	0	0	0	13	17	100	131	100	131
0352049100304315		0	0	0	0	0	0	100	17	100	17	100	17
03522161026	207	0	0	0	0	0	0	100	17	100	17	100	17
03520721006	507	0	0	0	0	0	0	100	16	100	16	100	16
03522061026	116	0	0	0	0	0	0	100	16	100	16	100	16
03522241027	208	0	0	0	0	0	0	100	16	100	16	100	16
03520441006	204	0	0	0	0	0	0	26	15	100	59	100	59
0352049100304312		0	0	0	0	0	0	100	15	100	15	100	15
03522201025	139	0	0	0	0	0	0	4	14	100	362	100	362
03522061026	102	0	0	0	0	0	0	100	13	100	13	100	13
03522061026	107	0	0	0	0	0	0	100	13	100	13	100	13
03522201025	140	0	0	0	0	0	0	99	13	100	13	100	13
03520721006	502	0	0	0	0	0	0	23	12	100	54	100	54
03522281026	303	0	0	0	0	0	0	100	11	100	11	100	11
03522201024	118	0	0	0	0	0	0	100	10	100	10	100	10
03520441006	203	0	0	0	0	0	0	11	8	100	73	100	73
0352049100304316		0	0	0	0	0	0	100	8	100	8	100	8
03522561028	515	0	0	0	0	0	0	84	7	100	8	100	8
03520441006	205	0	0	0	0	0	0	93	7	100	7	100	7
03522161026	314A	0	0	0	0	0	0	100	7	100	7	100	7
03522561028	512	0	0	0	0	0	0	100	7	100	7	100	7
03522201024	115	0	0	0	0	0	0	100	6	100	6	100	6
03522201024	116	0	0	0	0	0	0	100	6	100	6	100	6
03522201024	119	0	0	0	0	0	0	100	6	100	6	100	6
03522561028	516	0	0	0	0	0	0	40	5	100	12	100	12
03520511006	403	0	0	0	0	0	0	100	5	100	5	100	5
03522061026	110	0	0	0	0	0	0	100	5	100	5	100	5
03522541028	406	0	0	0	0	0	0	100	5	100	5	100	5
03520581006	109	0	0	0	0	0	0	6	4	100	75	100	75
03520561006	110	0	0	0	0	0	0	4	3	100	81	100	81
03522061026	108	0	0	0	0	0	0	100	3	100	3	100	3
03522061026	109	0	0	0	0	0	0	100	3	100	3	100	3
03522201025	120	0	0	0	0	0	0	58	2	100	3	100	3
03522201025	124	0	0	0	0	0	0	87	2	100	2	100	2
03522261026	316	0	0	0	0	0	0	100	2	100	2	100	2
03522301029	139	0	0	0	0	0	0	99	2	100	2	100	2
03522521028	428	0	0	0	0	0	0	100	2	100	2	100	2
03522521028	431	0	0	0	0	0	0	100	2	100	2	100	2
03522561028	513	0	0	0	0	0	0	97	2	100	2	100	2
03522561028	514	0	0	0	0	0	0	74	2	100	2	100	2
03520161001	305	0	0	0	0	0	0	2	1	100	113	100	113
03522281028	106	0	0	0	0	0	0	100	1	100	1	100	1
03522461028	221	0	0	0	0	0	0	100	1	100	1	100	1

0352002100304201	0	0	0	0	0	0	0	0	70	1,310	100	1,885
03520381005 103	0	0	0	0	0	0	0	0	100	986	100	986
0352002100304205	0	0	0	0	0	0	0	0	99	478	100	484
0351308113305310	0	0	0	0	0	0	0	0	100	469	100	469
03520641008 205	0	0	0	0	0	0	0	0	100	393	100	393
03520741008 305	0	0	0	0	0	0	0	0	100	392	100	392
03520661007 303	0	0	0	0	0	0	0	0	100	373	100	373
03523021022 210	0	0	0	0	0	0	0	0	100	346	100	346
0351306113307201A	0	0	0	0	0	0	0	0	54	338	100	622
0351312113305104	0	0	0	0	0	0	0	0	100	319	100	319
03522641029 311	0	0	0	0	0	0	0	0	77	313	100	406
03520661007 301	0	0	0	0	0	0	0	0	99	272	100	273
0351304113307417	0	0	0	0	0	0	0	0	71	261	100	367
0351308113305309	0	0	0	0	0	0	0	0	100	242	100	242
03520581005 211	0	0	0	0	0	0	0	0	100	238	100	238
03522201025 112	0	0	0	0	0	0	0	0	100	237	100	237
0352002100304206	0	0	0	0	0	0	0	0	100	230	100	230
03520161001 207	0	0	0	0	0	0	0	0	100	226	100	226
03520581006 111	0	0	0	0	0	0	0	0	100	173	100	173
03520581006 101	0	0	0	0	0	0	0	0	100	168	100	168
03520181007 107	0	0	0	0	0	0	0	0	53	156	100	293
0352003100304102	0	0	0	0	0	0	0	0	100	156	100	156
03520061004 218	0	0	0	0	0	0	0	0	100	150	100	150
03520041004 211	0	0	0	0	0	0	0	0	100	147	100	147
03520341005 301	0	0	0	0	0	0	0	0	100	146	100	146
03520041004 210	0	0	0	0	0	0	0	0	100	140	100	140
03520441005 212	0	0	0	0	0	0	0	0	100	139	100	139
03522641029 308	0	0	0	0	0	0	0	0	41	137	100	335
03520641008 302	0	0	0	0	0	0	0	0	100	135	100	135
03522301029 129	0	0	0	0	0	0	0	0	100	132	100	132
03520301005 410	0	0	0	0	0	0	0	0	100	131	100	131
0351308113305308	0	0	0	0	0	0	0	0	50	129	100	257
03520661007 305	0	0	0	0	0	0	0	0	100	128	100	128
0351310113305106	0	0	0	0	0	0	0	0	100	124	100	124
03520161001 206	0	0	0	0	0	0	0	0	100	124	100	124
03520301005 409	0	0	0	0	0	0	0	0	100	123	100	123
03522201025 111	0	0	0	0	0	0	0	0	100	123	100	123
03522301029 143	0	0	0	0	0	0	0	0	100	121	100	121
0352002100304208	0	0	0	0	0	0	0	0	100	118	100	118
03520301005 411	0	0	0	0	0	0	0	0	100	117	100	117
03520101004 118	0	0	0	0	0	0	0	0	100	116	100	116
03520681008 201	0	0	0	0	0	0	0	0	69	114	100	166
03520081004 204	0	0	0	0	0	0	0	0	100	114	100	114
03520301005 404	0	0	0	0	0	0	0	0	100	114	100	114
03520441005 201	0	0	0	0	0	0	0	0	100	114	100	114
03520341005 208	0	0	0	0	0	0	0	0	100	113	100	113
03520581006 106	0	0	0	0	0	0	0	0	100	112	100	112
03520141004 106	0	0	0	0	0	0	0	0	100	111	100	111
03520101004 120	0	0	0	0	0	0	0	0	100	110	100	110
03520161001 213	0	0	0	0	0	0	0	0	100	109	100	109
0351310113305105	0	0	0	0	0	0	0	0	100	108	100	108
03520641008 301	0	0	0	0	0	0	0	0	100	108	100	108
03520061004 202	0	0	0	0	0	0	0	0	100	105	100	105
03520341005 115	0	0	0	0	0	0	0	0	100	104	100	104
03520341005 116	0	0	0	0	0	0	0	0	100	103	100	103
03520301005 306	0	0	0	0	0	0	0	0	100	101	100	101
03520341005 304	0	0	0	0	0	0	0	0	100	101	100	101
03520381005 206	0	0	0	0	0	0	0	0	100	101	100	101
0351312113305107	0	0	0	0	0	0	0	0	100	99	100	99
03520141004 111	0	0	0	0	0	0	0	0	100	99	100	99

03520641008	203	0	0	0	0	0	0	0	0	100	99	100	99
03520341005	305	0	0	0	0	0	0	0	0	100	98	100	98
03520101004	119	0	0	0	0	0	0	0	0	100	97	100	97
03520041004	203	0	0	0	0	0	0	0	0	100	95	100	95
03520301005	310	0	0	0	0	0	0	0	0	100	95	100	95
0351310113305	109	0	0	0	0	0	0	0	0	100	94	100	94
03520341005	309	0	0	0	0	0	0	0	0	100	94	100	94
0352003100304	305	0	0	0	0	0	0	0	0	100	93	100	93
03520161001	313	0	0	0	0	0	0	0	0	100	93	100	93
03520301005	402	0	0	0	0	0	0	0	0	100	92	100	92
03520381005	214	0	0	0	0	0	0	0	0	100	89	100	89
03520161001	202	0	0	0	0	0	0	0	0	100	88	100	88
03520301005	403	0	0	0	0	0	0	0	0	100	86	100	86
03520581006	102	0	0	0	0	0	0	0	0	100	86	100	86
03520741008	303	0	0	0	0	0	0	0	0	100	86	100	86
03520441006	202	0	0	0	0	0	0	0	0	100	85	100	85
03524021030	210	0	0	0	0	0	0	0	0	75	84	100	112
0351310113305	108	0	0	0	0	0	0	0	0	100	84	100	84
0352003100304	302	0	0	0	0	0	0	0	0	100	84	100	84
03520041004	212	0	0	0	0	0	0	0	0	100	84	100	84
03520741007	307	0	0	0	0	0	0	0	0	100	83	100	83
03520361005	112	0	0	0	0	0	0	0	0	100	82	100	82
03520101004	115	0	0	0	0	0	0	0	0	100	81	100	81
0352002100304	101	0	0	0	0	0	0	0	0	49	80	100	165
0352003100304	304	0	0	0	0	0	0	0	0	100	80	100	80
03520081004	220	0	0	0	0	0	0	0	0	100	80	100	80
03522601029	207	0	0	0	0	0	0	0	0	100	80	100	80
03520081004	219	0	0	0	0	0	0	0	0	100	79	100	79
03520381005	105	0	0	0	0	0	0	0	0	100	79	100	79
03520581005	210	0	0	0	0	0	0	0	0	100	79	100	79
03520581006	103	0	0	0	0	0	0	0	0	100	79	100	79
0352002100304	209	0	0	0	0	0	0	0	0	100	78	100	78
03520581006	107	0	0	0	0	0	0	0	0	100	78	100	78
03520041004	227	0	0	0	0	0	0	0	0	100	77	100	77
03520081004	221	0	0	0	0	0	0	0	0	100	77	100	77
03520161001	209	0	0	0	0	0	0	0	0	100	77	100	77
03520661007	218	0	0	0	0	0	0	0	0	100	76	100	76
0351304113307	419	0	0	0	0	0	0	0	0	80	75	100	94
03520101004	116	0	0	0	0	0	0	0	0	99	73	100	74
0352003100304	303	0	0	0	0	0	0	0	0	100	73	100	73
03520061004	226	0	0	0	0	0	0	0	0	100	73	100	73
03520081004	201	0	0	0	0	0	0	0	0	100	73	100	73
03520661007	306	0	0	0	0	0	0	0	0	100	73	100	73
03522201024	152	0	0	0	0	0	0	0	0	100	73	100	73
03520161001	131	0	0	0	0	0	0	0	0	91	72	100	79
03520141004	105	0	0	0	0	0	0	0	0	93	72	100	77
03522601029	214	0	0	0	0	0	0	0	0	100	72	100	72
0351312113305	203	0	0	0	0	0	0	0	0	100	71	100	71
03520441006	108	0	0	0	0	0	0	0	0	100	71	100	71
03520081004	207	0	0	0	0	0	0	0	0	100	70	100	70
03522201025	137	0	0	0	0	0	0	0	0	100	69	100	69
03522601029	201	0	0	0	0	0	0	0	0	100	69	100	69
03522601029	217	0	0	0	0	0	0	0	0	100	69	100	69
0352002100304	207	0	0	0	0	0	0	0	0	100	68	100	68
03520361005	113	0	0	0	0	0	0	0	0	100	67	100	67
03520661007	217	0	0	0	0	0	0	0	0	100	67	100	67
03522201024	133	0	0	0	0	0	0	0	0	100	67	100	67
03520441006	201	0	0	0	0	0	0	0	0	100	66	100	66
0351312113305	212	0	0	0	0	0	0	0	0	100	65	100	65
03520161001	201	0	0	0	0	0	0	0	0	100	65	100	65

03520341005	308	0	0	0	0	0	0	0	0	100	65	100	65
03522301029	144	0	0	0	0	0	0	0	0	100	65	100	65
03520361005	110	0	0	0	0	0	0	0	0	100	64	100	64
0351312113305	115	0	0	0	0	0	0	0	0	100	63	100	63
03520661007	211	0	0	0	0	0	0	0	0	101	62	101	62
03520581006	104	0	0	0	0	0	0	0	0	100	61	100	61
03522301029	127	0	0	0	0	0	0	0	0	100	61	100	61
03520361005	108	0	0	0	0	0	0	0	0	100	60	100	60
03520061004	215	0	0	0	0	0	0	0	0	100	58	100	58
03520741008	304	0	0	0	0	0	0	0	0	100	58	100	58
03520101004	117	0	0	0	0	0	0	0	0	90	57	100	63
03520081004	208	0	0	0	0	0	0	0	0	100	57	100	57
03520141004	107	0	0	0	0	0	0	0	0	100	57	100	57
03522301029	107	0	0	0	0	0	0	0	0	100	57	100	57
03520041004	209	0	0	0	0	0	0	0	0	100	56	100	56
03520361005	104	0	0	0	0	0	0	0	0	100	56	100	56
03520361005	109	0	0	0	0	0	0	0	0	100	56	100	56
03520661007	216	0	0	0	0	0	0	0	0	100	56	100	56
03522201024	108	0	0	0	0	0	0	0	0	100	55	100	55
0351312113305	214	0	0	0	0	0	0	0	0	97	54	100	55
0351312113305	117	0	0	0	0	0	0	0	0	100	54	100	54
03520341005	114	0	0	0	0	0	0	0	0	100	53	100	53
03520581006	105	0	0	0	0	0	0	0	0	100	53	100	53
03522601029	240	0	0	0	0	0	0	0	0	100	53	100	53
03520061004	224	0	0	0	0	0	0	0	0	100	52	100	52
03520081004	206	0	0	0	0	0	0	0	0	100	52	100	52
03520161001	215	0	0	0	0	0	0	0	0	100	52	100	52
03520361005	106	0	0	0	0	0	0	0	0	100	52	100	52
03520441005	205	0	0	0	0	0	0	0	0	100	52	100	52
03524021030	211	0	0	0	0	0	0	0	0	68	51	100	74
03524021030	215	0	0	0	0	0	0	0	0	73	51	100	69
0351312113305	209	0	0	0	0	0	0	0	0	100	51	100	51
03520381005	207	0	0	0	0	0	0	0	0	100	51	100	51
03520381005	215	0	0	0	0	0	0	0	0	100	51	100	51
03522301029	105	0	0	0	0	0	0	0	0	100	51	100	51
03522301029	128	0	0	0	0	0	0	0	0	100	50	100	50
03523021024	126	0	0	0	0	0	0	0	0	100	50	100	50
0351306113307	427	0	0	0	0	0	0	0	0	100	49	100	49
0351312113305	116	0	0	0	0	0	0	0	0	100	49	100	49
03520301005	405	0	0	0	0	0	0	0	0	100	49	100	49
03520381005	101	0	0	0	0	0	0	0	0	100	49	100	49
03520081004	205	0	0	0	0	0	0	0	0	100	48	100	48
03522201024	113	0	0	0	0	0	0	0	0	100	48	100	48
0351312113305	123	0	0	0	0	0	0	0	0	100	47	100	47
03520061004	216	0	0	0	0	0	0	0	0	100	47	100	47
03520361005	102	0	0	0	0	0	0	0	0	100	47	100	47
03520361005	111	0	0	0	0	0	0	0	0	100	46	100	46
03522601029	208	0	0	0	0	0	0	0	0	100	46	100	46
03522641029	310	0	0	0	0	0	0	0	0	100	46	100	46
0352003100304	328	0	0	0	0	0	0	0	0	100	45	100	45
03522601029	239	0	0	0	0	0	0	0	0	100	45	100	45
0352002100304	204	0	0	0	0	0	0	0	0	97	44	100	45
0351312113305	208	0	0	0	0	0	0	0	0	100	44	100	44
03520361005	118	0	0	0	0	0	0	0	0	100	44	100	44
03521421008	107	0	0	0	0	0	0	0	0	34	43	100	130
03520361005	117	0	0	0	0	0	0	0	0	100	43	100	43
03520441005	204	0	0	0	0	0	0	0	0	100	43	100	43
03520641008	206	0	0	0	0	0	0	0	0	100	43	100	43
03522201024	150	0	0	0	0	0	0	0	0	100	43	100	43
03524221030	204	0	0	0	0	0	0	0	0	45	42	100	94

0351312113305211	0	0	0	0	0	0	0	0	100	42	100	42
03520741008 204	0	0	0	0	0	0	0	0	100	42	100	42
03520301005 406	0	0	0	0	0	0	0	0	100	41	100	41
03520341005 312	0	0	0	0	0	0	0	0	100	41	100	41
03520061004 213	0	0	0	0	0	0	0	0	100	40	100	40
03520081004 222	0	0	0	0	0	0	0	0	100	40	100	40
03522601029 202	0	0	0	0	0	0	0	0	100	40	100	40
0351304113307420	0	0	0	0	0	0	0	0	52	39	100	74
03520161001 132	0	0	0	0	0	0	0	0	100	39	100	39
03520381005 202	0	0	0	0	0	0	0	0	100	39	100	39
03520441005 203	0	0	0	0	0	0	0	0	100	39	100	39
0351312113305114	0	0	0	0	0	0	0	0	100	38	100	38
0351312113305122	0	0	0	0	0	0	0	0	100	38	100	38
0351312113305204	0	0	0	0	0	0	0	0	100	38	100	38
03520301005 407	0	0	0	0	0	0	0	0	100	38	100	38
03520441005 216	0	0	0	0	0	0	0	0	100	38	100	38
03522201025 107	0	0	0	0	0	0	0	0	100	38	100	38
03524221030 208	0	0	0	0	0	0	0	0	20	37	100	185
03524221030 209	0	0	0	0	0	0	0	0	53	37	100	69
0351312113305205	0	0	0	0	0	0	0	0	100	37	100	37
0351312113305207	0	0	0	0	0	0	0	0	100	37	100	37
03522201024 151	0	0	0	0	0	0	0	0	100	37	100	37
03520381005 213	0	0	0	0	0	0	0	0	100	36	100	36
03522601029 213	0	0	0	0	0	0	0	0	100	36	100	36
0351309113307101	0	0	0	0	0	0	0	0	24	35	100	145
03524021030 217	0	0	0	0	0	0	0	0	70	35	100	50
03520341005 311	0	0	0	0	0	0	0	0	100	35	100	35
03520661007 302	0	0	0	0	0	0	0	0	84	34	100	40
0351312113305119	0	0	0	0	0	0	0	0	100	34	100	34
0351312113305215	0	0	0	0	0	0	0	0	100	34	100	34
03520361005 107	0	0	0	0	0	0	0	0	100	34	100	34
03522641029 309	0	0	0	0	0	0	0	0	62	33	100	53
0351312113305112	0	0	0	0	0	0	0	0	100	33	100	33
0351312113305121	0	0	0	0	0	0	0	0	100	33	100	33
03522601029 245	0	0	0	0	0	0	0	0	100	33	100	33
03523021022 110	0	0	0	0	0	0	0	0	100	33	100	33
03520061004 214	0	0	0	0	0	0	0	0	100	32	100	32
03522301029 145	0	0	0	0	0	0	0	0	100	32	100	32
03524321031 303	0	0	0	0	0	0	0	0	10	31	100	328
03520041004 112	0	0	0	0	0	0	0	0	26	31	100	121
0351309113307104	0	0	0	0	0	0	0	0	100	31	100	31
0351309113307105	0	0	0	0	0	0	0	0	100	31	100	31
03520161001 133	0	0	0	0	0	0	0	0	100	31	100	31
03522301029 132	0	0	0	0	0	0	0	0	100	31	100	31
03520681007 210	0	0	0	0	0	0	0	0	18	30	100	165
0351309113307106	0	0	0	0	0	0	0	0	100	30	100	30
03520141004 110	0	0	0	0	0	0	0	0	100	30	100	30
03522201025 119	0	0	0	0	0	0	0	0	100	30	100	30
0351312113305206	0	0	0	0	0	0	0	0	100	29	100	29
0352002100304210	0	0	0	0	0	0	0	0	100	29	100	29
0351309113307432	0	0	0	0	0	0	0	0	100	28	100	28
03520061004 225	0	0	0	0	0	0	0	0	100	28	100	28
03520161001 205	0	0	0	0	0	0	0	0	100	28	100	28
03520081004 223	0	0	0	0	0	0	0	0	100	26	100	26
03522301029 108	0	0	0	0	0	0	0	0	100	26	100	26
03523021022 204	0	0	0	0	0	0	0	0	100	26	100	26
03523701023 207	0	0	0	0	0	0	0	0	100	26	100	26
03520161001 130	0	0	0	0	0	0	0	0	38	25	100	66
03520041004 229	0	0	0	0	0	0	0	0	100	24	100	24
03522201024 134	0	0	0	0	0	0	0	0	100	24	100	24

0351309113307111	0	0	0	0	0	0	0	0	53	23	100	44
0351309113307102	0	0	0	0	0	0	0	0	100	23	100	23
03520061004 217	0	0	0	0	0	0	0	0	100	23	100	23
03522301029 104	0	0	0	0	0	0	0	0	100	23	100	23
0351309113307110	0	0	0	0	0	0	0	0	52	22	100	42
03523701023 206	0	0	0	0	0	0	0	0	70	22	100	31
03520161001 214	0	0	0	0	0	0	0	0	100	22	100	22
03522301029 131	0	0	0	0	0	0	0	0	100	22	100	22
03522601029 206	0	0	0	0	0	0	0	0	92	21	100	22
03522601029 241	0	0	0	0	0	0	0	0	94	21	100	22
0351309113307103	0	0	0	0	0	0	0	0	100	21	100	21
03522561029 313	0	0	0	0	0	0	0	0	100	21	100	21
0351309113307424	0	0	0	0	0	0	0	0	100	20	100	20
0351312113305210	0	0	0	0	0	0	0	0	100	20	100	20
0351312113305103	0	0	0	0	0	0	0	0	100	18	100	18
03522201024 103	0	0	0	0	0	0	0	0	100	18	100	18
03521421008 105	0	0	0	0	0	0	0	0	14	17	100	128
03524221030 203	0	0	0	0	0	0	0	0	35	17	100	48
03520041004 230	0	0	0	0	0	0	0	0	100	17	100	17
03522301029 142	0	0	0	0	0	0	0	0	100	17	100	17
03522201024 112	0	0	0	0	0	0	0	0	100	16	100	16
03522201025 109	0	0	0	0	0	0	0	0	100	16	100	16
0351309113307109	0	0	0	0	0	0	0	0	37	15	100	40
0351312113305113	0	0	0	0	0	0	0	0	100	15	100	15
03520041004 228	0	0	0	0	0	0	0	0	100	15	100	15
03520161001 304	0	0	0	0	0	0	0	0	100	14	100	14
03520681007 215	0	0	0	0	0	0	0	0	36	13	100	36
03520681007 219	0	0	0	0	0	0	0	0	41	13	100	31
0351312113305118	0	0	0	0	0	0	0	0	100	13	100	13
03522301029 140	0	0	0	0	0	0	0	0	100	13	100	13
03522201024 140	0	0	0	0	0	0	0	0	100	12	100	12
03522301029 111	0	0	0	0	0	0	0	0	100	12	100	12
03522301029 125	0	0	0	0	0	0	0	0	100	12	100	12
0351309113307431	0	0	0	0	0	0	0	0	100	11	100	11
0351312113305120	0	0	0	0	0	0	0	0	100	11	100	11
03522201024 139	0	0	0	0	0	0	0	0	100	11	100	11
03522301029 130	0	0	0	0	0	0	0	0	100	11	100	11
03522601029 243	0	0	0	0	0	0	0	0	100	11	100	11
0351309113307108	0	0	0	0	0	0	0	0	47	10	100	22
03522201024 136	0	0	0	0	0	0	0	0	100	10	100	10
03522301029 106	0	0	0	0	0	0	0	0	100	10	100	10
03523021024 128	0	0	0	0	0	0	0	0	100	10	100	10
03523401023 202	0	0	0	0	0	0	0	0	100	10	100	10
03520181007 109	0	0	0	0	0	0	0	0	27	9	100	33
03522601029 209	0	0	0	0	0	0	0	0	69	9	100	12
03522301029 115	0	0	0	0	0	0	0	0	100	9	100	9
03523701030 206	0	0	0	0	0	0	0	0	60	8	100	13
03522301029 113	0	0	0	0	0	0	0	0	100	8	100	8
03520141004 104	0	0	0	0	0	0	0	0	12	7	100	62
03520161001 203	0	0	0	0	0	0	0	0	100	7	100	7
03520161001 208	0	0	0	0	0	0	0	0	100	7	100	7
03522601029 238	0	0	0	0	0	0	0	0	100	7	100	7
0351306113307301	0	0	0	0	0	0	0	0	8	6	100	84
03520181007 106	0	0	0	0	0	0	0	0	8	6	100	84
03523021022 108	0	0	0	0	0	0	0	0	40	6	100	15
03520161001 212	0	0	0	0	0	0	0	0	100	6	100	6
03522301029 110	0	0	0	0	0	0	0	0	100	6	100	6
03522301029 116	0	0	0	0	0	0	0	0	100	6	100	6
03522301029 124	0	0	0	0	0	0	0	0	100	6	100	6
03523021024 107	0	0	0	0	0	0	0	0	100	6	100	6

03523021022	101	0	0	0	0	0	0	0	0	4	5	100	142
03527021115	159	0	0	0	0	0	0	0	0	44	5	100	11
03522201024	135	0	0	0	0	0	0	0	0	100	5	100	5
03522301029	114	0	0	0	0	0	0	0	0	100	5	100	5
03522601029	218	0	0	0	0	0	0	0	0	100	5	100	5
03523021022	117	0	0	0	0	0	0	0	0	100	5	100	5
03523701030	207	0	0	0	0	0	0	0	0	100	5	100	5
03520161004	109	0	0	0	0	0	0	0	0	3	4	60	107
03522201024	104	0	0	0	0	0	0	0	0	100	4	100	4
03522201024	114	0	0	0	0	0	0	0	0	100	4	100	4
03522201025	141	0	0	0	0	0	0	0	0	100	4	100	4
03522301029	109	0	0	0	0	0	0	0	0	100	4	100	4
03522601029	220	0	0	0	0	0	0	0	0	100	4	100	4
03522641029	307	0	0	0	0	0	0	0	0	7	3	100	52
0352001100302184		0	0	0	0	0	0	0	0	100	3	100	3
03522201025	108	0	0	0	0	0	0	0	0	100	3	100	3
03522601029	244	0	0	0	0	0	0	0	0	100	3	100	3
03523021024	109	0	0	0	0	0	0	0	0	100	3	100	3
03520161001	122	0	0	0	0	0	0	0	0	22	2	100	11
0352001100302114		0	0	0	0	0	0	0	0	21	2	100	10
03522601029	212	0	0	0	0	0	0	0	0	28	2	100	7
0351312113305304		0	0	0	0	0	0	0	0	100	2	100	2
03522201024	125	0	0	0	0	0	0	0	0	100	2	100	2
03522201025	105	0	0	0	0	0	0	0	0	100	2	100	2
03522301029	147	0	0	0	0	0	0	0	0	100	2	100	2
03522561029	315	0	0	0	0	0	0	0	0	100	2	100	2
03522601029	233	0	0	0	0	0	0	0	0	100	2	100	2
03522601029	235	0	0	0	0	0	0	0	0	100	2	100	2
0351306113307203		0	0	0	0	0	0	0	0	2	1	100	105
03522601029	205	0	0	0	0	0	0	0	0	4	1	100	41
0351312113305217		0	0	0	0	0	0	0	0	6	1	100	17
0351312113305216		0	0	0	0	0	0	0	0	16	1	100	10
03523021022	109	0	0	0	0	0	0	0	0	24	1	100	5
0351304113405140		0	0	0	0	0	0	0	0	44	1	100	2
03522201024	141	0	0	0	0	0	0	0	0	100	1	100	1
03522201025	118	0	0	0	0	0	0	0	0	100	1	100	1
03522201025	136	0	0	0	0	0	0	0	0	100	1	100	1
03522301029	141	0	0	0	0	0	0	0	0	100	1	100	1
03522601029	226	0	0	0	0	0	0	0	0	100	1	100	1
03522601029	234	0	0	0	0	0	0	0	0	100	1	100	1
03523021022	113	0	0	0	0	0	0	0	0	100	1	100	1
03523021022	203	0	0	0	0	0	0	0	0	100	1	100	1
03523741023	305	0	0	0	0	0	0	0	0	0	0	100	555
03523401023	104	0	0	0	0	0	0	0	0	0	0	100	524
0351350113306104		0	0	0	0	0	0	0	0	0	0	88	453
03521741011	307	0	0	0	0	0	0	0	0	0	0	100	430
0351321113308303		0	0	0	0	0	0	0	0	0	0	99	428
0351304113307308		0	0	0	0	0	0	0	0	0	0	100	426
03521741011	304B	0	0	0	0	0	0	0	0	0	0	100	423
03521521011	304A	0	0	0	0	0	0	0	0	0	0	100	368
0351216113405106C		0	0	0	0	0	0	0	0	0	0	57	366
03527421115	164	0	0	0	0	0	0	0	0	0	0	100	357
03523401023	203	0	0	0	0	0	0	0	0	0	0	100	355
03523321017	206	0	0	0	0	0	0	0	0	0	0	100	351
0351321113308304		0	0	0	0	0	0	0	0	0	0	89	333
0351302113405108		0	0	0	0	0	0	0	0	0	0	100	328
03523081019	102	0	0	0	0	0	0	0	0	0	0	100	323
0351320113406107		0	0	0	0	0	0	0	0	0	0	47	320
03524621032	305	0	0	0	0	0	0	0	0	0	0	100	317
03520201002	107B	0	0	0	0	0	0	0	0	0	0	61	299

03523741020 305	0	0	0	0	0	0	0	0	0	0	100	296
03523061021 102	0	0	0	0	0	0	0	0	0	0	100	272
03527081114 106	0	0	0	0	0	0	0	0	0	0	86	267
0351350113306101	0	0	0	0	0	0	0	0	0	0	49	243
03523081019 103	0	0	0	0	0	0	0	0	0	0	100	243
03523081019 104	0	0	0	0	0	0	0	0	0	0	100	236
0351324113308107	0	0	0	0	0	0	0	0	0	0	100	233
03524721032 219	0	0	0	0	0	0	0	0	0	0	100	222
0351320113406103	0	0	0	0	0	0	0	0	0	0	100	220
03523021021 201	0	0	0	0	0	0	0	0	0	0	100	220
03523621023 304	0	0	0	0	0	0	0	0	0	0	100	219
03527061114 606	0	0	0	0	0	0	0	0	0	0	100	219
03523401023 105	0	0	0	0	0	0	0	0	0	0	100	216
0351334113304204	0	0	0	0	0	0	0	0	0	0	54	206
03523621023 107	0	0	0	0	0	0	0	0	0	0	100	205
03524441031 211	0	0	0	0	0	0	0	0	0	0	100	205
03524421031 304	0	0	0	0	0	0	0	0	0	0	100	203
0351326113305406	0	0	0	0	0	0	0	0	0	0	100	200
03523481017 302	0	0	0	0	0	0	0	0	0	0	100	198
0351324113308104	0	0	0	0	0	0	0	0	0	0	100	197
03523461020 106	0	0	0	0	0	0	0	0	0	0	100	195
03524241030 109	0	0	0	0	0	0	0	0	0	0	100	195
0351320113406102	0	0	0	0	0	0	0	0	0	0	32	190
03524421031 306	0	0	0	0	0	0	0	0	0	0	100	190
0351326113305404	0	0	0	0	0	0	0	0	0	0	100	189
03523781020 202	0	0	0	0	0	0	0	0	0	0	100	189
03521421008 101	0	0	0	0	0	0	0	0	0	0	100	184
03523761020 201	0	0	0	0	0	0	0	0	0	0	100	183
03521521011 209	0	0	0	0	0	0	0	0	0	0	100	175
03523021021 103	0	0	0	0	0	0	0	0	0	0	100	173
03523181019 106	0	0	0	0	0	0	0	0	0	0	100	171
0351302113405112	0	0	0	0	0	0	0	0	0	0	100	170
0351328113307303	0	0	0	0	0	0	0	0	0	0	100	166
03523501018 103	0	0	0	0	0	0	0	0	0	0	100	166
0351324113308101	0	0	0	0	0	0	0	0	0	0	100	163
03523621020 112	0	0	0	0	0	0	0	0	0	0	100	163
0351326113305407	0	0	0	0	0	0	0	0	0	0	100	160
03523301019 201	0	0	0	0	0	0	0	0	0	0	100	160
03523181019 105	0	0	0	0	0	0	0	0	0	0	100	156
03523781020 207	0	0	0	0	0	0	0	0	0	0	100	155
03520181007 101	0	0	0	0	0	0	0	0	0	0	100	154
03521521011 201	0	0	0	0	0	0	0	0	0	0	100	153
03523701023 205	0	0	0	0	0	0	0	0	0	0	100	152
03524241030 117	0	0	0	0	0	0	0	0	0	0	100	151
03523801018 202	0	0	0	0	0	0	0	0	0	0	100	150
0351216113405118	0	0	0	0	0	0	0	0	0	0	99	149
03523761020 301	0	0	0	0	0	0	0	0	0	0	100	149
03524021030 216	0	0	0	0	0	0	0	0	0	0	100	148
03523741023 306	0	0	0	0	0	0	0	0	0	0	100	145
03521741011 309B	0	0	0	0	0	0	0	0	0	0	100	144
03523061021 101	0	0	0	0	0	0	0	0	0	0	100	143
03524441031 216	0	0	0	0	0	0	0	0	0	0	100	143
03523021021 202	0	0	0	0	0	0	0	0	0	0	100	142
03527061114 609	0	0	0	0	0	0	0	0	0	0	100	142
03528301116 501	0	0	0	0	0	0	0	0	0	0	21	142
0351322113308220	0	0	0	0	0	0	0	0	0	0	100	140
0351323113308201	0	0	0	0	0	0	0	0	0	0	100	135
0351218113406201	0	0	0	0	0	0	0	0	0	0	85	133
0351320113406101	0	0	0	0	0	0	0	0	0	0	78	133
03521521011 208	0	0	0	0	0	0	0	0	0	0	100	132

03524481031 115	0	0	0	0	0	0	0	0	0	100	132
0351321113308302	0	0	0	0	0	0	0	0	0	100	131
03524641032 302	0	0	0	0	0	0	0	0	0	100	131
0351324113308103	0	0	0	0	0	0	0	0	0	100	130
03527081114 102	0	0	0	0	0	0	0	0	0	100	129
03523821018 209	0	0	0	0	0	0	0	0	0	100	127
0351320113406106	0	0	0	0	0	0	0	0	0	100	126
0351302113405111	0	0	0	0	0	0	0	0	0	100	125
0351322113308206	0	0	0	0	0	0	0	0	0	100	125
03521781011 406	0	0	0	0	0	0	0	0	0	100	125
03524421032 307	0	0	0	0	0	0	0	0	0	100	125
03523181017 108	0	0	0	0	0	0	0	0	0	100	124
03523781020 206	0	0	0	0	0	0	0	0	0	100	124
03521741011 301B	0	0	0	0	0	0	0	0	0	100	121
03524681032 101	0	0	0	0	0	0	0	0	0	100	121
03523181017 109	0	0	0	0	0	0	0	0	0	100	119
03524421031 305	0	0	0	0	0	0	0	0	0	100	119
03524641032 308	0	0	0	0	0	0	0	0	0	100	119
0351326113305401	0	0	0	0	0	0	0	0	0	100	118
0351326113305412	0	0	0	0	0	0	0	0	0	100	118
03522641029 304	0	0	0	0	0	0	0	0	0	100	118
03523301019 204	0	0	0	0	0	0	0	0	0	100	118
03523781018 204	0	0	0	0	0	0	0	0	0	100	118
03524421032 312	0	0	0	0	0	0	0	0	0	100	118
0351320113406105	0	0	0	0	0	0	0	0	0	100	117
03520201002 116	0	0	0	0	0	0	0	0	0	100	117
03524641032 303	0	0	0	0	0	0	0	0	0	100	117
03523781020 204	0	0	0	0	0	0	0	0	0	100	116
03524321031 302	0	0	0	0	0	0	0	0	0	100	115
03523781020 203	0	0	0	0	0	0	0	0	0	100	114
0351334113304202	0	0	0	0	0	0	0	0	0	80	113
03523781018 203	0	0	0	0	0	0	0	0	0	100	113
03524061035 312	0	0	0	0	0	0	0	0	0	97	113
0351326113305403	0	0	0	0	0	0	0	0	0	100	112
03521521011 302	0	0	0	0	0	0	0	0	0	100	112
0351309113307113	0	0	0	0	0	0	0	0	0	100	110
03524721032 204	0	0	0	0	0	0	0	0	0	100	110
0351321113308301	0	0	0	0	0	0	0	0	0	100	107
03523761020 205	0	0	0	0	0	0	0	0	0	100	107
03524261035 311	0	0	0	0	0	0	0	0	0	100	107
0351328113307209	0	0	0	0	0	0	0	0	0	100	105
0351350113306102	0	0	0	0	0	0	0	0	0	90	105
03523801018 206	0	0	0	0	0	0	0	0	0	100	105
03524321031 301	0	0	0	0	0	0	0	0	0	100	105
03524441031 218	0	0	0	0	0	0	0	0	0	100	105
03523761020 304	0	0	0	0	0	0	0	0	0	100	104
0351216113405117	0	0	0	0	0	0	0	0	0	100	103
0351216113405116	0	0	0	0	0	0	0	0	0	100	102
03521561011 402A	0	0	0	0	0	0	0	0	0	100	101
03524041030 112	0	0	0	0	0	0	0	0	0	100	101
0351216113405114	0	0	0	0	0	0	0	0	0	100	100
0351321113308305	0	0	0	0	0	0	0	0	0	100	100
0351328113307210	0	0	0	0	0	0	0	0	0	100	100
03521441011 102	0	0	0	0	0	0	0	0	0	100	100
03521741011 306	0	0	0	0	0	0	0	0	0	100	100
03524441031 210	0	0	0	0	0	0	0	0	0	100	99
03521561011 114	0	0	0	0	0	0	0	0	0	100	98
03521561011 212	0	0	0	0	0	0	0	0	0	100	98
03524741032 109	0	0	0	0	0	0	0	0	0	100	98
03523741020 307	0	0	0	0	0	0	0	0	0	100	97

03524741032	115	0	0	0	0	0	0	0	0	0	100	97
0351326113305	408	0	0	0	0	0	0	0	0	0	100	96
03521441011	112	0	0	0	0	0	0	0	0	0	100	96
03521441011	205	0	0	0	0	0	0	0	0	0	100	96
03521561011	213	0	0	0	0	0	0	0	0	0	100	96
03521781011	405B	0	0	0	0	0	0	0	0	0	100	96
03524041030	114	0	0	0	0	0	0	0	0	0	100	96
03524441031	212	0	0	0	0	0	0	0	0	0	100	96
03524741032	108	0	0	0	0	0	0	0	0	0	100	96
03523761020	208	0	0	0	0	0	0	0	0	0	100	95
03524041030	103	0	0	0	0	0	0	0	0	0	100	94
03524221030	202	0	0	0	0	0	0	0	0	0	100	94
03524261035	310	0	0	0	0	0	0	0	0	0	100	94
03524721032	217	0	0	0	0	0	0	0	0	0	100	94
0351306113307	205	0	0	0	0	0	0	0	0	0	100	93
03524241030	110	0	0	0	0	0	0	0	0	0	100	93
03524361031	107	0	0	0	0	0	0	0	0	0	100	93
03524361031	201	0	0	0	0	0	0	0	0	0	100	93
03521321010	228	0	0	0	0	0	0	0	0	0	100	92
03521781011	401B	0	0	0	0	0	0	0	0	0	100	92
03524721032	205	0	0	0	0	0	0	0	0	0	100	92
0351218113406	203	0	0	0	0	0	0	0	0	0	49	91
03524241030	118	0	0	0	0	0	0	0	0	0	100	91
03524661032	201	0	0	0	0	0	0	0	0	0	100	91
03524721032	218	0	0	0	0	0	0	0	0	0	100	91
0351324113308	102	0	0	0	0	0	0	0	0	0	100	90
0351323113308	211	0	0	0	0	0	0	0	0	0	100	89
03521441011	104	0	0	0	0	0	0	0	0	0	100	89
03523301019	205	0	0	0	0	0	0	0	0	0	100	89
03524221030	205	0	0	0	0	0	0	0	0	0	100	89
03524441031	213	0	0	0	0	0	0	0	0	0	100	89
0351323113308	202	0	0	0	0	0	0	0	0	0	100	88
03521441011	206	0	0	0	0	0	0	0	0	0	100	88
03523321017	205	0	0	0	0	0	0	0	0	0	35	88
03524041030	115	0	0	0	0	0	0	0	0	0	100	88
03524661032	214	0	0	0	0	0	0	0	0	0	100	88
03524681032	102	0	0	0	0	0	0	0	0	0	98	88
0351323113308	212	0	0	0	0	0	0	0	0	0	100	87
03523061021	204	0	0	0	0	0	0	0	0	0	100	87
0351216113405	120	0	0	0	0	0	0	0	0	0	100	86
0351309113307	115	0	0	0	0	0	0	0	0	0	100	86
03521441011	111	0	0	0	0	0	0	0	0	0	100	86
03521581012	316	0	0	0	0	0	0	0	0	0	94	86
03523101019	101	0	0	0	0	0	0	0	0	0	100	86
03524041030	104	0	0	0	0	0	0	0	0	0	100	86
03524321031	208	0	0	0	0	0	0	0	0	0	100	86
0351306113307	204	0	0	0	0	0	0	0	0	0	100	85
03524661032	212	0	0	0	0	0	0	0	0	0	100	85
0351328113307	201B	0	0	0	0	0	0	0	0	0	100	84
03523741023	301	0	0	0	0	0	0	0	0	0	100	84
03523821035	307	0	0	0	0	0	0	0	0	0	100	84
03524261035	317	0	0	0	0	0	0	0	0	0	100	84
03521441011	113	0	0	0	0	0	0	0	0	0	100	83
03523821018	210	0	0	0	0	0	0	0	0	0	100	83
03524641032	313	0	0	0	0	0	0	0	0	0	100	83
03524641032	314	0	0	0	0	0	0	0	0	0	100	83
0351322113308	217	0	0	0	0	0	0	0	0	0	100	82
03524321031	203	0	0	0	0	0	0	0	0	0	100	82
03524481031	111	0	0	0	0	0	0	0	0	0	100	82
03524481031	113	0	0	0	0	0	0	0	0	0	100	82

03521441011	203	0	0	0	0	0	0	0	0	0	100	81
03524321031	207	0	0	0	0	0	0	0	0	0	100	81
03527061114	601	0	0	0	0	0	0	0	0	0	100	81
03524421031	308	0	0	0	0	0	0	0	0	0	100	80
03527201114	510	0	0	0	0	0	0	0	0	0	96	80
0351328113307304		0	0	0	0	0	0	0	0	0	100	79
03523801018	207	0	0	0	0	0	0	0	0	0	65	79
03524041030	105	0	0	0	0	0	0	0	0	0	100	79
03524041030	111	0	0	0	0	0	0	0	0	0	100	79
03524041030	113	0	0	0	0	0	0	0	0	0	100	79
03524261035	316	0	0	0	0	0	0	0	0	0	100	79
03524481031	109	0	0	0	0	0	0	0	0	0	100	79
03524481031	114	0	0	0	0	0	0	0	0	0	100	79
03524661032	209	0	0	0	0	0	0	0	0	0	100	79
03524661032	215	0	0	0	0	0	0	0	0	0	100	79
03527061114	604	0	0	0	0	0	0	0	0	0	100	79
0351312113305222		0	0	0	0	0	0	0	0	0	100	78
0351328113307207		0	0	0	0	0	0	0	0	0	100	78
03521261010	215	0	0	0	0	0	0	0	0	0	82	78
03521781011	402B	0	0	0	0	0	0	0	0	0	100	78
03523621020	306	0	0	0	0	0	0	0	0	0	100	78
03523701023	303	0	0	0	0	0	0	0	0	0	100	78
0351322113308219		0	0	0	0	0	0	0	0	0	100	77
03524481031	110	0	0	0	0	0	0	0	0	0	100	77
03521441011	106	0	0	0	0	0	0	0	0	0	100	76
03521521011	202	0	0	0	0	0	0	0	0	0	100	76
03523061021	203	0	0	0	0	0	0	0	0	0	100	76
03523761020	310	0	0	0	0	0	0	0	0	0	100	76
0351312113305221		0	0	0	0	0	0	0	0	0	100	75
0351322113308218		0	0	0	0	0	0	0	0	0	100	75
03520181007	105	0	0	0	0	0	0	0	0	0	100	75
03521561011	309A	0	0	0	0	0	0	0	0	0	100	75
03524061035	304	0	0	0	0	0	0	0	0	0	63	75
03524241030	116	0	0	0	0	0	0	0	0	0	100	75
03524361031	105	0	0	0	0	0	0	0	0	0	100	75
0351216113405115		0	0	0	0	0	0	0	0	0	100	74
0351320113406104		0	0	0	0	0	0	0	0	0	100	74
03520681007	208	0	0	0	0	0	0	0	0	0	100	74
03521021009	103A	0	0	0	0	0	0	0	0	0	29	74
03524481031	112	0	0	0	0	0	0	0	0	0	100	74
03524661032	213	0	0	0	0	0	0	0	0	0	100	74
03527201114	506	0	0	0	0	0	0	0	0	0	100	74
0351218113406202		0	0	0	0	0	0	0	0	0	58	73
03523301019	208	0	0	0	0	0	0	0	0	0	100	73
03523801018	201	0	0	0	0	0	0	0	0	0	65	73
03524361031	104	0	0	0	0	0	0	0	0	0	100	73
03524441031	215	0	0	0	0	0	0	0	0	0	100	73
03524681031	116	0	0	0	0	0	0	0	0	0	100	73
03524721032	216	0	0	0	0	0	0	0	0	0	100	73
0351216113405119		0	0	0	0	0	0	0	0	0	71	72
0351323113308210		0	0	0	0	0	0	0	0	0	100	72
03524021030	212	0	0	0	0	0	0	0	0	0	100	72
03524641032	316	0	0	0	0	0	0	0	0	0	100	72
03527061114	610	0	0	0	0	0	0	0	0	0	100	72
0351324113308105		0	0	0	0	0	0	0	0	0	100	71
0351328113307202		0	0	0	0	0	0	0	0	0	100	71
03524361031	108	0	0	0	0	0	0	0	0	0	100	71
03524441031	214	0	0	0	0	0	0	0	0	0	100	71
0351306113307206		0	0	0	0	0	0	0	0	0	100	70
0351322113308208		0	0	0	0	0	0	0	0	0	100	70

03521441011	101	0	0	0	0	0	0	0	0	0	0	100	70
03521521011	207	0	0	0	0	0	0	0	0	0	0	100	70
03523301019	207	0	0	0	0	0	0	0	0	0	0	100	70
03523481017	304	0	0	0	0	0	0	0	0	0	0	43	70
03524681032	107	0	0	0	0	0	0	0	0	0	0	100	70
03521421008	103	0	0	0	0	0	0	0	0	0	0	100	69
03524021030	214	0	0	0	0	0	0	0	0	0	0	100	69
03524361031	204	0	0	0	0	0	0	0	0	0	0	100	69
03524641032	310	0	0	0	0	0	0	0	0	0	0	100	69
03521781011	408	0	0	0	0	0	0	0	0	0	0	100	68
03523461018	108	0	0	0	0	0	0	0	0	0	0	100	68
03523621020	302	0	0	0	0	0	0	0	0	0	0	100	68
03523701030	213	0	0	0	0	0	0	0	0	0	0	100	68
03524061035	315	0	0	0	0	0	0	0	0	0	0	82	68
03527421115	186	0	0	0	0	0	0	0	0	0	0	100	68
0351312113305224		0	0	0	0	0	0	0	0	0	0	100	67
03521781011	403B	0	0	0	0	0	0	0	0	0	0	100	67
03524681032	105	0	0	0	0	0	0	0	0	0	0	100	67
03524681032	106	0	0	0	0	0	0	0	0	0	0	100	67
03527201114	503	0	0	0	0	0	0	0	0	0	0	100	67
03527201114	513	0	0	0	0	0	0	0	0	0	0	100	67
03520181007	103	0	0	0	0	0	0	0	0	0	0	100	66
03524041030	108	0	0	0	0	0	0	0	0	0	0	100	66
03524641032	301	0	0	0	0	0	0	0	0	0	0	100	66
03524661032	202	0	0	0	0	0	0	0	0	0	0	100	66
03524661032	208	0	0	0	0	0	0	0	0	0	0	100	66
0351302113405107		0	0	0	0	0	0	0	0	0	0	48	65
0351326113305410		0	0	0	0	0	0	0	0	0	0	100	65
0351326113305411		0	0	0	0	0	0	0	0	0	0	100	65
0351328113307305		0	0	0	0	0	0	0	0	0	0	100	65
0351328113307306		0	0	0	0	0	0	0	0	0	0	100	65
0351352113509205		0	0	0	0	0	0	0	0	0	0	100	65
03520181007	111	0	0	0	0	0	0	0	0	0	0	100	65
03521221010	220	0	0	0	0	0	0	0	0	0	0	100	65
03521561011	109	0	0	0	0	0	0	0	0	0	0	100	65
03521561011	401A	0	0	0	0	0	0	0	0	0	0	100	65
03523181017	103	0	0	0	0	0	0	0	0	0	0	40	65
03524261035	308	0	0	0	0	0	0	0	0	0	0	100	65
03524361031	205	0	0	0	0	0	0	0	0	0	0	100	65
03524641032	317	0	0	0	0	0	0	0	0	0	0	100	65
03527081114	111	0	0	0	0	0	0	0	0	0	0	100	65
03521221010	303	0	0	0	0	0	0	0	0	0	0	100	64
03521321010	314	0	0	0	0	0	0	0	0	0	0	100	64
03521561011	301A	0	0	0	0	0	0	0	0	0	0	100	64
03521581012	307	0	0	0	0	0	0	0	0	0	0	68	64
03527021115	125	0	0	0	0	0	0	0	0	0	0	100	64
0351321113308307		0	0	0	0	0	0	0	0	0	0	100	63
03524041030	107	0	0	0	0	0	0	0	0	0	0	100	63
03524061035	302	0	0	0	0	0	0	0	0	0	0	100	63
03524421032	304	0	0	0	0	0	0	0	0	0	0	100	63
03527081114	103	0	0	0	0	0	0	0	0	0	0	100	63
03527201114	505	0	0	0	0	0	0	0	0	0	0	73	63
03521321010	312	0	0	0	0	0	0	0	0	0	0	100	62
03521441011	103	0	0	0	0	0	0	0	0	0	0	100	62
03521561011	115	0	0	0	0	0	0	0	0	0	0	100	62
03524261035	306	0	0	0	0	0	0	0	0	0	0	100	62
03524441031	219	0	0	0	0	0	0	0	0	0	0	100	62
03524681032	103	0	0	0	0	0	0	0	0	0	0	84	62
03527201114	507	0	0	0	0	0	0	0	0	0	0	100	62
0351312113305223		0	0	0	0	0	0	0	0	0	0	100	61

0351326113305409	0	0	0	0	0	0	0	0	0	0	100	61
03521321010 226	0	0	0	0	0	0	0	0	0	0	99	61
03521561011 403A	0	0	0	0	0	0	0	0	0	0	100	61
03522641029 305	0	0	0	0	0	0	0	0	0	0	100	61
03524421032 306	0	0	0	0	0	0	0	0	0	0	100	61
03527081114 108	0	0	0	0	0	0	0	0	0	0	100	61
03527421115 182	0	0	0	0	0	0	0	0	0	0	100	61
03521321010 310	0	0	0	0	0	0	0	0	0	0	100	60
03521561011 108	0	0	0	0	0	0	0	0	0	0	100	60
03521821012 415B	0	0	0	0	0	0	0	0	0	0	100	60
03524261035 318	0	0	0	0	0	0	0	0	0	0	100	60
03524361031 106	0	0	0	0	0	0	0	0	0	0	100	60
0351216113405121	0	0	0	0	0	0	0	0	0	0	56	59
03520181007 102	0	0	0	0	0	0	0	0	0	0	100	59
03521321010 229	0	0	0	0	0	0	0	0	0	0	100	59
03523701030 201	0	0	0	0	0	0	0	0	0	0	100	59
03523801018 305	0	0	0	0	0	0	0	0	0	0	34	59
03524481034 315	0	0	0	0	0	0	0	0	0	0	65	59
03524721032 203	0	0	0	0	0	0	0	0	0	0	100	59
03521221010 208	0	0	0	0	0	0	0	0	0	0	100	58
03524661032 207	0	0	0	0	0	0	0	0	0	0	100	58
0351309113307114	0	0	0	0	0	0	0	0	0	0	100	57
0351322113308207	0	0	0	0	0	0	0	0	0	0	100	57
03520201002 105	0	0	0	0	0	0	0	0	0	0	100	57
03521441011 105	0	0	0	0	0	0	0	0	0	0	100	57
03523821035 309	0	0	0	0	0	0	0	0	0	0	100	57
03524741032 112	0	0	0	0	0	0	0	0	0	0	100	57
03527061114 611	0	0	0	0	0	0	0	0	0	0	100	57
03527081114 112	0	0	0	0	0	0	0	0	0	0	50	57
0351218113406223	0	0	0	0	0	0	0	0	0	0	58	56
03520681007 214	0	0	0	0	0	0	0	0	0	0	100	56
03521221010 302	0	0	0	0	0	0	0	0	0	0	100	56
03521781011 407	0	0	0	0	0	0	0	0	0	0	100	56
03523501018 104	0	0	0	0	0	0	0	0	0	0	29	56
03524481034 311	0	0	0	0	0	0	0	0	0	0	84	56
03524721032 206	0	0	0	0	0	0	0	0	0	0	100	56
03527201114 509	0	0	0	0	0	0	0	0	0	0	100	56
0351216113405113	0	0	0	0	0	0	0	0	0	0	100	55
0351323113308214	0	0	0	0	0	0	0	0	0	0	100	55
0351348113509103	0	0	0	0	0	0	0	0	0	0	100	55
03520201002 102	0	0	0	0	0	0	0	0	0	0	100	55
03524321031 202	0	0	0	0	0	0	0	0	0	0	100	55
03524421032 315	0	0	0	0	0	0	0	0	0	0	100	55
0351322113308203	0	0	0	0	0	0	0	0	0	0	100	54
0351328113307208	0	0	0	0	0	0	0	0	0	0	100	54
03521321010 313	0	0	0	0	0	0	0	0	0	0	100	54
03523761020 309	0	0	0	0	0	0	0	0	0	0	100	54
0351309113307112	0	0	0	0	0	0	0	0	0	0	100	53
0351322113308209	0	0	0	0	0	0	0	0	0	0	100	53
0351323113308213	0	0	0	0	0	0	0	0	0	0	100	53
03521321010 232	0	0	0	0	0	0	0	0	0	0	100	53
03521421008 102	0	0	0	0	0	0	0	0	0	0	100	53
03521441011 204	0	0	0	0	0	0	0	0	0	0	100	53
03521561011 404	0	0	0	0	0	0	0	0	0	0	100	53
03524681032 104	0	0	0	0	0	0	0	0	0	0	100	53
0351321113308306	0	0	0	0	0	0	0	0	0	0	100	52
0351352113509206	0	0	0	0	0	0	0	0	0	0	100	52
03520161001 114	0	0	0	0	0	0	0	0	0	0	100	52
03521261010 216	0	0	0	0	0	0	0	0	0	0	100	52
03521321010 227	0	0	0	0	0	0	0	0	0	0	100	52

03521321010	231	0	0	0	0	0	0	0	0	0	100	52
03524361031	102	0	0	0	0	0	0	0	0	0	100	52
03524721032	220	0	0	0	0	0	0	0	0	0	100	52
03527061114	603	0	0	0	0	0	0	0	0	0	100	52
0351308113305317		0	0	0	0	0	0	0	0	0	100	51
0351324113308108		0	0	0	0	0	0	0	0	0	100	51
03520181007	104	0	0	0	0	0	0	0	0	0	100	51
03522641029	301	0	0	0	0	0	0	0	0	0	100	51
03524481034	316	0	0	0	0	0	0	0	0	0	57	51
03521221010	311	0	0	0	0	0	0	0	0	0	100	50
03521261010	209	0	0	0	0	0	0	0	0	0	99	50
03521581012	415A	0	0	0	0	0	0	0	0	0	100	50
0351334113304203		0	0	0	0	0	0	0	0	0	100	49
03523461019	211	0	0	0	0	0	0	0	0	0	100	49
03524261035	305	0	0	0	0	0	0	0	0	0	100	49
03524361031	206	0	0	0	0	0	0	0	0	0	100	49
03524441031	209	0	0	0	0	0	0	0	0	0	100	49
03524641032	309	0	0	0	0	0	0	0	0	0	100	49
03527061114	602	0	0	0	0	0	0	0	0	0	100	49
03527221114	204	0	0	0	0	0	0	0	0	0	46	49
03521561011	107	0	0	0	0	0	0	0	0	0	100	48
03524481034	309	0	0	0	0	0	0	0	0	0	92	48
03524681032	110	0	0	0	0	0	0	0	0	0	66	48
03527061114	608	0	0	0	0	0	0	0	0	0	100	48
0351323113308222		0	0	0	0	0	0	0	0	0	100	47
03520181007	110	0	0	0	0	0	0	0	0	0	100	47
03521221010	301	0	0	0	0	0	0	0	0	0	97	47
03522641029	306	0	0	0	0	0	0	0	0	0	100	47
0351323113308215		0	0	0	0	0	0	0	0	0	100	46
03520661007	202	0	0	0	0	0	0	0	0	0	100	46
03520681007	205	0	0	0	0	0	0	0	0	0	100	46
03521321010	230	0	0	0	0	0	0	0	0	0	100	46
03521421008	106	0	0	0	0	0	0	0	0	0	100	46
03523461019	209	0	0	0	0	0	0	0	0	0	100	46
03524681031	118	0	0	0	0	0	0	0	0	0	100	46
03527201114	502	0	0	0	0	0	0	0	0	0	96	46
03521321010	222	0	0	0	0	0	0	0	0	0	100	45
03521781011	411	0	0	0	0	0	0	0	0	0	100	45
03524441031	220	0	0	0	0	0	0	0	0	0	100	45
03524681031	117	0	0	0	0	0	0	0	0	0	100	45
03527061114	614	0	0	0	0	0	0	0	0	0	100	45
0351352113509208		0	0	0	0	0	0	0	0	0	100	44
03521521011	210	0	0	0	0	0	0	0	0	0	100	44
03523461018	109	0	0	0	0	0	0	0	0	0	100	44
03523621020	303	0	0	0	0	0	0	0	0	0	100	44
03527201114	508	0	0	0	0	0	0	0	0	0	100	44
0352002100304202		0	0	0	0	0	0	0	0	0	100	43
03520681007	209	0	0	0	0	0	0	0	0	0	100	43
03521221010	205	0	0	0	0	0	0	0	0	0	100	43
03521221010	207	0	0	0	0	0	0	0	0	0	100	43
03521261010	204	0	0	0	0	0	0	0	0	0	72	43
03527021115	129	0	0	0	0	0	0	0	0	0	100	43
03527421115	184	0	0	0	0	0	0	0	0	0	100	43
0351322113308205		0	0	0	0	0	0	0	0	0	100	42
03527061114	612	0	0	0	0	0	0	0	0	0	100	42
0351352113509201		0	0	0	0	0	0	0	0	0	100	41
03523461018	107	0	0	0	0	0	0	0	0	0	100	41
03524501034	308	0	0	0	0	0	0	0	0	0	44	41
03524741032	117	0	0	0	0	0	0	0	0	0	87	41
03521321010	223	0	0	0	0	0	0	0	0	0	100	40

03524481034	312	0	0	0	0	0	0	0	0	0	72	40
03527021115	124	0	0	0	0	0	0	0	0	0	100	40
0351323113308221		0	0	0	0	0	0	0	0	0	100	38
03524721032	211	0	0	0	0	0	0	0	0	0	100	38
0351218113406204		0	0	0	0	0	0	0	0	0	14	37
0351308113305314		0	0	0	0	0	0	0	0	0	100	37
0351323113308216		0	0	0	0	0	0	0	0	0	100	37
0351348113509101		0	0	0	0	0	0	0	0	0	16	37
03520201002	120	0	0	0	0	0	0	0	0	0	100	37
03520221002	109	0	0	0	0	0	0	0	0	0	100	37
03521261010	221	0	0	0	0	0	0	0	0	0	100	37
03527421115	181	0	0	0	0	0	0	0	0	0	100	37
03527421115	183	0	0	0	0	0	0	0	0	0	100	37
0351322113308204		0	0	0	0	0	0	0	0	0	100	36
03523701023	302	0	0	0	0	0	0	0	0	0	100	36
03524421031	307	0	0	0	0	0	0	0	0	0	100	36
03524421032	311	0	0	0	0	0	0	0	0	0	100	36
03527061114	605	0	0	0	0	0	0	0	0	0	100	36
0351348113509104		0	0	0	0	0	0	0	0	0	100	35
03521321010	224	0	0	0	0	0	0	0	0	0	67	35
03523621020	111	0	0	0	0	0	0	0	0	0	100	35
03523621020	113	0	0	0	0	0	0	0	0	0	100	35
03527201114	504	0	0	0	0	0	0	0	0	0	39	35
03523741020	308	0	0	0	0	0	0	0	0	0	100	34
03527061114	615	0	0	0	0	0	0	0	0	0	100	34
03527021115	127	0	0	0	0	0	0	0	0	0	100	33
03527021115	128	0	0	0	0	0	0	0	0	0	100	33
03527021115	177	0	0	0	0	0	0	0	0	0	100	33
03523101017	107	0	0	0	0	0	0	0	0	0	100	32
03524661032	210	0	0	0	0	0	0	0	0	0	100	32
03527421115	187	0	0	0	0	0	0	0	0	0	100	32
0351308113305312		0	0	0	0	0	0	0	0	0	100	31
03520681007	206	0	0	0	0	0	0	0	0	0	100	31
03523321017	204	0	0	0	0	0	0	0	0	0	42	31
03524481034	302	0	0	0	0	0	0	0	0	0	100	31
0351348113509109		0	0	0	0	0	0	0	0	0	76	30
03520681007	204	0	0	0	0	0	0	0	0	0	100	30
03521781011	410	0	0	0	0	0	0	0	0	0	100	30
03524681032	111	0	0	0	0	0	0	0	0	0	50	30
03524801049	104	0	0	0	0	0	0	0	0	0	48	30
03527021115	171	0	0	0	0	0	0	0	0	0	100	30
0351348113509111		0	0	0	0	0	0	0	0	0	96	28
03520681007	203	0	0	0	0	0	0	0	0	0	100	28
03521581012	306	0	0	0	0	0	0	0	0	0	41	28
03522641029	302	0	0	0	0	0	0	0	0	0	100	28
03524501034	307	0	0	0	0	0	0	0	0	0	35	28
0351030100303115B		0	0	0	0	0	0	0	0	0	100	27
0351304113307421		0	0	0	0	0	0	0	0	0	100	27
03520201002	103	0	0	0	0	0	0	0	0	0	100	27
03520221002	108	0	0	0	0	0	0	0	0	0	100	27
03524701033	304	0	0	0	0	0	0	0	0	0	32	27
03524741032	113	0	0	0	0	0	0	0	0	0	33	27
03527021115	180	0	0	0	0	0	0	0	0	0	100	27
03527081114	109	0	0	0	0	0	0	0	0	0	56	27
03520161001	112	0	0	0	0	0	0	0	0	0	100	26
03520221002	118	0	0	0	0	0	0	0	0	0	100	26
03521221010	218	0	0	0	0	0	0	0	0	0	100	26
03521221010	305	0	0	0	0	0	0	0	0	0	100	26
03527021115	105	0	0	0	0	0	0	0	0	0	100	26
03527021115	115	0	0	0	0	0	0	0	0	0	100	26

03521781011	409	0	0	0	0	0	0	0	0	0	100	25
03523101017	102	0	0	0	0	0	0	0	0	0	7	25
03524681031	119	0	0	0	0	0	0	0	0	0	100	25
03527321114	412	0	0	0	0	0	0	0	0	0	76	24
0351308113305316		0	0	0	0	0	0	0	0	0	100	23
0351332113304501		0	0	0	0	0	0	0	0	0	18	23
03521221010	217	0	0	0	0	0	0	0	0	0	100	23
03521821012	406	0	0	0	0	0	0	0	0	0	89	23
03524041030	106	0	0	0	0	0	0	0	0	0	100	23
03524801049	105	0	0	0	0	0	0	0	0	0	29	23
0351348113509106		0	0	0	0	0	0	0	0	0	100	22
0351348113509107		0	0	0	0	0	0	0	0	0	100	22
03520201002	104	0	0	0	0	0	0	0	0	0	100	22
03521221010	206	0	0	0	0	0	0	0	0	0	100	22
03521581012	414A	0	0	0	0	0	0	0	0	0	26	22
03524441031	217	0	0	0	0	0	0	0	0	0	100	22
03527021115	120	0	0	0	0	0	0	0	0	0	100	22
03527081114	107	0	0	0	0	0	0	0	0	0	100	22
0351324113308109		0	0	0	0	0	0	0	0	0	100	21
03523621023	101	0	0	0	0	0	0	0	0	0	100	21
03523621023	106	0	0	0	0	0	0	0	0	0	100	21
03524361031	103	0	0	0	0	0	0	0	0	0	100	21
03527421115	185	0	0	0	0	0	0	0	0	0	75	21
03527021115	142	0	0	0	0	0	0	0	0	0	100	20
0351304113307310		0	0	0	0	0	0	0	0	0	100	19
0351308113305311		0	0	0	0	0	0	0	0	0	100	19
0351348113509102		0	0	0	0	0	0	0	0	0	74	19
03523101017	104	0	0	0	0	0	0	0	0	0	99	19
03523481017	301	0	0	0	0	0	0	0	0	0	100	19
03527081114	110	0	0	0	0	0	0	0	0	0	33	19
0351308113305313		0	0	0	0	0	0	0	0	0	100	18
0351324113308106		0	0	0	0	0	0	0	0	0	100	18
0351348113509105		0	0	0	0	0	0	0	0	0	100	18
03522601029	211	0	0	0	0	0	0	0	0	0	100	18
03523821018	208	0	0	0	0	0	0	0	0	0	100	18
03524801049	103	0	0	0	0	0	0	0	0	0	66	18
03527021115	126	0	0	0	0	0	0	0	0	0	100	18
03527021115	135	0	0	0	0	0	0	0	0	0	100	18
0351348113509110		0	0	0	0	0	0	0	0	0	74	17
0351352113509207		0	0	0	0	0	0	0	0	0	100	17
03527021115	108	0	0	0	0	0	0	0	0	0	100	17
03527061114	613	0	0	0	0	0	0	0	0	0	100	17
0351218113406205		0	0	0	0	0	0	0	0	0	55	16
0351308113305315		0	0	0	0	0	0	0	0	0	100	16
03523301019	206	0	0	0	0	0	0	0	0	0	100	16
03527061114	607	0	0	0	0	0	0	0	0	0	100	16
0351348113509108		0	0	0	0	0	0	0	0	0	100	15
03523461020	104	0	0	0	0	0	0	0	0	0	100	15
0351030100303111		0	0	0	0	0	0	0	0	0	100	14
03520161001	115	0	0	0	0	0	0	0	0	0	100	14
03527021115	112	0	0	0	0	0	0	0	0	0	100	14
03527201114	501	0	0	0	0	0	0	0	0	0	100	14
03527421115	188	0	0	0	0	0	0	0	0	0	36	14
03522601029	210	0	0	0	0	0	0	0	0	0	100	13
03527021115	176	0	0	0	0	0	0	0	0	0	100	13
03527321114	413	0	0	0	0	0	0	0	0	0	28	13
0351350113304101B		0	0	0	0	0	0	0	0	0	41	12
03520161001	117	0	0	0	0	0	0	0	0	0	100	12
03520221002	117	0	0	0	0	0	0	0	0	0	100	12
03523461019	210	0	0	0	0	0	0	0	0	0	100	12

03527221114	206	0	0	0	0	0	0	0	0	0	0	15	12
03520161001	113	0	0	0	0	0	0	0	0	0	0	100	11
03520161001	119	0	0	0	0	0	0	0	0	0	0	100	11
03524741032	114	0	0	0	0	0	0	0	0	0	0	14	11
03527021115	102	0	0	0	0	0	0	0	0	0	0	100	11
03527021115	106	0	0	0	0	0	0	0	0	0	0	100	11
03520161001	108	0	0	0	0	0	0	0	0	0	0	100	10
03521741011	308	0	0	0	0	0	0	0	0	0	0	100	10
03523501018	102	0	0	0	0	0	0	0	0	0	0	55	10
03523821018	309	0	0	0	0	0	0	0	0	0	0	37	10
03524361031	101	0	0	0	0	0	0	0	0	0	0	100	10
03524381034	301	0	0	0	0	0	0	0	0	0	0	16	10
03527021115	123	0	0	0	0	0	0	0	0	0	0	100	10
03527421116	206	0	0	0	0	0	0	0	0	0	0	41	10
0351326113305402		0	0	0	0	0	0	0	0	0	0	100	9
03521261010	225	0	0	0	0	0	0	0	0	0	0	19	9
03523461020	105	0	0	0	0	0	0	0	0	0	0	100	9
03527021115	101	0	0	0	0	0	0	0	0	0	0	100	9
0351308113305318		0	0	0	0	0	0	0	0	0	0	100	8
03520681007	213	0	0	0	0	0	0	0	0	0	0	100	8
03521261010	210	0	0	0	0	0	0	0	0	0	0	18	8
03521341010	124	0	0	0	0	0	0	0	0	0	0	13	8
03521741011	303	0	0	0	0	0	0	0	0	0	0	100	8
03527021115	104	0	0	0	0	0	0	0	0	0	0	100	8
03527021115	173	0	0	0	0	0	0	0	0	0	0	100	8
03527021115	178	0	0	0	0	0	0	0	0	0	0	100	8
03520161001	120	0	0	0	0	0	0	0	0	0	0	100	7
03527421116	205	0	0	0	0	0	0	0	0	0	0	83	7
0351348113509116		0	0	0	0	0	0	0	0	0	0	97	6
03520161001	107	0	0	0	0	0	0	0	0	0	0	100	6
03520681007	220	0	0	0	0	0	0	0	0	0	0	100	6
03521421008	109	0	0	0	0	0	0	0	0	0	0	100	6
03524061035	301	0	0	0	0	0	0	0	0	0	0	12	6
03524801049	107	0	0	0	0	0	0	0	0	0	0	16	6
03527021115	113	0	0	0	0	0	0	0	0	0	0	100	6
03527421116	201	0	0	0	0	0	0	0	0	0	0	77	6
0351218113406208		0	0	0	0	0	0	0	0	0	0	2	5
03520161001	110	0	0	0	0	0	0	0	0	0	0	100	5
03520161001	124	0	0	0	0	0	0	0	0	0	0	100	5
03521261010	203	0	0	0	0	0	0	0	0	0	0	20	5
03527021115	116	0	0	0	0	0	0	0	0	0	0	100	5
0351348113509112		0	0	0	0	0	0	0	0	0	0	12	4
03524381034	303	0	0	0	0	0	0	0	0	0	0	6	4
03527021115	141	0	0	0	0	0	0	0	0	0	0	100	4
03527021115	172	0	0	0	0	0	0	0	0	0	0	100	4
03527421116	202	0	0	0	0	0	0	0	0	0	0	30	4
0351030100303109		0	0	0	0	0	0	0	0	0	0	56	3
03523801018	205	0	0	0	0	0	0	0	0	0	0	100	3
03524241030	102	0	0	0	0	0	0	0	0	0	0	100	3
0351030100303106		0	0	0	0	0	0	0	0	0	0	41	2
03520201002	107A	0	0	0	0	0	0	0	0	0	0	8	2
03521221010	306	0	0	0	0	0	0	0	0	0	0	100	2
03521581012	315	0	0	0	0	0	0	0	0	0	0	3	2
03521821012	405	0	0	0	0	0	0	0	0	0	0	1	2
03523461020	102	0	0	0	0	0	0	0	0	0	0	100	2
03523461020	103	0	0	0	0	0	0	0	0	0	0	100	2
03527021115	137	0	0	0	0	0	0	0	0	0	0	100	2
03527081114	101	0	0	0	0	0	0	0	0	0	0	100	2
03527201114	511	0	0	0	0	0	0	0	0	0	0	5	2
0351352113509202		0	0	0	0	0	0	0	0	0	0	100	1

0352001100303118	0	0	0	0	0	0	0	0	0	44	1
03521321010 309	0	0	0	0	0	0	0	0	0	100	1
03521821012 407	0	0	0	0	0	0	0	0	0	100	1
03523461020 101	0	0	0	0	0	0	0	0	0	100	1
03524061035 313	0	0	0	0	0	0	0	0	0	1	1
03524241030 101	0	0	0	0	0	0	0	0	0	100	1
03527021115 179	0	0	0	0	0	0	0	0	0	100	1
03527081114 105	0	0	0	0	0	0	0	0	0	100	1
03527421115 189	0	0	0	0	0	0	0	0	0	3	1
03528301116 403	0	0	0	0	0	0	0	0	0	6	1
0351030100303103C	0	0	0	0	0	0	0	0	0	12	0
0351030100303107	0	0	0	0	0	0	0	0	0	7	0
0351030100303110	0	0	0	0	0	0	0	0	0	99	0
0351030100303112	0	0	0	0	0	0	0	0	0	100	0
0351030100303113	0	0	0	0	0	0	0	0	0	100	0
0351030100303114	0	0	0	0	0	0	0	0	0	100	0
0351210113405102	0	0	0	0	0	0	0	0	0	100	0
0351210113405103	0	0	0	0	0	0	0	0	0	44	0
0351210113405104	0	0	0	0	0	0	0	0	0	32	0
0351218113406206	0	0	0	0	0	0	0	0	0	2	0
0351304113307309	0	0	0	0	0	0	0	0	0	100	0
0351312113305202	0	0	0	0	0	0	0	0	0	100	0
0351312113305218	0	0	0	0	0	0	0	0	0	100	0
0351312113305219	0	0	0	0	0	0	0	0	0	100	0
0351312113305220	0	0	0	0	0	0	0	0	0	100	0
0351326113305405	0	0	0	0	0	0	0	0	0	100	0
0351332113304502	0	0	0	0	0	0	0	0	0	3	0
0351334113304201	0	0	0	0	0	0	0	0	0	66	0
0351348113509117	0	0	0	0	0	0	0	0	0	8	0
0351348113509118	0	0	0	0	0	0	0	0	0	1	0
0351350113306103	0	0	0	0	0	0	0	0	0	100	0
0351352113509203	0	0	0	0	0	0	0	0	0	79	0
0351352113509204	0	0	0	0	0	0	0	0	0	100	0
0352001100303103B	0	0	0	0	0	0	0	0	0	31	0
0352001100303117	0	0	0	0	0	0	0	0	0	1	0
0352001100303122	0	0	0	0	0	0	0	0	0	83	0
0352001100303126	0	0	0	0	0	0	0	0	0	100	0
0352001100303127	0	0	0	0	0	0	0	0	0	100	0
0352001100303128	0	0	0	0	0	0	0	0	0	76	0
0352001100303129	0	0	0	0	0	0	0	0	0	100	0
0352001100303130	0	0	0	0	0	0	0	0	0	100	0
0352001100303131	0	0	0	0	0	0	0	0	0	100	0
0352001113901138A	0	0	0	0	0	0	0	0	0	12	0
0352001113901153	0	0	0	0	0	0	0	0	0	28	0
0352001113901154	0	0	0	0	0	0	0	0	0	4	0
0352001113901157	0	0	0	0	0	0	0	0	0	1	0
0352001113901158	0	0	0	0	0	0	0	0	0	5	0
0352001113901159	0	0	0	0	0	0	0	0	0	64	0
0352001113901160	0	0	0	0	0	0	0	0	0	9	0
0352001113901162	0	0	0	0	0	0	0	0	0	16	0
0352001113901170	0	0	0	0	0	0	0	0	0	3	0
03520161001 101	0	0	0	0	0	0	0	0	0	69	0
03520161001 103	0	0	0	0	0	0	0	0	0	100	0
03520161001 104	0	0	0	0	0	0	0	0	0	100	0
03520161001 105	0	0	0	0	0	0	0	0	0	100	0
03520161001 106	0	0	0	0	0	0	0	0	0	100	0
03520161001 109	0	0	0	0	0	0	0	0	0	100	0
03520161001 111	0	0	0	0	0	0	0	0	0	100	0
03520161001 116	0	0	0	0	0	0	0	0	0	100	0
03520161001 118	0	0	0	0	0	0	0	0	0	100	0

03520161001	121	0	0	0	0	0	0	0	0	0	0	100	0
03520161001	123	0	0	0	0	0	0	0	0	0	0	100	0
03520161001	127	0	0	0	0	0	0	0	0	0	0	100	0
03520161001	128	0	0	0	0	0	0	0	0	0	0	100	0
03520161004	113	0	0	0	0	0	0	0	0	0	0	38	0
03520161004	114	0	0	0	0	0	0	0	0	0	0	100	0
03520181007	108	0	0	0	0	0	0	0	0	0	0	100	0
03520201002	111	0	0	0	0	0	0	0	0	0	0	100	0
03520201002	114	0	0	0	0	0	0	0	0	0	0	97	0
03520201002	115	0	0	0	0	0	0	0	0	0	0	85	0
03520201002	121	0	0	0	0	0	0	0	0	0	0	100	0
03520221002	106	0	0	0	0	0	0	0	0	0	0	100	0
03520681007	201	0	0	0	0	0	0	0	0	0	0	100	0
03520681007	207	0	0	0	0	0	0	0	0	0	0	100	0
03520681007	212	0	0	0	0	0	0	0	0	0	0	100	0
03520681007	221	0	0	0	0	0	0	0	0	0	0	100	0
03521221010	219	0	0	0	0	0	0	0	0	0	0	100	0
03521221010	304	0	0	0	0	0	0	0	0	0	0	100	0
03521221010	307	0	0	0	0	0	0	0	0	0	0	100	0
03521321010	308	0	0	0	0	0	0	0	0	0	0	100	0
03521441011	110	0	0	0	0	0	0	0	0	0	0	100	0
03521521011	211	0	0	0	0	0	0	0	0	0	0	100	0
03521561011	405A	0	0	0	0	0	0	0	0	0	0	100	0
03521741011	305	0	0	0	0	0	0	0	0	0	0	100	0
03521821012	414B	0	0	0	0	0	0	0	0	0	0	53	0
03522641029	303	0	0	0	0	0	0	0	0	0	0	100	0
03523301019	202	0	0	0	0	0	0	0	0	0	0	100	0
03523301019	203	0	0	0	0	0	0	0	0	0	0	100	0
03523461020	107	0	0	0	0	0	0	0	0	0	0	100	0
03523621020	108	0	0	0	0	0	0	0	0	0	0	100	0
03523621020	109	0	0	0	0	0	0	0	0	0	0	100	0
03523621020	110	0	0	0	0	0	0	0	0	0	0	100	0
03524381034	304	0	0	0	0	0	0	0	0	0	0	0	0
03524701033	305	0	0	0	0	0	0	0	0	0	0	1	0
03524741032	116	0	0	0	0	0	0	0	0	0	0	1	0
03524801049	108	0	0	0	0	0	0	0	0	0	0	0	0
03527021115	103	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	107	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	111	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	117	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	118	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	119	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	122	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	134	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	136	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	138	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	139	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	140	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	143	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	144	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	167	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	168	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	169	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	170	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	174	0	0	0	0	0	0	0	0	0	0	100	0
03527021115	175	0	0	0	0	0	0	0	0	0	0	100	0
03527081114	104	0	0	0	0	0	0	0	0	0	0	100	0
03527221114	213A	0	0	0	0	0	0	0	0	0	0	45	0
03527321114	410	0	0	0	0	0	0	0	0	0	0	0	0
03527421115	163	0	0	0	0	0	0	0	0	0	0	98	0

03527421115	165	0	0	0	0	0	0	0	0	0	85	0
03527421115	166	0	0	0	0	0	0	0	0	0	100	0
03527421115	190	0	0	0	0	0	0	0	0	0	66	0
03527421115	191	0	0	0	0	0	0	0	0	0	100	0
03527421115	192	0	0	0	0	0	0	0	0	0	100	0
03527421115	193	0	0	0	0	0	0	0	0	0	100	0
03527421115	194	0	0	0	0	0	0	0	0	0	96	0
03527421115	195	0	0	0	0	0	0	0	0	0	10	0
03527421116	204	0	0	0	0	0	0	0	0	0	2	0
03527421116	207	0	0	0	0	0	0	0	0	0	0	0
0352742113305201A		0	0	0	0	0	0	0	0	0	100	0
0351304113307307		0	0	0	0	0	0	0	0	0	100	83
0351306113307302		0	0	0	0	0	0	0	1	0	100	65
03521421008	104	0	0	0	0	0	0	0	0	0	100	55
03520161001	129	0	0	0	0	0	0	0	1	0	100	28
0352002100304203		0	0	0	0	0	0	0	1	0	100	21
0351312113305201B		0	0	0	0	0	0	0	19	0	100	4
0351304113307406		0	0	0	0	0	0	0	100	0	100	0
0351304113307407		0	0	0	0	0	0	0	100	0	100	0
0351304113307408		0	0	0	0	0	0	0	100	0	100	0
0351304113307409		0	0	0	0	0	0	0	100	0	100	0
0351304113307410		0	0	0	0	0	0	0	100	0	100	0
0351304113307411		0	0	0	0	0	0	0	100	0	100	0
0351304113307412		0	0	0	0	0	0	0	100	0	100	0
0351304113307413		0	0	0	0	0	0	0	100	0	100	0
0351304113307414		0	0	0	0	0	0	0	100	0	100	0
0351304113307415		0	0	0	0	0	0	0	100	0	100	0
0351304113307416		0	0	0	0	0	0	0	100	0	100	0
0351304113307418		0	0	0	0	0	0	0	100	0	100	0
0351304113307422		0	0	0	0	0	0	0	100	0	100	0
0351304113405101		0	0	0	0	0	0	0	26	0	100	0
0351304113405109		0	0	0	0	0	0	0	37	0	100	0
0351304113405110		0	0	0	0	0	0	0	9	0	100	0
0351304113405141		0	0	0	0	0	0	0	100	0	100	0
0351304113405142		0	0	0	0	0	0	0	100	0	100	0
0351306113307423		0	0	0	0	0	0	0	100	0	100	0
0351306113307425		0	0	0	0	0	0	0	100	0	100	0
0351306113307426		0	0	0	0	0	0	0	100	0	100	0
0351306113307428		0	0	0	0	0	0	0	100	0	100	0
0351306113307429		0	0	0	0	0	0	0	100	0	100	0
0351306113307430		0	0	0	0	0	0	0	100	0	100	0
0351308113305305		0	0	0	0	0	0	0	100	0	100	0
0351308113305306		0	0	0	0	0	0	0	100	0	100	0
0351308113305307		0	0	0	0	0	0	0	100	0	100	0
0351308113305399		0	0	0	0	0	0	0	100	0	100	0
0351309113307107		0	0	0	0	0	0	0	100	0	100	0
0351310113305110		0	0	0	0	0	0	0	100	0	100	0
0351310113305111		0	0	0	0	0	0	0	100	0	100	0
0351312113305213		0	0	0	0	0	0	0	87	0	100	0
0351312113305302		0	0	0	0	0	0	0	100	0	100	0
0351312113305303		0	0	0	0	0	0	0	100	0	100	0
0352001100302113		0	0	0	0	0	0	0	100	0	100	0
0352001100302146		0	0	0	0	0	0	0	45	0	98	0
0352001100302185		0	0	0	0	0	0	0	100	0	100	0
0352001100302186		0	0	0	0	0	0	0	100	0	100	0
0352001100302187		0	0	0	0	0	0	0	99	0	100	0
0352001100302188		0	0	0	0	0	0	0	56	0	100	0
0352001100302189		0	0	0	0	0	0	0	33	0	100	0
0352001100302190		0	0	0	0	0	0	0	100	0	100	0
0352001100302191		0	0	0	0	0	0	0	100	0	100	0

0352001100302192	0	0	0	0	0	0	0	0	100	0	100	0
0352001100302195	0	0	0	0	0	0	0	0	100	0	100	0
0352001100302196	0	0	0	0	0	0	0	0	100	0	100	0
0352001100302199	0	0	0	0	0	0	0	0	100	0	100	0
0352001100303116	0	0	0	0	0	0	0	0	100	0	100	0
0352001100303119	0	0	0	0	0	0	0	0	51	0	100	0
0352001100303120	0	0	0	0	0	0	0	0	10	0	100	0
0352001100303121	0	0	0	0	0	0	0	0	10	0	100	0
0352001100303124	0	0	0	0	0	0	0	0	100	0	100	0
0352001100303125	0	0	0	0	0	0	0	0	100	0	100	0
0352001100303132	0	0	0	0	0	0	0	0	53	0	100	0
0352001100303133	0	0	0	0	0	0	0	0	90	0	100	0
0352001100303134	0	0	0	0	0	0	0	0	1	0	100	0
0352001100303135	0	0	0	0	0	0	0	0	2	0	100	0
0352001100303149	0	0	0	0	0	0	0	0	100	0	100	0
0352001100303150	0	0	0	0	0	0	0	0	100	0	100	0
0352001100303151	0	0	0	0	0	0	0	0	100	0	100	0
0352001100303152	0	0	0	0	0	0	0	0	100	0	100	0
0352001100303153	0	0	0	0	0	0	0	0	100	0	100	0
0352001100303154	0	0	0	0	0	0	0	0	100	0	100	0
0352001100303155	0	0	0	0	0	0	0	0	100	0	100	0
0352001100303156	0	0	0	0	0	0	0	0	100	0	100	0
0352001100303157	0	0	0	0	0	0	0	0	100	0	100	0
0352001100303158	0	0	0	0	0	0	0	0	100	0	100	0
0352001100303159	0	0	0	0	0	0	0	0	100	0	100	0
03520161001 102	0	0	0	0	0	0	0	0	32	0	87	0
03520161001 125	0	0	0	0	0	0	0	0	73	0	100	0
03520161001 126	0	0	0	0	0	0	0	0	100	0	100	0
03520161001 204	0	0	0	0	0	0	0	0	100	0	100	0
03520161001 210	0	0	0	0	0	0	0	0	100	0	100	0
03520161001 211	0	0	0	0	0	0	0	0	100	0	100	0
03520161001 216	0	0	0	0	0	0	0	0	100	0	100	0
03520161001 301	0	0	0	0	0	0	0	0	100	0	100	0
03520161001 302	0	0	0	0	0	0	0	0	100	0	100	0
03520161001 303	0	0	0	0	0	0	0	0	100	0	100	0
03520161001 306	0	0	0	0	0	0	0	0	100	0	100	0
03520161001 307	0	0	0	0	0	0	0	0	100	0	100	0
03520161001 308	0	0	0	0	0	0	0	0	100	0	100	0
03520301005 408	0	0	0	0	0	0	0	0	100	0	100	0
03520341005 209	0	0	0	0	0	0	0	0	100	0	100	0
03520661007 304	0	0	0	0	0	0	0	0	100	0	100	0
03520741008 202	0	0	0	0	0	0	0	0	100	0	100	0
03520741008 306	0	0	0	0	0	0	0	0	100	0	100	0
03521421008 108	0	0	0	0	0	0	0	0	60	0	100	0
03521421008 110	0	0	0	0	0	0	0	0	82	0	100	0
03522201024 101	0	0	0	0	0	0	0	0	100	0	100	0
03522201024 102	0	0	0	0	0	0	0	0	100	0	100	0
03522201024 105	0	0	0	0	0	0	0	0	100	0	100	0
03522201024 111	0	0	0	0	0	0	0	0	100	0	100	0
03522201024 124	0	0	0	0	0	0	0	0	100	0	100	0
03522201024 143	0	0	0	0	0	0	0	0	100	0	100	0
03522201025 101	0	0	0	0	0	0	0	0	100	0	100	0
03522201025 102	0	0	0	0	0	0	0	0	100	0	100	0
03522201025 103	0	0	0	0	0	0	0	0	100	0	100	0
03522201025 104	0	0	0	0	0	0	0	0	100	0	100	0
03522201025 106	0	0	0	0	0	0	0	0	100	0	100	0
03522201025 110	0	0	0	0	0	0	0	0	100	0	100	0
03522201025 113	0	0	0	0	0	0	0	0	100	0	100	0
03522201025 114	0	0	0	0	0	0	0	0	100	0	100	0
03522201025 115	0	0	0	0	0	0	0	0	100	0	100	0

03522201025	116	0	0	0	0	0	0	0	0	100	0	100	0
03522201025	117	0	0	0	0	0	0	0	0	100	0	100	0
03522201025	121	0	0	0	0	0	0	0	0	100	0	100	0
03522201025	126	0	0	0	0	0	0	0	0	100	0	100	0
03522201025	138	0	0	0	0	0	0	0	0	100	0	100	0
03522201025	142	0	0	0	0	0	0	0	0	100	0	100	0
03522201025	143	0	0	0	0	0	0	0	0	100	0	100	0
03522201025	144	0	0	0	0	0	0	0	0	100	0	100	0
03522301029	101	0	0	0	0	0	0	0	0	100	0	100	0
03522301029	102	0	0	0	0	0	0	0	0	100	0	100	0
03522301029	103	0	0	0	0	0	0	0	0	100	0	100	0
03522301029	112	0	0	0	0	0	0	0	0	100	0	100	0
03522301029	117	0	0	0	0	0	0	0	0	100	0	100	0
03522301029	126	0	0	0	0	0	0	0	0	100	0	100	0
03522301029	133	0	0	0	0	0	0	0	0	100	0	100	0
03522301029	134	0	0	0	0	0	0	0	0	100	0	100	0
03522301029	135	0	0	0	0	0	0	0	0	100	0	100	0
03522301029	136	0	0	0	0	0	0	0	0	100	0	100	0
03522301029	137	0	0	0	0	0	0	0	0	100	0	100	0
03522301029	146	0	0	0	0	0	0	0	0	100	0	100	0
03522301029	229A	0	0	0	0	0	0	0	0	100	0	100	0
03522561028	113	0	0	0	0	0	0	0	0	100	0	100	0
03522561028	501	0	0	0	0	0	0	0	0	100	0	100	0
03522561028	517A	0	0	0	0	0	0	0	0	100	0	100	0
03522561028	518	0	0	0	0	0	0	0	0	100	0	100	0
03522561028	519	0	0	0	0	0	0	0	0	100	0	100	0
03522561028	520	0	0	0	0	0	0	0	0	100	0	100	0
03522561028	521	0	0	0	0	0	0	0	0	100	0	100	0
03522561028	522A	0	0	0	0	0	0	0	0	100	0	100	0
03522561028	524A	0	0	0	0	0	0	0	0	100	0	100	0
03522561029	312	0	0	0	0	0	0	0	0	100	0	100	0
03522561029	314	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	203	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	204	0	0	0	0	0	0	0	0	54	0	100	0
03522601029	215	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	216	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	219	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	221	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	222	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	223	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	224	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	225	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	227	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	228	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	229B	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	230	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	231	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	232	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	236	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	237	0	0	0	0	0	0	0	0	100	0	100	0
03522601029	242	0	0	0	0	0	0	0	0	100	0	100	0
03523021022	102	0	0	0	0	0	0	0	0	21	0	100	0
03523021022	103	0	0	0	0	0	0	0	0	100	0	100	0
03523021022	104	0	0	0	0	0	0	0	0	100	0	100	0
03523021022	105	0	0	0	0	0	0	0	0	100	0	100	0
03523021022	106	0	0	0	0	0	0	0	0	100	0	100	0
03523021022	107	0	0	0	0	0	0	0	0	100	0	100	0
03523021022	111	0	0	0	0	0	0	0	0	74	0	100	0
03523021022	112	0	0	0	0	0	0	0	0	83	0	100	0
03523021022	114	0	0	0	0	0	0	0	0	100	0	100	0

03523021022	115	0	0	0	0	0	0	0	0	100	0	100	0
03523021022	116	0	0	0	0	0	0	0	0	100	0	100	0
03523021022	202	0	0	0	0	0	0	0	0	100	0	100	0
03523021022	208	0	0	0	0	0	0	0	0	100	0	100	0
03523021022	213	0	0	0	0	0	0	0	0	100	0	100	0
03523021024	106	0	0	0	0	0	0	0	0	100	0	100	0
03523021024	127	0	0	0	0	0	0	0	0	100	0	100	0
03523021024	129	0	0	0	0	0	0	0	0	100	0	100	0
03523021024	130	0	0	0	0	0	0	0	0	100	0	100	0
03523021024	131	0	0	0	0	0	0	0	0	100	0	100	0
03523021024	132	0	0	0	0	0	0	0	0	100	0	100	0
03523401023	102	0	0	0	0	0	0	0	0	94	0	100	0
03523401023	201	0	0	0	0	0	0	0	0	93	0	100	0
03523701023	204	0	0	0	0	0	0	0	0	94	0	100	0
03527021028	522B	0	0	0	0	0	0	0	0	100	0	100	0
03527021028	523	0	0	0	0	0	0	0	0	100	0	100	0
03527021028	524B	0	0	0	0	0	0	0	0	100	0	100	0
03527021115	109	0	0	0	0	0	0	0	0	43	0	100	0
03527021115	110	0	0	0	0	0	0	0	0	99	0	100	0
03527021115	114	0	0	0	0	0	0	0	0	100	0	100	0
03527021115	121	0	0	0	0	0	0	0	0	100	0	100	0
03527021115	130	0	0	0	0	0	0	0	0	100	0	100	0
03527021115	131	0	0	0	0	0	0	0	0	100	0	100	0
03527021115	132	0	0	0	0	0	0	0	0	82	0	100	0
03527021115	133	0	0	0	0	0	0	0	0	38	0	100	0
03527021115	145	0	0	0	0	0	0	0	0	36	0	100	0
03527021115	146	0	0	0	0	0	0	0	0	9	0	100	0
03527021115	147	0	0	0	0	0	0	0	0	29	0	100	0
03527021115	148	0	0	0	0	0	0	0	0	34	0	100	0
03527021115	149	0	0	0	0	0	0	0	0	35	0	100	0
03527021115	150	0	0	0	0	0	0	0	0	100	0	100	0
03527021115	151	0	0	0	0	0	0	0	0	100	0	100	0
03527021115	152	0	0	0	0	0	0	0	0	100	0	100	0
03527021115	153	0	0	0	0	0	0	0	0	100	0	100	0
03527021115	154	0	0	0	0	0	0	0	0	100	0	100	0
03527021115	155	0	0	0	0	0	0	0	0	100	0	100	0
03527021115	156	0	0	0	0	0	0	0	0	100	0	100	0
03527021115	157	0	0	0	0	0	0	0	0	100	0	100	0
03527021115	158	0	0	0	0	0	0	0	0	74	0	100	0
03527021115	160	0	0	0	0	0	0	0	0	39	0	100	0
03527021115	161	0	0	0	0	0	0	0	0	100	0	100	0
03527021115	162	0	0	0	0	0	0	0	0	100	0	100	0
03522561028	525	0	0	0	0	0	0	1	0	100	7	100	7
03522561028	517B	0	0	0	0	0	0	1	0	100	4	100	4
03522301029	123	0	0	0	0	0	0	13	0	100	3	100	3
0352001100302112		0	0	0	0	0	0	3	0	52	2	100	4
0351306113307401		0	0	0	0	0	0	56	0	100	0	100	0
0351306113307402		0	0	0	0	0	0	100	0	100	0	100	0
0351306113307403		0	0	0	0	0	0	98	0	100	0	100	0
0351306113307404		0	0	0	0	0	0	50	0	100	0	100	0
0351306113307405		0	0	0	0	0	0	1	0	100	0	100	0
0351310113305102		0	0	0	0	0	0	52	0	100	0	100	0
0351312113305301		0	0	0	0	0	0	61	0	100	0	100	0
0352001100302111		0	0	0	0	0	0	43	0	71	0	100	0
0352001100302115		0	0	0	0	0	0	8	0	100	0	100	0
0352001100302116		0	0	0	0	0	0	38	0	100	0	100	0
0352001100302117		0	0	0	0	0	0	100	0	100	0	100	0
0352001100302142		0	0	0	0	0	0	100	0	100	0	100	0
0352001100302143		0	0	0	0	0	0	26	0	100	0	100	0
0352001100302144		0	0	0	0	0	0	100	0	100	0	100	0

0352001100302145	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302147	0	0	0	0	0	0	57	0	100	0	100	0
0352001100302148	0	0	0	0	0	0	99	0	100	0	100	0
0352001100302163	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302164	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302165	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302166	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302167	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302170	0	0	0	0	0	0	87	0	100	0	100	0
0352001100302171	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302172	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302173	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302174	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302175	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302176	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302177	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302178	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302179	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302181	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302182	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302183	0	0	0	0	0	0	100	0	100	0	100	0
0352001100302193	0	0	0	0	0	0	17	0	100	0	100	0
0352001100302194	0	0	0	0	0	0	86	0	100	0	100	0
0352001100302197	0	0	0	0	0	0	4	0	100	0	100	0
0352001100303123	0	0	0	0	0	0	2	0	74	0	100	0
0352001100303136	0	0	0	0	0	0	32	0	100	0	100	0
0352001100303137	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303138	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303139	0	0	0	0	0	0	5	0	100	0	100	0
0352001100303140	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303141	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303143	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303147	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303148	0	0	0	0	0	0	3	0	76	0	100	0
0352001100303160	0	0	0	0	0	0	41	0	100	0	100	0
0352001100303161	0	0	0	0	0	0	51	0	100	0	100	0
0352001100303162	0	0	0	0	0	0	55	0	100	0	100	0
0352001100303163	0	0	0	0	0	0	32	0	100	0	100	0
0352001100303164	0	0	0	0	0	0	95	0	100	0	100	0
0352001100303165	0	0	0	0	0	0	95	0	100	0	100	0
0352001100303166	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303167	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303168	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303169	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303170	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303171	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303172	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303173	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303174	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303175	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303176	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303177	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303178	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303179	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303180	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303181	0	0	0	0	0	0	100	0	100	0	100	0
0352001100303182	0	0	0	0	0	0	100	0	100	0	100	0
0352003100304307	0	0	0	0	0	0	62	0	100	0	100	0
0352049100304308	0	0	0	0	0	0	100	0	100	0	100	0
0352050100304401	0	0	0	0	0	0	100	0	100	0	100	0

03520721006	501	0	0	0	0	0	0	15	0	100	0	100	0
03520721006	505	0	0	0	0	0	0	100	0	100	0	100	0
03522041027	101	0	0	0	0	0	0	100	0	100	0	100	0
03522041027	104	0	0	0	0	0	0	100	0	100	0	100	0
03522041027	105	0	0	0	0	0	0	100	0	100	0	100	0
03522061026	111	0	0	0	0	0	0	100	0	100	0	100	0
03522061026	117	0	0	0	0	0	0	100	0	100	0	100	0
03522061026	119	0	0	0	0	0	0	100	0	100	0	100	0
03522061026	120	0	0	0	0	0	0	100	0	100	0	100	0
03522161026	123	0	0	0	0	0	0	100	0	100	0	100	0
03522161026	124	0	0	0	0	0	0	100	0	100	0	100	0
03522161026	125	0	0	0	0	0	0	100	0	100	0	100	0
03522201024	110	0	0	0	0	0	0	15	0	100	0	100	0
03522201024	117	0	0	0	0	0	0	100	0	100	0	100	0
03522201024	120	0	0	0	0	0	0	100	0	100	0	100	0
03522201024	121	0	0	0	0	0	0	100	0	100	0	100	0
03522201024	122	0	0	0	0	0	0	100	0	100	0	100	0
03522201024	123	0	0	0	0	0	0	27	0	100	0	100	0
03522201024	137	0	0	0	0	0	0	29	0	100	0	100	0
03522201024	138	0	0	0	0	0	0	28	0	100	0	100	0
03522201024	142	0	0	0	0	0	0	22	0	100	0	100	0
03522201024	144	0	0	0	0	0	0	100	0	100	0	100	0
03522201024	145	0	0	0	0	0	0	100	0	100	0	100	0
03522201024	146	0	0	0	0	0	0	100	0	100	0	100	0
03522201024	147	0	0	0	0	0	0	100	0	100	0	100	0
03522201024	148	0	0	0	0	0	0	100	0	100	0	100	0
03522201024	149	0	0	0	0	0	0	100	0	100	0	100	0
03522201025	122	0	0	0	0	0	0	100	0	100	0	100	0
03522201025	123	0	0	0	0	0	0	100	0	100	0	100	0
03522201025	125	0	0	0	0	0	0	0	0	100	0	100	0
03522201025	127	0	0	0	0	0	0	16	0	100	0	100	0
03522201025	129	0	0	0	0	0	0	100	0	100	0	100	0
03522201025	130	0	0	0	0	0	0	100	0	100	0	100	0
03522201025	131	0	0	0	0	0	0	100	0	100	0	100	0
03522201025	132	0	0	0	0	0	0	100	0	100	0	100	0
03522201025	133	0	0	0	0	0	0	77	0	100	0	100	0
03522201025	134	0	0	0	0	0	0	5	0	100	0	100	0
03522201025	135	0	0	0	0	0	0	68	0	100	0	100	0
03522241028	201	0	0	0	0	0	0	100	0	100	0	100	0
03522241028	206	0	0	0	0	0	0	100	0	100	0	100	0
03522261026	322	0	0	0	0	0	0	100	0	100	0	100	0
03522281026	302	0	0	0	0	0	0	100	0	100	0	100	0
03522281028	101	0	0	0	0	0	0	100	0	100	0	100	0
03522281028	102	0	0	0	0	0	0	100	0	100	0	100	0
03522281028	103	0	0	0	0	0	0	100	0	100	0	100	0
03522281028	110	0	0	0	0	0	0	100	0	100	0	100	0
03522281028	111	0	0	0	0	0	0	100	0	100	0	100	0
03522301029	118	0	0	0	0	0	0	39	0	100	0	100	0
03522301029	119	0	0	0	0	0	0	100	0	100	0	100	0
03522301029	120	0	0	0	0	0	0	100	0	100	0	100	0
03522301029	121	0	0	0	0	0	0	100	0	100	0	100	0
03522301029	122	0	0	0	0	0	0	32	0	100	0	100	0
03522301029	138	0	0	0	0	0	0	2	0	100	0	100	0
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03522521028	432	0	0	0	0	0	0	100	0	100	0	100	0
03522521028	433	0	0	0	0	0	0	100	0	100	0	100	0
03522521028	434	0	0	0	0	0	0	87	0	100	0	100	0

03522561028	112	0	0	0	0	0	0	69	0	100	0	100	0
03522561028	502	0	0	0	0	0	0	5	0	100	0	100	0
03522561028	503	0	0	0	0	0	0	47	0	100	0	100	0
03522561028	510	0	0	0	0	0	0	100	0	100	0	100	0
03522561028	511	0	0	0	0	0	0	100	0	100	0	100	0
03527021028	526	0	0	0	0	0	0	3	0	100	0	100	0
03522461028	208	0	0	0	0	0	0	100	97	100	97	100	97
03522041027	127	0	0	0	0	3	0	100	12	100	12	100	12
0352001100302119		0	0	0	0	2	0	100	10	100	10	100	10
0352001100302110		0	0	0	0	0	0	100	4	100	4	100	4
0352001100302118		0	0	0	0	0	0	100	2	100	2	100	2
0352001100302122		0	0	0	0	100	0	100	0	100	0	100	0
0352001100302131		0	0	0	0	100	0	100	0	100	0	100	0
0352001100302132		0	0	0	0	100	0	100	0	100	0	100	0
0352001100302133		0	0	0	0	100	0	100	0	100	0	100	0
0352001100302134		0	0	0	0	100	0	100	0	100	0	100	0
0352001100302135		0	0	0	0	100	0	100	0	100	0	100	0
0352001100302136		0	0	0	0	100	0	100	0	100	0	100	0
0352001100302137		0	0	0	0	100	0	100	0	100	0	100	0
0352001100302138		0	0	0	0	100	0	100	0	100	0	100	0
0352001100302139		0	0	0	0	100	0	100	0	100	0	100	0
0352001100302141		0	0	0	0	12	0	100	0	100	0	100	0
0352001100302156		0	0	0	0	93	0	100	0	100	0	100	0
0352001100302157		0	0	0	0	100	0	100	0	100	0	100	0
0352001100302158		0	0	0	0	100	0	100	0	100	0	100	0
0352001100302159		0	0	0	0	100	0	100	0	100	0	100	0
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0352001100302168		0	0	0	0	2	0	100	0	100	0	100	0
0352001100302169		0	0	0	0	2	0	100	0	100	0	100	0
0352001100303115A		0	0	0	0	0	0	24	0	63	0	98	0
0352001100303142		0	0	0	0	3	0	100	0	100	0	100	0
0352001100303144		0	0	0	0	39	0	100	0	100	0	100	0
0352001100303146		0	0	0	0	9	0	100	0	100	0	100	0
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0352001100303184		0	0	0	0	100	0	100	0	100	0	100	0
0352001100303185		0	0	0	0	100	0	100	0	100	0	100	0
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0352001100303187		0	0	0	0	100	0	100	0	100	0	100	0
0352050100304411		0	0	0	0	25	0	100	0	100	0	100	0
0352050100304507		0	0	0	0	24	0	100	0	100	0	100	0
0352202100304502		0	0	0	0	100	0	100	0	100	0	100	0
0352202100304508		0	0	0	0	100	0	100	0	100	0	100	0
0352202100304511		0	0	0	0	100	0	100	0	100	0	100	0
0352202100304512		0	0	0	0	100	0	100	0	100	0	100	0
0352202100304513		0	0	0	0	100	0	100	0	100	0	100	0
03522021027	102	0	0	0	0	32	0	100	0	100	0	100	0
03522021027	103	0	0	0	0	85	0	100	0	100	0	100	0
03522021027	115	0	0	0	0	100	0	100	0	100	0	100	0
03522021027	116	0	0	0	0	100	0	100	0	100	0	100	0
03522041027	108	0	0	0	0	27	0	100	0	100	0	100	0
03522041027	114	0	0	0	0	100	0	100	0	100	0	100	0
03522041027	119	0	0	0	0	100	0	100	0	100	0	100	0
03522041027	120	0	0	0	0	65	0	100	0	100	0	100	0
03522221027	314	0	0	0	0	100	0	100	0	100	0	100	0
03522241028	202	0	0	0	0	31	0	100	0	100	0	100	0
03522441028	301	0	0	0	0	100	0	100	0	100	0	100	0
03522441028	302	0	0	0	0	100	0	100	0	100	0	100	0
03522441028	323	0	0	0	0	100	0	100	0	100	0	100	0

03522521028	424	0	0	0	0	64	0	100	0	100	0	100	0		
03522521028	425	0	0	0	0	9	0	100	0	100	0	100	0		
03522221027	339	0	0	1	0	100	26	100	26	100	26	100	26		
0352001100302102		0	0	36	0	99	0	99	0	99	0	99	0		
0352001100302103		0	0	100	0	100	0	100	0	100	0	100	0		
0352001100302104		0	0	36	0	100	0	100	0	100	0	100	0		
0352001100302105		0	0	78	0	100	0	100	0	100	0	100	0		
0352001100302106		0	0	100	0	100	0	100	0	100	0	100	0		
0352001100302107		0	0	100	0	100	0	100	0	100	0	100	0		
0352001100302149		0	0	1	0	56	0	100	0	100	0	100	0		
0352001100302150		0	0	100	0	100	0	100	0	100	0	100	0		
0352001100302151		0	0	100	0	100	0	100	0	100	0	100	0		
0352001100302154		0	0	10	0	100	0	100	0	100	0	100	0		
03522021027	117	0	0	5	0	100	0	100	0	100	0	100	0		
03522021027	138	0	0	60	0	100	0	100	0	100	0	100	0		
03522421028	312	0	0	34	115	100	343	100	343	100	343	100	343		
03522221027	336	12	0	100	7	100	7	100	7	100	7	100	7		
0352001100302120		27	0	92	1	100	1	100	1	100	1	100	1		
0352001100302121		15	0	44	0	100	1	100	1	100	1	100	1		
0352001100302101		38	0	81	0	100	0	100	0	100	0	100	0		
0352001100302108		49	0	100	0	100	0	100	0	100	0	100	0		
0352001100302109		12	0	34	0	95	0	100	0	100	0	100	0		
0352001100302123		100	0	100	0	100	0	100	0	100	0	100	0		
0352001100302124		100	0	100	0	100	0	100	0	100	0	100	0		
0352001100302125		100	0	100	0	100	0	100	0	100	0	100	0		
0352001100302128		12	0	55	0	100	0	100	0	100	0	100	0		
0352001100302129		46	0	100	0	100	0	100	0	100	0	100	0		
0352001100302130		33	0	72	0	100	0	100	0	100	0	100	0		
0352001100302152		3	0	62	0	100	0	100	0	100	0	100	0		
0352001100302153		31	0	100	0	100	0	100	0	100	0	100	0		

TOTAL 1/4 MILE	319.000000
TOTAL 1/2 MILE	1,833.000000
TOTAL 1 MILE	8,289.000000
TOTAL 2 MILE	25,291.000000
TOTAL 3 MILE	50,358.000000
TOTAL 4 MILE	102,541.000000

APPENDIX I

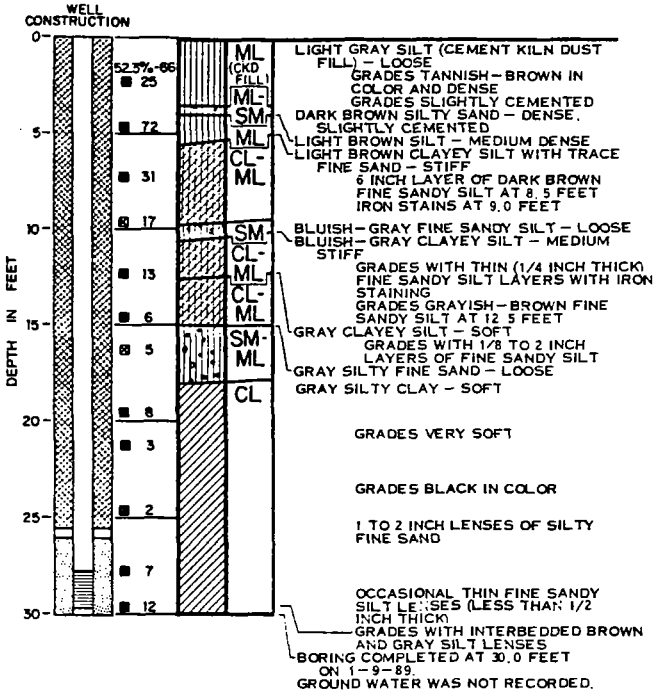
Portland Cement Company of Utah

Company Sites 2 & 3 (UTD980718670)

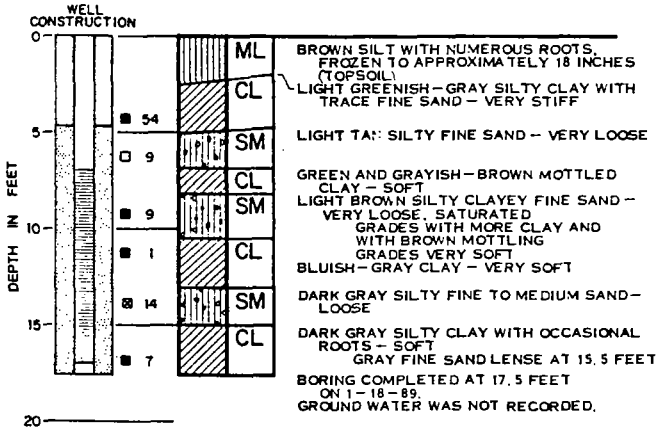
Waste Cement Kiln Dust Disposal Site

Salt Lake City, Utah

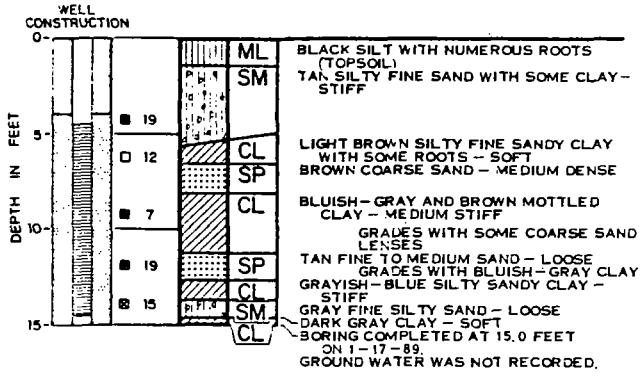
BORING CL-31



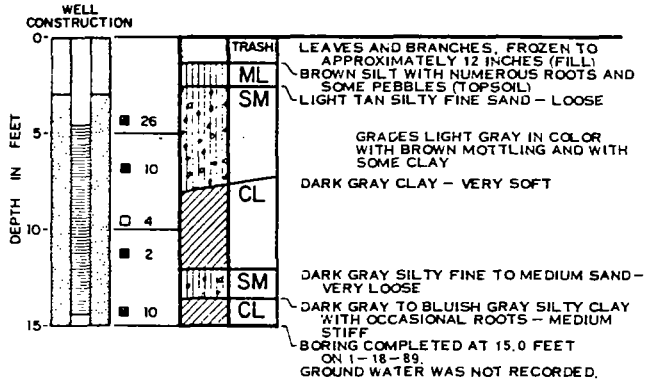
BORING P-3L



BORING P-3K



BORING P-3M



LOG OF BORINGS

Dames & Moore

Dames & Moore Job No. 12818-011-031

Salt Lake City, Utah

July 21, 1989

LONE STAR INDUSTRIES, INC.

PHASE II REMEDIAL INVESTIGATION REPORT

PORTLAND CEMENT COMPANY OF UTAH

WASTE CEMENT KILN DUST DISPOSAL SITE

SALT LAKE CITY, UTAH

VOLUME II - APPENDIX A

DAMES & MOORE

TABLE A-3 (Continued-2)

PHASE II WATER LEVEL ELEVATIONS

LOCATION	DATE	DTW	ELEVATION
CD-1	02/28/89	5.55	4216.11
CD-1a	02/28/89	3.96	4217.82
CD-3	02/28/89	3.80	4218.48
CL-2l	02/28/89	12.87	4220.27
CL-2u	02/28/89	13.92	4219.18
CL-3l	02/28/89	9.40	4220.58
CL-3u	02/28/89	11.60	4219.00
P-2A	02/28/89	7.46	4221.19
P-2B	02/28/89	10.74	4220.16
P-2C	02/28/89	9.78	4219.48
P-2D	02/28/89	11.17	4217.95
P-2E	02/28/89	6.60	4222.28
P-2F	02/28/89	12.23	4215.79
P-2G	02/28/89	10.97	4219.45
P-2H	02/28/89	9.50	4218.19
P-2I	02/28/89	8.33	4219.43
P-2J	02/28/89	0.80	4225.92
P-2K	02/28/89	12.27	4219.23
P-2KB	02/28/89	13.30	4218.69
P-2L	02/28/89	1.48	4227.45
P-3A	02/28/89	6.81	4223.97
P-3B	02/28/89	8.85	4220.67
P-3C	02/28/89	13.22	4215.97
P-3D	02/28/89	12.75	4216.36
P-3E	02/28/89	4.05	4225.40
P-3F	02/28/89	8.95	4220.16
P-3G	02/28/89	3.35	4223.48
P-3H	02/28/89	4.27	4225.58
P-3I	02/28/89	8.87	4220.30
P-3J	02/28/89	9.96	4219.03
P-3K	02/28/89	6.25	4223.42
P-3L	02/28/89	10.00	4219.01
P-3M	02/28/89	11.43	4216.82
PW-A	02/28/89	4.96	4221.83
PW-B	02/28/89	10.46	4217.67
PW-C	02/28/89	11.49	4219.91
PW-D	02/28/89	11.18	4219.21
PW-E	02/28/89	5.22	4219.55
PW-F	02/28/89	3.70	4221.11
PW-I	02/28/89	8.95	4220.59
PW-J	02/28/89	10.90	4219.26
PW-JB	02/28/89	9.75	4221.58
PW-K	02/28/89	11.56	4219.71
PW-L	02/28/89	8.57	4222.43
PW-LB	02/28/89	13.16	4218.83
PW-M	02/28/89	11.82	4218.83
PW-N	02/28/89	5.37	4221.76
PW-O	02/28/89	3.80	4222.88
PW-P	02/28/89	6.93	4218.90
PW-Q	02/28/89	5.20	4220.77
PW-R	02/28/89	8.03	4218.11
PZ-1	02/28/89	5.38	4220.22
PZ-11	02/28/89	8.64	4220.47
PZ-2	02/28/89	12.73	4217.10
PZ-3	02/28/89	10.53	4219.76
PZ-4	02/28/89	9.70	4218.36
PZ-5	02/28/89	11.45	4219.81
PZ-6	02/28/89	7.16	4219.52
PZ-7	02/28/89	8.68	4221.42
PZ-8	02/28/89	6.22	4220.47
PZ-9	02/28/89	8.14	4222.26
SC-1	02/28/89	12.13	4216.29
SC-2a	02/28/89	14.78	4215.87
SW3-1	02/28/89	-0.91	4218.19
SW3-2	02/28/89	-0.65	4223.55

description was verified by laboratory analysis of grain size and Atterberg limits as described in the geotechnical tests section of this Appendix.

Logs of Borings for the Phase II monitor wells are presented in Plates A-2 through A-3 of this Appendix. These logs are based on field evaluation of boring samples collected on a continuous basis at each location. The second cluster well (upper screen interval) was only sampled on five-foot intervals to confirm the observed soil types previously observed in the deep member of the cluster.

On-site wells penetrated 4 to 5 feet of waste CKD fill at Site 3 and 8.5 feet of waste CKD fill at Site 2. Immediately below the fill at both locations a thin (less than 6 inch), slightly cemented, buried topsoil was encountered. Below the buried topsoil, interbedded layers of silty fine sands and clayey silts were penetrated to a depth of approximately 20 feet at Site 3 and 25 feet at Site 2. A fairly massive soft silty clay which grades black was found for a minimum of 7 to 12 feet below the interbedded silts and sands. A few silt or fine sandy silt lenses less than 1/2 inch thick were found below 30 feet in depth.

Monitor wells drilled off-site also penetrated interbedded silty sands, silts, and clays. Samples from boring P-3K tended to be cleaner and courser sands compared to other borings, which correspond to the higher estimates of hydraulic conductivity for that well. Dark gray clays were logged at the bottom of each boring, but their thickness was not determined.

A summary of field pH measurements of subsurface soils including the borehole and sample depth is provided in Table A-2. The results show that alkaline pH values were encountered to depths of 15 to 18 feet in the cluster wells. Waste CKD material yielded pH readings of 12 to 13, and pH was measured at 10 to 13 in the soils beneath the waste CKD until those depths were reached. Below 15 to 18 feet, pH ranged from 7 to 9 units. At off-site wells, soil pH was measured at 8 to 9 units throughout the soil profile.

13. Performance of a detailed well inventory.

14. Surficial waste CKD sampling for the Air Quality investigation.

Methods are also given in this Appendix for other analyses presented in the Phase II Report, including:

- o Waste CKD erosion under peak precipitation
- o Potential discharge to the Surplus Canal
- o Worst case contamination in City Drain
- o Numerical model of ground water flow

WELL DRILLING PROGRAM

INTRODUCTION

Seven monitor wells were installed at sites selected and agreed to by Lone Star, Dames & Moore, and the UBSHW, Plate A-1. The drilling and well completion phase was initiated January 9, 1989 and completed January 18, 1989. Methods and results of the drilling and well completion activities performed as part of the detailed geohydrologic portion of the remedial investigation are presented and discussed in this section. Field work was conducted and/or supervised by experienced Dames & Moore hydrogeologists or engineers.

OBJECTIVES

The objectives of the drilling program were:

1. To install monitor wells for evaluation of the vertical extent of migration beneath the waste CKD.

2. To install monitor wells for evaluation of the extent of off-site migration of waste CKD constituents in ground water to the north of Site 3.

The tasks which were carried out to achieve these objectives of the well drilling program included:

- Installation of 2 on-site well clusters and 3 off-site monitor wells. Monitor well cluster CL-2u and CL-21 were installed on Site 2 and cluster CL-3u and CL-31 on Site 3 to evaluate the vertical extent of waste CKD effects. Monitor wells P-3K, P-3L, and P-3M were installed north of Site 3 to evaluate the extent of migration in that direction. A series of water quality and geotechnical tests were conducted on the wells and are presented in this Appendix.

MONITOR WELL DRILLING AND INSTALLATION

SCOPE OF WORK PERFORMED

Monitor wells installed as part of this investigation were drilled, completed, and developed using the methods and materials described in Section 4.1 of the quality assurance project plan of the "Work Plan Amendment for Seventh Stage of Geohydrologic Investigation, Lone Star Industries, Inc. Waste Cement Kiln Dust Disposal Site, Salt Lake City, Utah, February 3, 1989." Elevations and selected construction data on the monitoring wells are presented in Table A-1.

All monitor wells were drilled by Mountain States Drilling Company of Salt Lake City, Utah using a CME-55 drilling rig equipped with hollow-stem augers. Well drilling and completion was supervised by an experienced Dames & Moore hydrogeologist or engineer. Subsurface soil samples were collected in advance of the augers as described in the section on soil sampling. Cluster wells were isolated from the waste CKD by augering a 14-inch over-size hole through the waste CKD and then driving a 12-inch steel protective surface casing to one foot into the underlying native soils. The remainder of the boring was then drilled with standard 7.5-inch O.D. hollow-stem flight augers. At the completion of a cluster well and placement of the cement/bentonite grout seal, the temporary steel casing was pulled from the boring and the grout topped-off to land surface.

Three shallow monitor wells were completed north of Indiana Avenue and the railroad tracks, P-3K, P-3L and P-3M. These wells now serve as upgradient monitor points for characterizing ground water quality, and aquifer hydraulic properties. Plates A-2 through A-3 provide well completion data and logs of the borings for the cluster wells. The deeper wells in each cluster were completed so that their interception zones (sand pack and screen interval) are at depths of 27 to 35 feet below grade (CL-21), and 27 to 30 feet below grade (CL-31). The shallow wells in the cluster were completed to intercept zones of 20.5 to 24 feet below grade (CL-2u), and 13.5 to 17.5 feet below grade (CL-3u). Initial estimates of the cluster well target depths were attained with the exception of CL-3u. Well CL-3u was completed 5 to 6 feet shallower than anticipated, but within the desired target zone. Examination of the well logs for CL-2u and CL-3u show both wells are completed in a gray silty fine to medium sand. It was the opinion of the field hydrogeologist that this sand occurred at depths approximately 15 to 17 feet below grade at CL-3U, and at depths of 20 to 27 feet in CL-2u. Well logs from previous borings at the Lone Star site (Dames & Moore, 1986c) show contiguity of this zone across much of the area. It is described in previous logs of wells at the site as a gray silty clay interlayered with silty sand, or gray fine sandy silt.

Boring CL-2u was initially drilled past the gray silty sand so completion required that the boring be backfilled. Bentonite pellets were placed down the auger annulus to backfill the boring from 30 to 26 feet. Silica sand was placed 26 to 24.5 feet, then more bentonite pellets to 24 feet. The well was then completed at 24 feet.

The deeper wells, CL-31 and CL-21, in the well clusters are completed in a gray silty clay with occasional interbedded thin fine sandy silt or silty sand lenses. The upgradient shallow wells, P-3K, P-3L and P-3M, monitor ground water at the water table surface to depths of 17.5 feet below land surface. Included in the interception zone of each of these wells is the gray silty fine to medium sand which is intercepted by wells CL-2u and CL-3u.

Wastewater and auger cuttings generated during drilling were disposed of on-site. Decontamination procedures of drill flight augers and well materials are described in the quality assurance/quality control section of this Appendix.

MONITOR WELL MATERIALS

The monitor wells were constructed of 2-inch diameter Schedule 40 PVC pipe with flush-coupled threads. Cluster wells were completed with 2-foot lengths of machined 0.020-slot screens, and the off-site wells were completed with 10-foot lengths of machined 0.020-slot screens. Each screen bottom was fitted with a threaded end cap. The annulus around the screen and borehole was filled with 16-40 Colorado silica sand. The sand pack formation stabilizer extended in each borehole from the bottom of the screen to at least one foot above the screen section. During introduction of the sand into the annulus the sand top was tagged and measured by a weighted tape in order to determine the top of the sand location. Granular bentonite was placed on top of the sand pack to approximately one foot in thickness. The remainder of the annulus was filled with a cement-bentonite grout. Exceptions to this completion procedure are described in the construction methods section.

The grout was prepared using a jet mixer in order to obtain proper yield of the powdered bentonite to eliminate aggregates of unyielded gel in the mixture. The cement was a Portland Type II and mixed as per instructions which required approximately 6 gallons of water per 90 pound bag of cement. Powdered bentonite was slowly added to the cement mixture until the grout reached a Marsh funnel viscosity of approximately 65 to 80 seconds (4 percent bentonite). The grout was pumped through a tremie pipe until a good return of the mixture was evident out the annulus at the ground surface. The tremie pipe was kept just under the grout as it was pumped in order to reduce turbulence and possible damage to the bentonite seal or sand pack.

The PVC well casing was protected above ground by an 8-inch diameter steel surface casing. The surface casing was cemented in place and capped with a lockable top. The well casing was fitted with a slip cap inside the steel surface casing. Concrete surface pads were than constructed at the ground surface surrounding the surface casing.

CONSTRUCTION METHODS

Phase II monitor well construction data are summarized in Table A-1. Plates A-2 through A-3, Log of Borings, present a graphic summary of the monitor well construction details, and a diagram of a typical monitor well completion is presented in Plate A-4.

Cluster well borings were drilled with an over-sized 14-inch O.D. solid stem auger through the waste CKD to native soils. Upon reaching the bottom of the waste CKD, the auger was pulled and the borehole cased with a temporary 12-inch I.D. steel casing. The temporary casing isolated the well casing and remainder of the borehole from the waste CKD. The boring was then completed by augering with 7-1/2-inch O.D. hollow-stem augers. PVC casing was installed by inserting the assembled PVC screen and blank casing through the hollow-stem augers while they were at total depth in the boring. The sand pack was slowly introduced into the annulus between the PVC and the auger flight while the top of the sand pack was constantly tagged with a weighted tape. The augers were pulled from the boring as the sand was poured. The final tops of sand in the completed wells extend from 2 feet to approximately 8 inches above the top of the well screen. The cluster wells had bentonite seals placed on top of the sand pack which varied from approximately 2 feet to 6 inches in thickness. Granular bentonite in the shallow off-site wells extends from the top of each sand pack to within 2 feet of the ground surface. Due to the shallow depths of these wells, only 5 to 7 feet of borehole remained after the sand pack placement; therefore, bentonite was used to seal the annulus to within 2 feet of ground surface. The cluster wells had cement-bentonite grout pumped through a 1-inch O.D. tremie pipe into the annulus between the PVC casing and

the flight augers. The augers were pulled from the borehole once a good return of grout was evident at the land surface. The borehole was topped-off with grout after removal of the augers and the over-sized steel surface casing.

An 8-inch O.D. by 5-foot long steel surface casing with locking top was pushed through the grout so that about 3 feet of the steel casing was above grade. The casing was surrounded by a square pad of poured concrete measuring approximately 24" x 24" x 6". The well identification was inscribed into the concrete pad and on top of the PVC cap.

WELL DEVELOPMENT

Completed monitor wells were developed by bailing with a teflon bailer. The bailer was lowered by rope into each well and was used to bail and surge water. Wells were developed until silt no longer accumulated in the well and the field hydrogeologist judged that no further improvement in clarity was being achieved. All wells except P-3K remained turbid at the end of development. Approximately one hour was required to develop each well.

SURVEYING

Locations and elevations of all monitor wells were surveyed by Great Basin Engineering and Surveying of Bountiful, Utah, a licensed land surveying company. Table A-1 provides a summary of all monitor well survey data. Locations were surveyed for grade, top of steel casing, top of PVC casing elevations, and horizontal coordinates. Surveyed locations were tied into a base elevation of 4222.28 feet above mean sea level located at the west end of a horizontal rebar driven into the concrete culvert where the City Drain crosses Redwood Road. The horizontal control was also established from this site on a northeast coordinate grid as N:10547.51 E:11222.75. Horizontal and vertical control was accurate to within one-hundredth of a foot, and was checked against Phase I Remedial Investigation survey results.

RECORD OF DECISION

PORTLAND CEMENT CO. (KILN DUST #2 & #3)
Operable Unit No. 2
Salt Lake City, Utah

March 31, 1992

Prepared by:

U.S. Environmental Protection Agency
Region VIII

Decision Summary for the Record of Decision

I. Site Name, Location, and Description

Site History

The Portland Cement Co. (Kiln Dust #2 and #3) Superfund Site (Site) is located in Salt Lake City, Utah, on the west side of Redwood Road (1700 West) at 1000 South, within a triangular area defined by Indiana Avenue, Redwood Road and the Jordan River Surplus Canal (Figure 1). The Site consists of three separate but adjacent properties known as Site 2, Site 3 and the West Site (Figure 2). The West Site and Sites 2 and 3 cover approximately 35, 17 and 19 acres, respectively. The area surrounding to the Site is primarily industrial and borders low density residential and vacant or agricultural land. The immediate area surrounding the Site is highly commercialized and industrialized. Residential areas exist primarily east of the Site and include single-family dwellings, mobile home parks and some high density multi-family residential units. There are no buildings on the Site. However, two underground structures, a large sewer pipe with above-ground manholes and a natural gas pipeline, traverse the Site. A chain-link fence was constructed around the Site in 1989 to prevent unauthorized entry.

Between 1965 and 1983, waste cement kiln dust (waste CKD) generated at the Portland Cement Company plant in Salt Lake City was deposited on the Site, resulting in soil, surface water and groundwater contamination. For purposes of conducting remedial efforts, the Site has been divided into two operable units: Operable Unit 1 (OU1), which addresses on the waste CKD deposited on the Site, and Operable Unit 2 (OU2), which is defined as the on-site soils and other materials potentially contaminated by the waste CKD, specifically the chromium-bearing refractory kiln (chrome-bearing) bricks that were disposed of with the waste CKD.

Site Geology and Hydrology

The Site is located in the Salt Lake Valley which occupies approximately 400 square miles in north-central Utah. The Salt Lake Valley lies on the eastern portion of the Basin and Range physiographic province. The boundaries of the Salt Lake Valley are formed by the Great Salt Lake on the north and by mountain ranges to the east, west and south.

In general, the Salt Lake Valley is filled with alluvial and fluvial detritus derived from the surrounding mountains through an ongoing process of erosion and deposition. The Site is underlain by several thousand feet of unconsolidated sediments including lake-bottom clays interbedded with thin discontinuous sand lenses. The coarser grained sediments form aquifers which are used as a source of irrigation and drinking water in the Salt Lake Valley.

Topography

The topography at the Site is relatively flat with elevations varying slightly above and below 4225 feet above mean sea level. The waste CKD addressed by OU1 is present in piles over much of the Site, creating an uneven ground surface; it will be removed during implementation of the OU1 remedy. Early surveys show that before fill was placed at the Site, a grade break existed in the ground surface which bisected the triangular-shaped area along a northwest-southeast axis. Land to the northeast of this break was relatively high ground and was used for agricultural and residential purposes. Land southwest of the break was comprised of low-lying salt flats. The apparent purpose of placing the waste CKD on the Site was to raise the ground surface elevation, enabling development of this area.

Drainage

Drainage on the Site is poor. Occasionally water collects in confined depressions east and south of Site 2, between Sites 2 and 3 and north of Site 3. The Surplus Canal, which flows along the southern boundary of the Site, carries excess flow in a northwesterly direction from the Jordan River to the Great Salt Lake. The City Drain, part of the urban storm sewer system, bisects the Site, separating Site 3 from Site 2 and the West Site. A shallow drainage which carries surface runoff into City Drain has been excavated along the west boundary of the Link Trucking property, which is situated between Sites 2 and 3.

Groundwater

Groundwater under the Site occurs in three divisions: (1) a shallow groundwater body overlying confining layers, (2) local perched water bodies, and (3) an artesian basin. In general, the aquifers are separated by a confining bed consisting of a relatively impermeable interbedded series of clay, silt and fine sand ranging in thickness from 40 to 100 feet.

The shallow unconfined aquifer is largely comprised of clay, silt and fine sand deposits. It is recharged by infiltration from precipitation, canals, irrigation, and surface water. Additionally, groundwater in the deeper aquifer typically moves upward into the shallow aquifer and is a source of recharge for the shallow aquifer. The shallow or unconfined groundwater in the area of the Site has been classified as Class II and Class III groundwater by the Utah Department of Environmental Quality.

The deep confined aquifer is composed of clay, silt, sand and gravel, all hydrologically connected, with individual beds ranging from less than one foot to more than 50 feet thick. The maximum thickness for the deep aquifer is approximately 1000 feet in the northern portion of the Salt Lake Valley near the Site. Water in the deep aquifer is under artesian pressure with upward flow gradients, resulting in some recharge to the shallow unconfined aquifer. The artesian aquifer, which flows to the north-northwest toward the Great Salt Lake, serves as the primary source of groundwater in the Salt Lake Valley. It is used for stock watering, irrigation and industrial supply and public drinking consumption.

Seven municipal wells are present at distances from one to three miles from the Site. There are 67 low yield private wells within one mile of the Site.

Vegetation

Most of the area near the Site consisted of saltgrass alkali flats prior to industrial development. Currently, the Site is mostly barren of vegetation. However, there is still suitable habitat for numerous animal species on the West Site and on the Site perimeter. The State of Utah (State) has classified the Surplus Canal as Class 3C, 3D and 4, which are protective of non-game fish and other aquatic organisms; waterfowl, shorebirds and other water-oriented wildlife; and for agricultural uses such as irrigation of crops and stock watering. According to previous investigations, no listed or candidate threatened or endangered species are known to occur in the vicinity of the Site.

II. Site History and Enforcement Activities

All waste CKD deposited at the Site was produced between 1959 and 1983 by the Portland Cement plant located at 619 West 700 South in Salt Lake City, Utah. The plant was owned and operated by Portland Cement Company of Utah (PCU) until September 1979, when Lone Star Industries (Lone Star) purchased the stock of PCU. At the time of purchase, the name of the company was changed to Utah Portland Quarries, Inc. Although the waste CKD was placed on the Site by PCU and Lone Star, neither company owns the land comprising the Site.

Dry waste CKD was reportedly placed on the West Site from 1965 until 1974. Disposal of dry waste CKD in the area of Site 3 occurred from 1974 until 1978. At Site 2, waste CKD was disposed as a dry material between 1978 and 1980 and as a wet slurry between 1980 and 1983.

In response to complaints from area residents who were concerned about windblown waste CKD, the U.S. Environmental Protection Agency (EPA) initiated a Preliminary Assessment, which indicated the potential for risk to the community. In April 1984, Lone Star voluntarily began environmental investigations at the Site which included the installation of groundwater monitoring wells to determine if groundwater contamination was present. In September 1984, Sites 2 and 3 were proposed for inclusion on the National Priorities List (NPL). In 1985, the investigation was organized and expanded as a Remedial Investigation/Feasibility Study (RI/FS) under a Consent Decree issued by the State. The Site was formally listed on the NPL on June 10, 1986. The West Site was added to the Superfund Site at this time. On September 17, 1990, the EPA sent a Special Notice Letter, which advised Potentially Responsible Parties (PRPs) of their potential liability. The letters were sent to Lone Star Industries and the Site landowners, Williamsen Investment Co., Lawrence D. Williamsen, Sidney M. and Veoma H. Horman, Horman Family Trust, Calvin B. Brown and Southwest Investment, Inc. as identified PRPs.

On July 19, 1990, a Record of Decision (ROD) was issued for Operable Unit No. 1 (OU1) of the Site. The selected remedy described in the ROD addressed the principal source of contamination at the Site through excavation and off-site disposal of the waste CKD. About 360 tons of chrome-bearing bricks which were disposed with waste CKD are to be separated from the waste CKD, temporarily stored at the Site and managed as part of the OU2 remedial action. In addition, groundwater monitoring for the Site will be initiated. Negotiations with the PRPs regarding the conductance of the remedy ended unsuccessfully. The State recently assumed the Superfund-financed lead of OU1 Remedial Design from the EPA. Currently, the State is in the process of selecting a consultant to conduct the OU1 remedial design work.

Environmental investigations focusing on OU2 have been conducted by the Utah Department of Environmental Quality (UDEQ) and the EPA. In October 1991, a Baseline Risk Assessment (BRA) which evaluated potential chemical exposure and the risks associated with contaminated soil and bricks was completed. It was followed in November 1991 by a Remedial Investigation (RI) Report and Focused Feasibility Study (FFS). Upon finalization and approval of this ROD, the selected remedy will be implemented.

III. Highlights of Community Participation

Although the community has played a role in Site activities since 1983, when the EPA responded to complaints by area business owners who were concerned about airborne waste CKD being blown into their offices, community participation for OU2 became most active in late 1991. Soon after the completion of the OU2 RI and FFS, Salt Lake City representatives and Salt Lake County Commissioners were briefed on the reports' findings and the Preferred Alternative. Copies of the Proposed Plan were mailed to area residents and others on the mailing list on November 8, 1991. The notice of availability for these reports and the announcement of the Preferred Alternative were published in the Salt Lake Tribune and Deseret News on November 10, 1991. News coverage of the release of the Proposed Plan was also provided by other major media in the Salt Lake City market, notifying the public of a scheduled public meeting and the public comment period. The Preferred Alternative presented in the Proposed Plan consisted of on-site treatment and on-site disposal of contaminated soil and chrome-bearing bricks.

A public meeting to receive comments on the Proposed Plan was held November 20, 1991 and was attended by approximately 50 people, including concerned citizens, elected officials, State and EPA officials and legal representatives of Lone Star and some Site landowners. A transcript of this meeting is available for public review at UDEQ, the Chapman Branch of the Salt Lake City Public Library, and the EPA offices in Denver, Colorado. Media coverage of the public meeting included broadcasts that night and written news reports the following day.

The 30-day public comment period, which was initially scheduled for November 12 to December 13, 1991, was extended another 30 days in response to public interest. This extension was advertised in the Salt Lake Tribune and the Deseret News on December 8, 1991. The comments received and responses to these comments are summarized in the Responsiveness Summary section of this ROD.

EPA and the State have continued to keep the community and local government officials informed regarding the status of the Site through on-going community relations activities. Regular briefings have been held by the UDEQ Superfund representatives for Salt Lake City and Salt Lake City-County Health representatives to update them on Superfund sites within Salt Lake City, including the Site. During 1991, briefings were held in March and August. In addition, the UDEQ Community Relations staff maintained regular phone contact with the Salt Lake City Council representative from the Site area and with Salt Lake City-County Health Department Community Relations personnel.

IV. Scope and Role of Operable Units Within Site Strategy

For purposes of conducting remedial efforts, the Site has been divided into two operable units: OU1, the remedy of which focuses on the waste CKD deposited on the Site, and OU2, which is defined as the on-site soils and other materials potentially contaminated by the waste CKD, specifically chrome-bearing bricks that were disposed of with the waste CKD.

Groundwater contamination will be addressed as either a separate operable unit (OU3) or under the 5-year review of the OU1 remedial action. Investigation of the groundwater began during the OU1 RI/FS. Groundwater monitoring will occur during the OU1 remedial action. The OU1 and OU2 remedies focus on source control and therefore do not include groundwater treatment. This approach was based on a number of factors, including: there is no present uses of the groundwater impacted by the Site; short-term potential use is minimal; the extent of groundwater contamination is limited; and remedies which remove the contamination sources are expected to accelerate improvement in the groundwater quality. If monitoring indicates that source removal does not provide adequate protection of human health and the environment, additional investigation and remediation will be initiated. The approach which most efficiently addresses the problem will determine whether groundwater contamination is addressed as a third OU or under the OU1 five-year review.

This ROD addresses OU2. The waste CKD addressed by OU1 is the primary source of contamination of on-site soil. For this reason, the waste CKD is being removed during the OU1 remedial action. However, the on-site contaminated soil and chrome-bearing bricks also provide a potential source of groundwater contamination on the Site; therefore, the remediation of these sources is addressed by this ROD.

The BRA determined that conditions at the Site after implementation of the OU1 remedy will pose a risk to human health and the environment. Specifically, the high alkalinity of the soil and the lead levels detected in the contaminated soil pose a risk through direct contact, ingestion, and inhalation. The selected remedy for OU2 reduces these principal threats as well as prevents further contamination of the groundwater. Risks associated with the chrome-bearing bricks that were excavated with the waste CKD during the OU1 remedial action are also addressed in OU2.

V. Summary of Site Characteristics

Nature and Extent of Contamination

The waste CKD addressed by OU1 and the chrome-bearing bricks disposed with the waste CKD are a source of contamination of the underlying soil and groundwater. Additionally, the contaminated soils beneath the waste CKD are a potential source of groundwater contamination. Contaminants related to the waste CKD have been detected above background concentrations in shallow groundwater to a depth of about 25 feet both on the Site and immediately north of the Site. There are no known users of shallow groundwater in the immediate vicinity of the Site. There is no evidence that groundwater from the deeper artesian aquifer has been affected by waste CKD constituents on the Site.

Several potentially toxic metals in OU2 soils exceed local background levels: cadmium, chromium, chromium VI (hexavalent chromium), lead and molybdenum. In addition, the high alkalinity of the soil on Site is higher than the background, causing alkalinity to be a potential concern as well. Statistical analysis of on-site sampling results for soils indicates that an insufficient number of samples were analyzed to eliminate arsenic, a known human carcinogen, as a potential contaminant. Since the waste CKD was found to contain elevated levels of arsenic, it was suspected that the underlying soil would also contain elevated arsenic levels. Detected concentrations of chemicals of potential concern and pH are shown in Table V-1.

Samples of contaminated soil and chrome-bearing bricks were analyzed using the Toxicity Characteristic Leaching Procedure (TCLP). Detected concentrations in the contaminated soil exceeded the toxicity characteristic hazardous waste criterion for lead of 5 milligrams per liter (mg/L), and the soil has a hazardous waste code of D008. Chromium concentrations in the chrome-bearing bricks ranged between 1238 mg/L and 6977 mg/L, greater than the toxicity characteristic hazardous waste criterion for chromium of 5 mg/L. Once excavated, the chrome-bearing bricks have the hazardous waste code of D007. As a characteristic hazardous wastes, treatment is required prior to disposal in accordance with the Land Disposal Restrictions (LDRs) promulgated under the Resource Conservation and Recovery Act (RCRA). Comparison of the results of both total chromium and hexavalent chromium indicate that most or all of the chromium that can be leached is in the hexavalent state in these brick samples.

TABLE V-1
SUMMARY OF CHEMICALS OF POTENTIAL CONCERN IN SOILS

Compound	Frequency of Detection (# of detections/# of analyzed samples)	Range (mg/kg)	Mean (mg/kg)	95% Upper Confidence Limit	TCLP (mg/L)	Background (mg/kg)
Arsenic	23/23	1.1-55.1	8.64	13.92	.002-.06	3.4-24.2
Cadmium	6/23	0.96-8.1	1.16	1.9	NA	.25-2.5
Chromium (Total)	23/23	4.7-66	21.19	27.5	.01-.07	3.1-22.9
Chromium VI	21/23	ND-3.1	0.91	1.25	NA	ND
Lead	23/23	4.6-2730	420.2	772.4	.02-24.7	39.8-327
Molybdenum	22/23	0.84-150	27.8	43.3	NA	1.3*
Alkalinity	23/23	1680-13100	6463	7543	NA	443*
pH	23/23	10.3-13.3	11.75	12.1	NA	8.2*

Total concentrations in milligrams per kilogram (mg/kg)
* Range not available, arithmetic mean of background values given
ND Not Detected
NA Not Analyzed

Soil situated between the base of the waste CKD and the top of the groundwater were investigated under OU2. The volume of this soil is approximately 488,000 cubic yards. Of this total volume, an estimated 27,400 cubic yards of soil exceed the health-based levels for lead, all of which are located on Site 2.

After implementation of the OU1 remedy, the chrome-bearing bricks will be located in a temporary storage area.

Contaminant Fate and Transport

Contaminants present in soil may potentially migrate into air, groundwater, or surface water. Soil contaminants may leach into groundwater as a result of infiltrating water or rising groundwater levels that contact contaminated soil. Suspended soil particles can also contribute to airborne contamination. Contaminants could also be transported, either in solution or sorbed to sediments, by surface water runoff or groundwater discharge. Soils may also act as the source of chemicals taken up by vegetation or by animals. All of these types of migration mechanisms have either been observed or could potentially occur at the Site.

The current risk of exposure to area residents is minimal since there are no nearby residences to the north (down-gradient) and northwest (downwind) of the Site.

VI. Summary of Site Risks

HUMAN HEALTH RISKS

As part of the RI/FFS, 23 soil samples from seven on-site locations were collected at a variety of depths and were analyzed for 14 metals as well as pH, conductivity and alkalinity. Based on a statistical comparison (t-test) of contaminant concentrations in Site soils to those found in background soils, the BRA identified six chemicals of potential concern at the Site: arsenic, cadmium, total chromium, hexavalent chromium, lead, and molybdenum. Also identified as potential health concerns at the Site were highly alkaline soils and chrome-bearing refractory bricks. Each of these potential health concerns was evaluated under a hypothetical exposure scenario consisting of future residential use of the Site. Current land uses were not considered to represent potential contaminant exposure because the Site is presently not used and is fenced to prevent trespassing.

Exposure Pathways

Several potential exposure pathways were evaluated within the residential exposure scenario. These consisted of:

- Dermal contact;
- Incidental soil ingestion;
- Ingestion of indoor dust;
- Inhalation of airborne dust following implementation of OU1 remedy; and
- Ingestion of homegrown produce.

The pathways resulting in the largest amount of exposure to contaminants are ingestion of dust and ingestion of produce. Of the chemicals evaluated, exposures to molybdenum are the greatest. However, this exposure does not correspond to the greatest risk to human health due to molybdenum's low toxicity relative to the other chemicals of concern. Groundwater was not evaluated as an exposure pathway since it will be addressed in the future. Exposure to surface water was not evaluated in the BRA as this pathway was considered incomplete. Risks associated with the chrome-bearing bricks and the waste CKD were quantified during the OU1 investigations. The OU2 BRA did not re-evaluate the risk associated with the chrome-bearing bricks.

Exposure assumptions were developed in accordance with EPA guidance documents. These assumptions were based on a residential scenario and were time-weighted over a 30-year period for all pathways except ingestion of indoor dust, which was evaluated only for children up to 2 years of age. Two year old children exhibit pica (soil eating) behavior and are susceptible to the adverse effects from contaminant exposure. Specific exposure assumptions for each pathway are presented in Table VI-1. Due to the lack of an established threshold exposure level for lead, exposures to lead were evaluated using the U.S. EPA Integrated Uptake Biokinetic (IU/BK) model, which evaluates exposures to the following media: air; diet; drinking water; soil and indoor dust; paint; and maternal contribution during gestation. Three pathways were selected for site-specific quantitative evaluation: ingestion of soils and indoor dust, inhalation of airborne dust, and ingestion of produce. Default values provided by the IU/BK model were used for the remaining pathways. It was assumed that children at the Site would not be exposed to lead-contaminated paint and that fetal exposures would be comparable to the U.S. normal maternal lead level of 7.5 micrograms per deciliter (μg/dL). Additional assumptions of the IU/BK model are that gastrointestinal absorption of lead is 50 percent, that 2-year old children have an inhalation rate of 5 m^3/day, and that the lungs absorb 32 percent of inhaled lead. Lead exposures that are predicted by the IU/BK model are then compared with an acceptable blood level, currently set at 10 μg/dL.

A summary of analytical results and exposure point concentrations for contaminants in soil, air and produce are presented in Tables V-1, VI-2 and VI-3, respectively. Exposure point concentrations for contaminants in soil are based on the 23 soil samples collected, which included samples collected at the surface and at depths of up to 3.92 feet below the surface. A 95-percentile upper confidence limit was calculated on the arithmetic mean and used as the exposure point concentration.

Contaminant concentrations in dust were assumed to be equal to those found in soil. Contaminant concentrations in air were estimated using several models which used contaminant concentrations in the upper six inches of soil as well as site-specific meteorological data. Contaminant concentrations in produce were estimated assuming airborne deposition of contaminants onto plants and uptake of contaminants from soil by roots.

TABLE VI-1
ASSUMPTIONS FOR EVALUATED EXPOSURE PATHWAYS

Exposure Assumptions	Ingestion of Soil	Ingestion of Indoor Dust	Ingestion of Produce	Inhalation of Air
Exposure Frequency (days/yr)	350	350	52	37
Exposure Duration (years)	30	6	30	30
Ingestion/Inhalation Rate	120 mg/day	200 mg/day	151 g/day Vine 144 g/day Leafy 114 g/day Root	20
Fraction of Time Spent Exposed via Pathway	0.04	0.74	Not Applicable	
Fraction Ingested from a Contaminated Source	0.37	0.71	1.0	
Body Weight (kg)	48	16	48	48
Oral/Inhalation Absorption/Retention	0.8 Arsenic 1.0 Cadmium 1.0 Chromium 1.0 Molybdenum	0.8 Arsenic 1.0 Cadmium 1.0 Chromium 1.0 Molybdenum	0.8 Arsenic 1.0 Cadmium 1.0 Chromium 1.0 Molybdenum	0.23 Arsenic 0.75 Cadmium 1.0 Chromium 1.0 Molybdenum

TABLE VI-2
SUMMARY OF AIRBORNE DUST CONCENTRATIONS
CHEMICALS OF POTENTIAL CONCERN

Compound	Airborne Dust Concentration ($\mu g/m^3$)*
Arsenic	8.02E-04
Cadmium	2.02E-04
Chromium (Total)	2.04E-03
Chromium VI	7.77E-05
Lead	3.86E-03
Molybdenum	1.36E-03

* based on soil concentrations

TABLE VI-3
SUMMARY OF METAL CONCENTRATIONS IN HOMEGROWN PRODUCE

Compound	Total Metal Concentrations (mg/kg)*		
	Vine	Leaf	Root
Arsenic	5.57E-03	2.78E-02	1.39E-02
Cadmium	1.71E-02	5.70E-02	6.27E-02
Chromium (Total)	3.74E-02	3.74E-02	3.74E-02
Chromium VI	1.70E-03	1.70E-03	1.70E-03
Lead	2.10E-01	8.40E-01	8.40E-01
Molybdenum	1.19E-00	1.19E-00	1.19E-00

* Estimated concentrations as a result of deposition and uptake by roots

1.0 INTRODUCTION

This report describes the objectives, procedures and results of the groundwater activities that will support remedial design (RD) of the Portland Cement Sites 2 and 3 Superfund Site (Site). The need for groundwater remediation at the Site will also be decided based on data obtained from these activities. Five types of activities are being implemented, as described in Addendum B of the Field Sampling Plan: a well survey; monthly water level measurements; installation of monitoring wells, installation of staff gauges and quarterly groundwater sampling. The following sections describe Site background, Site hydrogeology, and the objectives, strategy, rationale and results of each activity.

1.1 SITE BACKGROUND

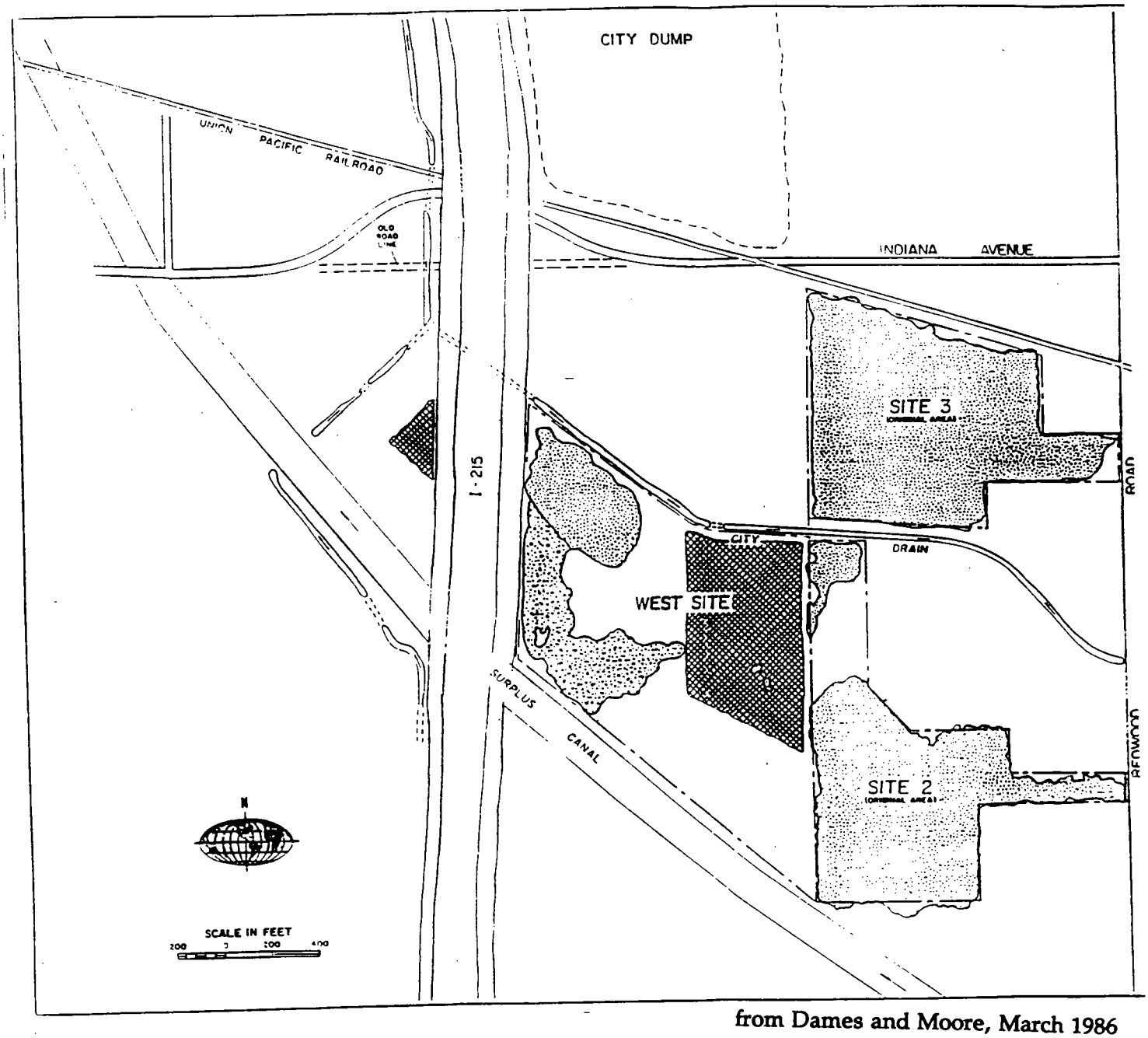
The Site is located in Salt Lake City, Utah. It is comprised of three separate but adjacent properties known as Site 2, Site 3 and the West Site, as shown on Figure 1.1-1. The Site is mostly within the area bounded by Indiana Avenue, Redwood Road, the Jordan River Surplus Canal and Interstate 215.

Between 1965 and 1983, cement kiln dust (CKD) and chromium-bearing refractory bricks (Cr-bearing bricks) were deposited on the Site, resulting in soil, surface water and groundwater contamination. For purposes of selecting a remedy, the Site was divided into two operable units: Operable Unit 1 (OU1), which addressed the CKD deposited on the Site, and Operable Unit 2 (OU2), which was defined as the Cr-bearing bricks, which were disposed of with the CKD, and the contaminated on-site soils. These soils include the natural and imported fill soils associated with the site that have been contaminated above risk-based levels. Elevated concentrations of arsenic, chromium and lead, attributed to leaching from Site wastes, have been detected in Site soils.

In July 1990, a Record of Decision (ROD) was issued for OU1. The remedy selected for OU1 consisted of excavation and off-site disposal of the CKD, as well as separation and temporary on-site storage of the Cr-bearing bricks and groundwater monitoring. In March 1992, the OU2 ROD was issued. The OU2 selected remedy called for excavation of contaminated soil (greater than 500 mg/kg lead or 70 mg/kg arsenic), treatment of contaminated soil and Cr-bearing bricks to enable land disposal, and off-site disposal. A protective layer of clean fill was to be installed on the Site. The OU2 ROD also called for groundwater monitoring to evaluate the nature and extent of groundwater contamination on the Site. Groundwater contamination will be addressed after the removal of potential contaminant sources (CKD and contaminated soil) under the five-year review of OU1 or as a third OU.

In December 1992, the Utah Department of Environmental Quality (UDEQ) awarded URS Consultants, Inc. (URS) a contract to provide RD and remedial action (RA) oversight services for OU1 and OU2, which had been merged into a single operable unit in May 1992. RD is expected to be completed in Spring 1994. RA construction is expected to begin in June 1994.

FIGURE 1.1-1
Waste Cement Kiln Dust Disposal Sites



from Dames and Moore, March 1986

1.2 PREVIOUS WORK

Approximately 11 piezometers and 49 monitoring wells were installed on and near the Site between 1984 and 1989 by Dames and Moore for Lone Star Industries to support Phases I and II of the Remedial Investigation (RI). The piezometers were constructed with 2-inch PVC, were screened at an interval of approximately 8.5 to 15 feet below ground surface and were left unlocked after completion. It is doubtful that the piezometers were sampled, because no data or reference of sampling was found.

The monitoring wells are also constructed with 2-inch PVC. Section 1.3 of this report, Addendum B and the RI reports provide detailed discussions of the subsurface geology at the Site. All but 6 monitoring wells screen what has been referred to in the RI as the shallow aquifer at approximately 15 to 30 feet in depth below ground surface. There are six well nests which comprise of one shallow well and one deep well. The deep wells are approximately 45 to 55 feet in depth below ground surface. The RI referred to these wells as deep although the deep principal aquifer is at least 100 feet below the ground surface.

Groundwater samples were collected and analyzed for total and dissolved metals and inorganic parameters between 1984 and 1989. Groundwater flow at the shallow and deep intervals was also characterized during the RI.

1.3 SUMMARY OF SITE HYDROGEOLOGY

Data from previous investigations indicate the following regarding the shallow groundwater system:

- The subsurface geology is comprised of interbedded fine grained sand, silt and clay, becoming more clayey with depth. The uppermost geologic unit on the Site is considered the confining layer which separates the unconfined aquifer, which is absent on the Site, and the deep principal aquifer, which is present at the Site at depths of greater than 100 feet below ground surface.

- Confined conditions have been encountered at depths below 30 - 40 feet and are a result of the gradational fining downward of the lithology. Sand stringers within the confining layer are water bearing and can be tracked over a 1 - 2 mile distance. An upward vertical gradient has been documented across much of the Site. A downward vertical gradient appears to be present on the western portion of the West Site, the northern portion of Site 3, and the southern portion of Site 2.

- Two intervals have been investigated during previous activities. The shallow interval, which is unconfined, was characterized by wells completed at a depth of between 15 and 25 feet below ground surface. The deep interval, which is

confined, was characterized by wells completed at a depth of between 45 and 55 feet below ground surface. Groundwater flow in the shallow interval is controlled by City Drain, Surplus Canal and a north-south trending sanitary sewer conduit that separates Sites 2 and 3 from the West Site. Water in City Drain and the Surplus Canal flows to the northwest. Flow in the sanitary sewer is to the north. Groundwater flows toward the sewer conduit and to the north, and/or toward City Drain and then to the northwest. Documented groundwater flow at the shallow interval has been into and away from Surplus Canal, depending on the water level of the Surplus Canal, which can be controlled by the local flood control district. Groundwater flow directions in the deep interval are difficult to determine based on existing data. The potentiometric surface of the deep interval appears to be mounded under City Drain, with groundwater north of City Drain flowing northwest and groundwater south of City Drain flowing southwest. Potentiometric surface maps of the shallow and deep intervals are included in Section 4.2.

- Elevated levels of pH, total dissolved solids (TDS), arsenic, molybdenum, chromium and lead have been detected in Site groundwater, primarily in the shallow interval. Arsenic, chromium, molybdenum and pH were detected at levels exceeding federal drinking water standards (or Maximum Contaminant Levels (MCLs)). Although no MCLs have been established for molybdenum and TDS, concentrations measured in June 1993 exceeded background levels. Section 4.5 contains maps showing pH and concentrations of arsenic, chromium, molybdenum and TDS.

- Groundwater quality improves with depth. This could be a result of soil attenuation and/or the upward vertical gradient hindering downward contaminant migration.

TABLE 3.5-2

Summary of Groundwater Analyses

ANALYSIS	RATIONALE
Arsenic	Previously detected at concentrations that exceed federal or state drinking water standard.
Cadmium	
Chromium	
Lead	Previously detected at concentrations exceeding state groundwater quality standard.
Manganese	Previously detected at concentrations exceeding listed (proposed) MCLG.
Molybdenum	Critical for determining pre-discharge treatment levels.
pH	Previously detected at levels exceeding state groundwater quality standard.
TDS	Critical for determining pre-discharge treatment levels.

5.0 SUMMARY OF PRE-REMEDIAL ACTION CONDITIONS

5.1 SUMMARY OF GROUNDWATER ACTIVITIES

5.1.1 RI/FS Groundwater Activities

Groundwater activities were conducted by Dames and Moore in two phases between 1984 and 1989 as part of the site-wide RI/FS. Wells and piezometers were installed to monitor the flow and quality of groundwater in two zones within the shallow unconfined aquifer beneath the Site. The shallow interval is comprised of the sandy strata between 10 and 30 feet below ground surface. The deep interval is a sandy unit between 35 and 50 feet below ground surface. A series of monthly water level measurements and sample collection events were conducted. Slug tests were conducted on all wells and pump tests were conducted on selected wells upon completion of sampling activities.

The analytical results indicated elevated levels of arsenic, chromium, lead, molybdenum, TDS, pH, alkalinity, potassium and fluoride in the shallow interval. The horizontal and vertical conductivities calculated from the aquifer test results ranged from 1.7×10^{-2} to 1.1×10^{-4} cm/sec and 7.1×10^{-4} to 7.9×10^{-8} cm/sec, respectively. Analytical data also indicated no effect on the deep interval from the Site.

5.1.2 Remedial Design Groundwater Activities

Access Agreements: URS worked with UDEQ to obtain access to private and public properties on which existing or proposed monitoring wells included in the RD monitoring program were located. An access agreement was developed, presented to, and executed by each landowner. Copies of the agreements are included in Appendix D. The owners' names, location of their respective properties, wells of interest and agreement expiration date are listed below:

TABLE 5.1-1
Summary of Access Agreements

Property Owner	Property Description	Expiration Date
Calvin Brown	West Site west of I-215, wells PW-M and PW-P	RA completion
Richard Erickson (D&D Associates)	Northeast portion of Site 3, well P3-H	None
HANCO Limited	Parcel south of Site 2, well P2-I	RA completion
Horman Trust	Sites 2 and 3, all onsite P2- and P3- wells, and CL2-U	RA completion
Pingree Associates	Parcel west of I-215 and north of City Drain tributary, wells PW-N and PW-O	RA completion
Salt Lake City Department of Public Works	Indiana Avenue right-of-way, wells P3-K and P3-L	none
Lawrence Williamsen; Williamsen Investment	West Site east of I-215 all PW- wells on the West Site	7/31/94
Lawrence Williamsen; Williamsen Investment	North of the West Site, east of I-215, well PW-V	4/12/94

Well Survey: URS conducted a well survey in May 1993 to evaluate the physical condition of the onsite wells and offsite wells adjacent to the Site. The purpose of the well survey was to identify wells in good condition that could be monitored during RD. The condition of the well screen, well casing, protective casing, lock, cap and concrete pad were examined. Appendix A contains the results of the well survey.

Stream Gauge and Well Installation/Maintenance: Two stream gauges were installed in the City Drain in July 1993 to collect stream level data during RD. In addition, a line was marked on the northeast I-215 overpass support to provide stream level data from the Surplus Canal.

URS installed 10 wells and one piezometer in October 1993 to provide additional water level and water quality data. Seven deep wells with screened intervals between 35 and 50 feet were installed adjacent to a new or existing shallow well. Three shallow wells with screened intervals between 12 and 30 feet were drilled to replace existing shallow wells which were identified during the well survey to be in poor condition. One piezometer was installed to provide water level data for the area west of the sewer alignment located along the western edge of Site 3. Although the piezometer was constructed as a well, its use was limited to the collection of water level measurements as per the access agreement with the landowner and is referred to as a piezometer. The details regarding the installation of the wells and the piezometer are presented in Section 4.3. and Appendix C.

All wells, stream gauges and stream datums utilized in the monitoring program were surveyed to provide accurate locations and elevations. Well locations are plotted on an aerial photograph in Appendix E. Periodic maintenance included painting, labelling and installing locks on the protective casings and cleaning the stream gauges in City Drain.

Monthly Water and Stream Level Measurements May 1993 to August 1994: Water levels in 34 wells were measured monthly beginning with the well survey in May 1993 and continuing monthly through September 1993. During October through December 1993 the new wells (including the replacement wells) and the original wells were monitored, for a total of 45 wells. During January through August 1994, only the replacement wells were monitored, reducing the total to 40 wells. Combustible gases were monitored in all the wells monthly beginning in February 1994 due to an observed pressure build-up in well P3-Ca in December 1993. Organic vapors were monitored in May and October, 1993 and March 1994.

1994?

Stream levels were measured in the City Drain and Surplus Canal from July 1993 through August 1994 in conjunction with the monthly well water level measurement program.

Quarterly Groundwater Sampling: Five quarterly groundwater sampling events were conducted from June 1993 through July 1994. The first sampling event included 15 shallow and three deep wells for a total of 18 wells. The ten new wells and four existing wells were also sampled during October 1993 and during all subsequent sampling events to better delineate the limits and movement of contamination. The samples were analyzed for pH, TDS, and total and dissolved arsenic, cadmium, chromium, lead, manganese and molybdenum by Mountain States Analytical in Salt Lake City. The analytical data were validated by Environmental Data Services of Denver.

5.2 SUMMARY OF RESULTS

5.2.1 Site Geology and Hydrogeology

The geologic terminology of the Salt Lake Valley, including the Site vicinity, has recently been reinterpreted. Previous studies had considered the native zone underlying the CKD and other fill materials as part of the confining bed which overlies the Deep Principal Aquifer. This unit is now considered part of the shallow unconfined aquifer, which comprises the entire subsurface interval above a confining bed of variable thickness which overlies the Deep Principal Aquifer.

Confined conditions exist locally, defining at least three zones within the shallow unconfined aquifer on the Site. Permeable horizons lie at depths of 10 to 25 feet and 40 to 95 feet, corresponding to the shallow and deep interval, respectively. A deeper zone was encountered in a deep borehole drilled during the RI but has not been fully delineated in the vicinity of the Site. Data from this borehole indicates that this zone appears to extend from 110 to at least 145 feet in depth.

The shallow unconfined aquifer on the Site consists of interbedded silty, fine to medium grained sands, silts and clays with occasional coarser materials present. A laterally continuous fine grained zone at a depth of approximately 30 feet confines the underlying deep interval, resulting in an upward gradient condition between the shallow and deep intervals beneath the Site.

5.2.2 Groundwater Flow

Hydrographs containing monthly water level and precipitation data are shown in Figures 5.2-1, 5.2-2 and 5.2-3. The hydrographs indicate that water levels within the shallow interval on the Site were controlled or affected primarily by fluctuations in Surplus Canal levels and/or precipitation. Water levels in shallow wells near the Surplus Canal on the West Site and Site 2 mirrored changes in the canal, particularly during the drastic fall and rise of the canal in January and May 1994, respectively, Figure 5.2-1a. There was little fluctuation in the water level in City Drain. Water levels in shallow wells near City Drain reflected changes in monthly precipitation, Figures 5.2-1b,c. Elsewhere on the Site, water

levels in shallow wells were also controlled by monthly precipitation, Figures 5.2-2a,b,c. Water levels in the deep interval appear to be affected primarily by precipitation except near the Surplus Canal, where corresponding fluctuations in the Surplus Canal and deep well water levels were evidenced, Figure 5.2-3.

Monthly potentiometric maps were constructed for the shallow and deep intervals using the water level measurement data collected from May 1993 through August 1994 and are included in Section 4.2. General flow trends persisted within both intervals during the monitoring period, except for a shift in flow directions when the level of the Surplus Canal dropped approximately seven feet between January and April 1994.

Groundwater flow in the shallow interval flowed northeasterly towards the City Drain on the West Site and northwesterly towards the City Drain on Site 2. A second component of flow towards the sewer alignment developed to varying degrees on Site 2 and the West Site. The shallow interval flow beneath Site 3 and the adjacent parcel to the west was generally toward the City Drain and the sewer alignment. Low stream levels in the Surplus Canal in January, March and April 1994 led to the development of a local groundwater divide beneath the central and southern portions of the West Site and the southern portion of Site 2. Flow south of the divide was towards the canal during these periods. A second exception to the general shallow interval trends persisted in the area of the City Drain/sewer alignment intersection. Water levels in well P2-F were consistently lower than the stream levels measured in City Drain, and water levels in P3-D and PW-V were close to or below City Drain stream levels throughout the monitoring period, Figure 5.2-1c. These wells may lie within a narrow low in a sand body beneath the City Drain with a northwest gradient which locally represents the pathway of groundwater discharge for the areas north and south of the City Drain. Clays and fine silts in the stream bed would restrict the infiltration rate of water in the City Drain, accounting for City Drain stream levels above water levels in some adjacent wells which represent the shallow interval water table.

Hydraulic gradients in both the shallow and deep intervals have been variable throughout the monitoring period. The shallow interval gradient has ranged from 0.00013 to 0.06 feet/foot and the deep interval gradient has ranged from 0.0008 to 0.04 feet/foot. The gradients in particular areas of the Site have been consistent, with the highest (steepest) shallow interval gradient consistently occurring in the northwest corner of the West Site and the lowest (most gentle) gradient consistently occurring in the eastern portion of Site 2 or Site 3.

Comparison of the shallow and deep interval monthly potentiometric surface data has documented the existence of an upward vertical gradient which has persisted throughout the monitoring period. This gradient has reduced the potential for the downward movement of contamination into the deep interval, Table 5.2-1. The zero values reflect very small negative gradients rounded to the nearest 0.1 feet/foot, with the exception of the small positive gradient for

P3-Ga/P3-O in March 1994. This anomalous gradient may be attributed to operator or instrument error, which is suggested by the uncharacteristically large fluctuation in the P3-O water level for the March 1994 event. The units represent the difference in water level elevation between wells in a nested pair per foot of difference in the elevation of the well screen midpoint for the same two wells.

Surface water features in the Site area include the Surplus Canal, a controlled stream, and the City Drain, which collects stormwater drainage and had a very low flow during the monitoring period. Standing water collects in several depressions located on and adjacent to the Site: consistently along the eastern and northern edge of Site 3; along the southeastern and southern edge of Site 2; along the southern edge of the eastern limb of Site 2; and along the southern and western edge of the north limb of Site 2, during the winter and spring months. The depressions are closed on all sides with no outlets to other surface water bodies. The water in these depressions has a similar appearance to the contaminated groundwater samples collected on the Site, most likely as a result of exposure to CKD present on the surface.

5.2.3 Groundwater Quality

The results of the five sampling events are depicted on the series of maps included as figures at the end of Section 5. Figures 5.2-4 and 5.2-5 show the extent of contamination for the shallow and deep interval for each analyte based on July 1994 data. The shallow interval map illustrates the coincidence of the plumes and their general onsite occurrence. The single exception is manganese, for which the lower concentrations underlie the Site. MCL exceedances within the deep interval beneath the Site include only pH and a small lead plume present beneath the southern portion of the Site. The low manganese concentrations beneath the Site were measured in the deep interval samples as well.

Figures 5.2-6 through 5.2-13 depict quarterly plume movement in the shallow and deep intervals. Maps were constructed only for analytes for which significant changes in position or size were noted between quarterly sampling events. Shallow interval maps include: chromium, lead, manganese and molybdenum. Deep interval maps include: arsenic, chromium, lead and pH. The degree of correlation between the distribution of the shallow and deep interval plumes for each analyte are discussed in the quarterly sampling summaries in Section 4.5.

The shallow interval plume movements are summarized by analyte below:

Chromium — The chromium plume has not moved in any particular direction during the monitoring period. In the Site 2/West Site area, the most eastern extent of chromium exceedances occurred in October 1993, the most western extent occurred in April 1994 and in

general the plume has remained beneath Site 2 and the eastern half of the West Site. On Site 3 the most eastern extent of the plume also occurred in October 1993 and in general has remained beneath the western half of the Site, Figure 5.2-6.

Lead — Lead exceeded the state standard for three of the five sampling events: October 1993 and April and July 1994. The plume diminished significantly in size between April and July 1994 and encompassed only a small area in the southwest corner of Site 3 in July 1994, Figure 5.2-7.

Manganese — The area exceeding the proposed MCL for manganese migrated more between quarters in the Site 2/West Site area than on Site 3. It is important to note that the area outside the contour denoted by hachure marks represents the exceedance area. The presence of low manganese concentrations beneath the Site suggests that the water quality chemically affects the retention of manganese in groundwater, Figure 5.2-8.

Molybdenum — The size and location of the molybdenum plume varied to a lesser degree between sampling events than those of other analytes. There has been a general westward movement on Site 3 throughout the monitoring period. The plume beneath the Site 2/West Site area diminished in size between the October 1993 and January 1994 events then expanded to beyond the October 1993 limits during the April and July 1994 events. There has, however, been no significant movement of the Site 2/West Site plume throughout the monitoring period, Figure 5.2-9.

The deep interval plume movements are summarized by analyte below:

. Arsenic — Exceedances of the MCL for arsenic occurred only during the October 1993 and January 1994 events. In October 1993 exceedances were detected on Site 2/West Site and Site 3. During the next quarter there were no exceedances on Site 3 and the area on Site 2/West Site diminished significantly and moved northeasterly to the central portion of the West Site, Figure 5.2-10.

. Chromium — There were no exceedances of the chromium MCL during the June 1993 and July 1994 events. The plume progressively diminished in size during the October to April period but there was little movement noted in either area of the Site, Figure 5.2-11.

. Lead — The state standard for lead was exceeded for all but the June 1993 event and the exceedances occurred only in the Site 2/West Site area. The plume progressively diminished in size, and by July

was restricted to a small area in the central portion of the West Site, Figure 5.2-12.

. pH — The upper MCL for pH was exceeded for all events except the June 1993 event. The plume diminished in size between October 1993 and April 1994 but remained unchanged between April and July 1994 in the Site 2/West Site area. On Site 3 the upper MCL was exceeded only for the October 1993 and January 1994 events and remained essentially unchanged in size and location, Figure 5.2-13.

5.3 GROUNDWATER IMPACT ON REMEDIAL DESIGN/REMEDIAL ACTION

The presence of contaminated groundwater above the designated base of excavation and the need for continued groundwater monitoring after RA has affected RD and will affect RA. Four specific issues have been addressed in three technical specifications developed during RD:

- Specification 2140 Dewatering
- Specification 2201 Monitoring Well and Piezometer Abandonment
- Specification 2202 Monitoring Well Reconstruction

These issues are discussed in the following sections.

5.3.1 Construction Dewatering and Construction Water Detention

CKD and contaminated soil are present within the saturated zone on Site 2 and the West Site. As excavation progresses below the water table, groundwater will flow into the excavation(s). RD calls for the removal of construction water from the excavations to lower the moisture content, and consequently the weight, of the excavated material which will be transported off the Site. Because of the expected chemical characteristics of the construction water, construction water cannot be discharged untreated into City Drain or the Surplus Canal. Technical specification 2140 directs the RA contractor to capture construction water from the excavation(s) and temporarily store it in lined impoundments to be constructed on Site 3. To promote zero discharge, the impoundments are to be built to the specifications promulgated for hazardous waste impoundments.

The construction water will be similar in quality to groundwater in the shallow interval and will contain elevated levels of arsenic, cadmium, chromium, lead, molybdenum, TDS and pH. As such, construction water in the impoundments will be allowed to evaporate and any remaining sludge will be tested, characterized, and disposed of appropriately.

The amount of groundwater that flows into the excavation(s) depends on horizontal and vertical hydraulic conductivity, the surface area within the

saturation zone that is exposed, and the duration of exposure. Horizontal and vertical hydraulic conductivities on the Site have been shown to vary with depth and laterally due to changes in lithology. Lateral groundwater flow through the cut face(s) will be predominant, as compared to vertical flow through the excavation floor, because horizontal hydraulic conductivity is several orders of magnitude greater than vertical hydraulic conductivity. The size of the exposed surface area and the duration of exposure will depend on the excavation strategy utilized by the RA contractor. Technical Specification 2140 directs the contractor to schedule and sequence its activities to minimize the intrusion of groundwater.

5.3.2 Monitoring Well and Piezometer Abandonment

Numerous wells and piezometers are located within the area of excavation. In addition, several existing wells located outside the area of excavation are not expected to be used for future monitoring at the Site which is described in Section 5.4. Wells and piezometers that will not be utilized for post-RA monitoring will be abandoned by the RA contractor, according to Specification 2201. The wells and piezometers to be abandoned are located on and off the Site and are listed in the specification.

5.3.3 Well Protection and Reconstruction

To ensure the integrity of the monitoring wells that have been designated for use after RA and are located within the zone of excavation, Specification 2202 directs the RA contractor to use caution in the vicinity of existing monitoring wells that will be used during post-RA monitoring. In addition, the specification directs the RA contractor to reconstruct the wells to accommodate the new ground surface by adjusting the height of the PVC casing and replacing the steel protective casing and concrete pad. The specification lists the wells to be reconstructed.

5.4 POST OU1/OU2 REMEDIAL ACTION RECOMMENDATIONS

A major source of groundwater contamination on the site will be eliminated during RA when the CKD and contaminated on-site soils are removed and construction water is removed. URS recommends that groundwater quality, surface water quality and groundwater flow directions are monitored for at least one year following the completion of RA. The ultimate purpose of post-RA monitoring will be to provide data that will enable DERR to determine the need for further remediation based on post-RA conditions.

URS recommends the following actions:

- **Installation of three monitoring wells:** one screened in the deep interval and two screened at approximately 110 feet in depth.

- **Monthly water level measurements** in shallow and deep wells, City Drain and the Surplus Canal;

- **Quarterly groundwater sampling** of existing wells covering three intervals: the shallow, deep and deeper interval; and

- **Quarterly surface water sampling** of City Drain and the Surplus Canal.

These recommendations were presented to DERR in the Draft Remedial Action Monitoring Plan dated February 1994. The rationale and description of each activity is summarized in the following sections.

5.4.1 Installation of Monitoring Wells

The downgradient and vertical extent of groundwater contamination in the deep interval has not been completely delineated during RD based on the existing monitoring locations. The purpose of installing the three additional monitoring wells is to provide monitoring locations which will provide this information.

The deep well should be located downgradient (west) of existing deep interval wells on the West Site. During RD, elevated levels of all analytes except cadmium were detected in the most downgradient deep wells on the Site (PW-F and P3-I), although during the last sampling event detections in these wells were below MCLs. URS recommends that the deep well be located south of Indiana Avenue just west of I-215 to provide data downgradient from the Site.

Two wells penetrating a sand/gravel unit approximately 50 feet below the deep interval will determine if contamination detected in the deep interval has migrated downward to affect an aquifer that has historically been tapped for irrigation and stock-watering purposes. URS recommends placing the wells upgradient and downgradient of Site 2 and the West Site, preferably near Redwood Road and I-215, respectively. Data from the upgradient well will represent background conditions, while the downgradient well will indicate the impact of the Site on this interval.

To prevent cross-contamination among the three depth intervals that will be monitored, URS recommends that the three wells be drilled using an outer casing or an air-percussion drill.

5.4.2 Monthly Water Level Measurements

The piezometric surface at the Site may change when the topographic surface is modified as a result of RA. Changes in flow directions may affect contaminant migration and the potential for exposure. The

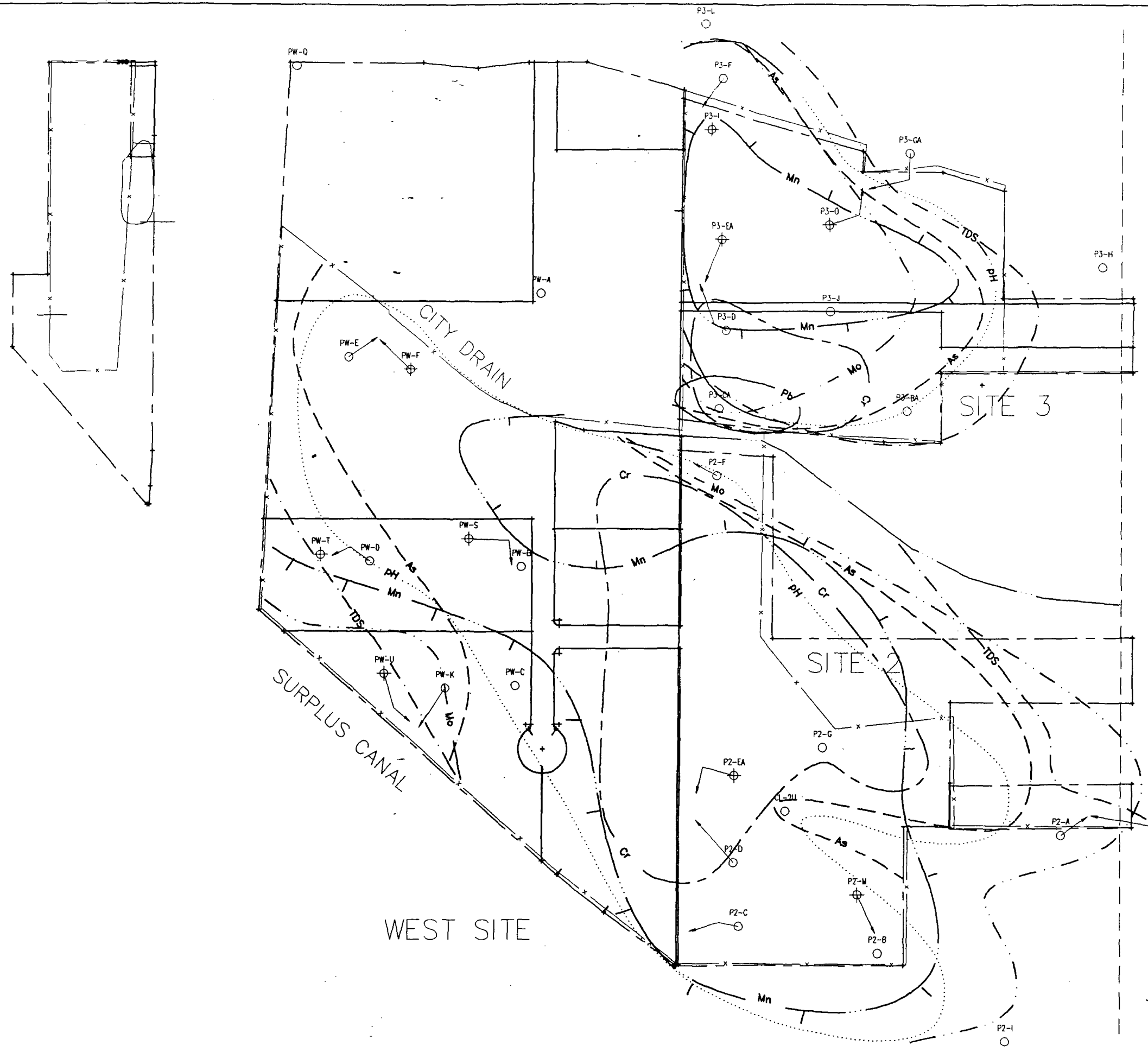
purpose of measuring the water levels in wells, City Drain and the Surplus Canal is to confirm groundwater flow directions and the relationship between groundwater and water in City Drain and the Surplus Canal. In general, URS recommends that water levels be measured at the monitoring locations used during RD to provide comparable data.

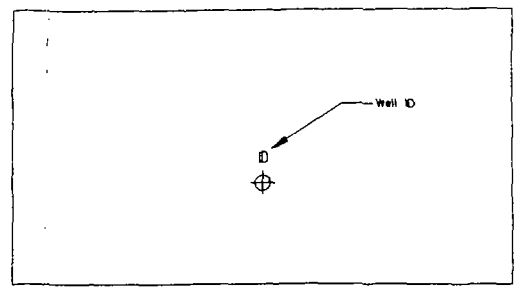
5.4.3 Quarterly Groundwater Sampling

Groundwater quality on the Site will likely improve after the contaminant source is removed during RA. URS recommends that groundwater be sampled across the Site and on the Site's periphery on a quarterly basis for one year or until a trend is apparent. In general, the sampling locations and analytical suite from RD should be continued after RA to provide comparable data. The risks associated with exposure to groundwater after RA should be evaluated with the data obtained during this monitoring.

5.4.4 Quarterly Surface Water Sampling

Contaminated groundwater from the Site may discharge into the Surplus Canal (during low canal levels) and City Drain. URS recommends that upstream and downstream samples from the Surplus Canal and City Drain be collected quarterly for one year following the completion of RA. These data would indicate the impact of the Site on surface water quality.





ID ○ Shallow Well

ID ⊕ Deep Well

N

SCALE

300 150 0 150
200 100

Explanation of Map Contours

As	50 ug/l (MCL)
Cd	5 ug/l (MCL)
Cr	50 ug/l (State Std.)
Pb	50 ug/l (State Std.)
Mn	50 ug/l (Prop. MCL)
Mo	150 ug/l (3x Background)
pH	8.5 (MCL)
TDS	3000 mg/l (3x Background)

Except for Manganese, contours enclose area of MCL or standard exceedance

Hature marks on Manganese contour indicate direction of MCL exceedance.

FIGURE 5.2-4

Extent of Groundwater Exceeding Federal/State Standards*

Shallow Interval

Based on July 1994 data

* 3x background used in absence of promulgated standard

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY

DIVISION OF ENVIRONMENTAL RESPONSE AND REMEDIATION

USEPA

UDEQ PORTLAND CEMENT
RD/RA

URS CONSULTANTS, INC.

SCALE: 1=300'

DATE: 6/94

DRAWN BY: RDC

DESIGNED BY: BLB

CHECKED BY: -

URS PROJECT NUMBER: 44084

REVISION RECORD

NO.	BY	PURPOSE	DATE	CKD

SHEET TITLE

GROUNDWATER SAMPLING

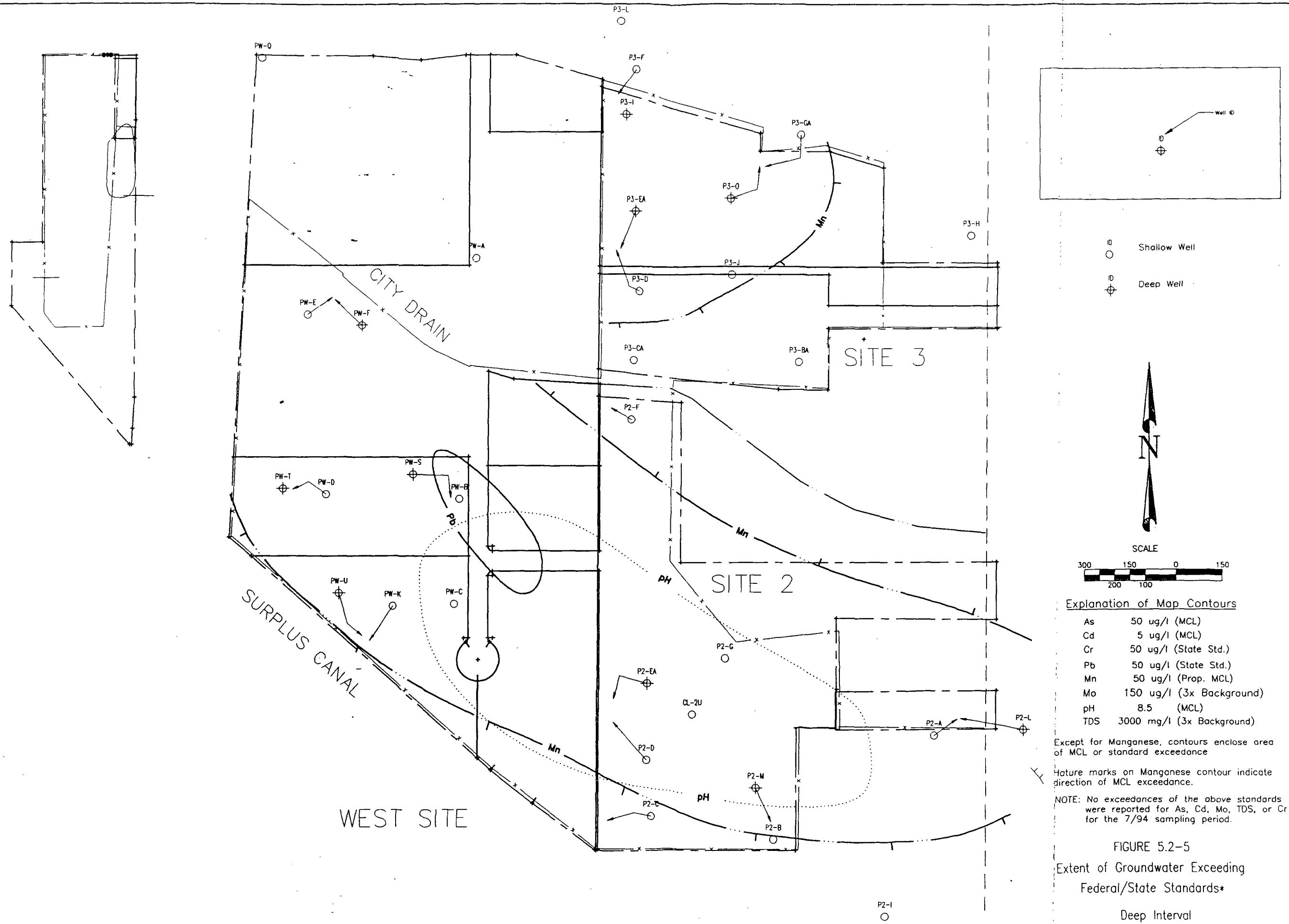
SHEET NO.

OF

CADD FILE LOCATION

cadd2/portland/geotech/tot_gw.dwg

dist0c/cadd/portland/geotech/summary.dwg rdc 10/26/94 11:29



Explanation of Map Contours

As	50 ug/l	(MCL)
Cd	5 ug/l	(MCL)
Cr	50 ug/l	(State Std.)
Pb	50 ug/l	(State Std.)
Mn	50 ug/l	(Prop. MCL)
Mo	150 ug/l	(3x Background)
pH	8.5	(MCL)
TDS	3000 mg/l	(3x Background)

Except for Manganese, contours enclose area of MCL or standard exceedance

Hature marks on Manganese contour indicate direction of MCL exceedance.

NOTE: No exceedances of the above standards were reported for As, Cd, Mo, TDS, or Cr for the 7/94 sampling period.

FIGURE 5.2-5

Extent of Groundwater Exceeding Federal/State Standards*

Deep Interval

Based on July 1994 data

* 3x background used in absence of promulgated standard

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY

DIVISION OF ENVIRONMENTAL RESPONSE AND REMEDIATION

USEPA

UDEQ PORTLAND CEMENT
RD/RA

URS CONSULTANTS, INC.

SCALE: 1=300'

DATE: 6/94

DRAWN BY: RDC

DESIGNED BY: BLB

CHECKED BY: -

URS PROJECT NUMBER: 44084

REVISION RECORD

NO.	BY	PURPOSE	DATE	CKD

SHEET TITLE

GROUNDWATER SAMPLING

SHEET NO.

OF

CADD FILE LOCATION

cadd2/portland/geotech/tot_gw.dwg

dasbc/cadd/portland/geotech/summary.dwg rdc 10/26/94 11:29

APPENDIX I

Redwood Road Dump Site Visit and Photographs

REDWOOD ROAD DUMP SITE VISIT

Date: June 22, 1995
Weather: Sunny, temperature approximately 60°F
DERR employees on site: Elizabeth Yeomans, Michelle Lutz, Terry Hawkins
SLCC Parks & Recreation employee on site: Allan Linsley

9:00 am: We left the Division of Environmental Response and Remediation and traveled east on North Temple to Redwood Road, then south on Redwood Road to 500 South. Go west on 500 South to 1965 West.

9:10 am: At Salt Lake City Corporation's Department of Parks and Recreation, we met with Allan Linsley, who oversees the landfill and proceeded to give us a guided tour. Walking south from the north gate through the Redwood Road Dump, we followed the road. Some of the recent materials at the dump include stuff from the Mountain Dale Golf Course, and some Derk's Field material such as dirt, chairs and cement. The landfill gets phone calls for people looking for Derk's Field souveniers, and gives them away to the public.

At the top of the hill we viewed the area where possible hazardous soil was dumped illegally in 1991. Two to three years ago, a disgruntled employee turned his employer in. A West Valley shop dumped hazardous wastes into dirt. Photo's 1, 2, 3 are of this soil. The Attorney General's office has an investigation into it. Allan Linsley isn't sure how much dirt was dumped or exactly where, but it's possibly 4 or 5 of the mounds of dirt.

Bill Luhann with SLCC Public Works dumps their stuff in the southeast area of the dump. Tree and lawn trimmings. Photo's 4, 5, and 6. No one can gain access from the south unless they drive through the gate access. There is fence now with barbed wire on the front North side, put in the first of this summer.

Photo's 7 through 10 are of the Portland Cement and SLCC Public Works - clippings area. Photo's were taken to the southeast. One photo was taken to the northeast of asphalt and other debris.

Storm drain runs on the east side of the property from the north side to the southeast side. Photo 11 is taken to the south, of storm drain area, with wetlands. The top of the dump was the area with fires. Fire trucks used to come almost every day.

9:45 am: end of walking tour. Drove west and south and east around the property, then in through the south side road. Photo 12 looks north at "No Trespassing" sign where a trench was dug across the road and filled with tree stump material to block access and prevent more illegal dumping.

10:00 am: Put in new roll of film. Photo 1 is of the SLCC truck having just dumped tree &

lawn trimmings. Photo 2 is of southern access to dump, which is unbarred and unfenced. The SLCC Parks and Recreation building has a security camera on the outside of the building pointed southwest towards the landfill to watch for illegal dumping. Illegal dumping used to occur about twice a day. Photos 3 & 4 are of Portland Cement's P-3K monitoring well, upgradient of the site. It is found in the southeast corner of the auto yard, downgradient and off-site of Portland Cement. This well was sampled for the Redwood Road Dump. Photos 5 through 9 on the second roll of film are panoramic shots from the southeast corner of the landfill on the west side of I-215.

Photo 10 was taken in the southwest area of the landfill, looking north, of 5 drums on the west side of I-215. Photo 11 is of standing water on SW side of railroad tracks and landfill. Photo 12 is of the City Drain on the south side of Indiana Avenue, just across from our site, and west of I-215. The City Drain goes underground beneath the road and then continues along the west side of I-215 through the site. Photos 13 through 15 were taken from the west side of the property looking east. Photo 16 was taken at the northwest corner of the landfill and looks east. Photo 17 shows a crane at the City Drain. The photo is taken looking south. Photo 18, and the last one, is of the Redwood Road Dump's front gate. Photo is toward the south from the north edge of the property.

10:20 am: We left the site and returned to the office.

Notes by E. Yeomans and M. Lutz

1. Approximate site of contaminated soil illegally dumped. Photo taken 6-22-95, looking Northwest. Photo 1 of 31.

2. Approximate site of contaminated soil piles. Photo taken 6-22-95, looking north-northwest. Photo 2 of 31.

3. Site of contaminated soil illegally dumped. Notice whitened/stressed vegetation. Photo looks North. Photo 3 or 31.

4. Southeast area of dump in middle ground. Plowed area currently used by Salt Lake City Corporation Parks & Recreation Dept., and Public Works. Photo looks Southeast. Photo's 4, 5, 6 of 31.

5. Southeastern, plowed area of dump currently used by SLCC Parks & Recreation for the disposal of grass & tree trimmings, yard clippings. View to the southeast. Photo 7 of 31.

6. A 42" sewer pipe runs underground from north to south along the eastern edge of the landfill. Photo's 8-9-10-11 of 31.

7. Photo of north unnamed ditch, where it exits the landfill at the northern fence. Note gap in fence and wetlands in the drain-ditch. Photo looks to south. Photo 12 of 31.

8. Photo looks to the north and was taken in the southern area of the dump. SLCC Parks & Recreation posted the sigh and dug a trench across the road, filled it with debris, to prevent further trespass & illegal dumping. Photo 13 of 31.

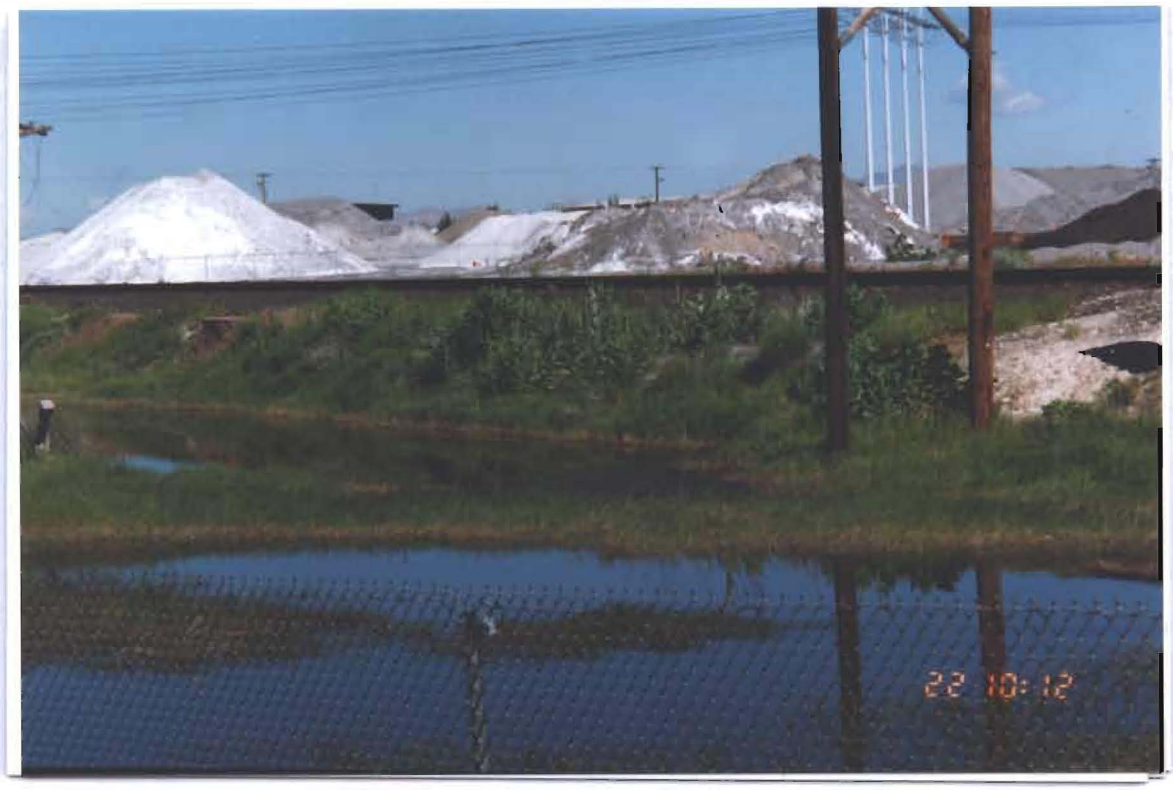
9. Southeastern area of the dump where SLCC Parks & Rec dumps yard clippings. Photo looks to northeast. Photo 14 of 31.

10. Southern access to the Redwood Road Dump. Unbarred and unfenced. Photo looks southeast. Photo 15 of 31.

11. Portland Cement's monitoring well #P3-K, located to the east of the landfill on the north side of Indiana Avenue. Phono's 16 and 17 of 31.

12. Panoramic view of dump from southeast corner, on Indian a Avenue. This area is unfenced. Photo's 18 through 22 of 31.

13. Photo looks north from Indiana Avenue onto the western refuse pile of RRD, west of City Drain and I-215. Note 5 drums, which were empty and removed by SLCC. Phto 23 of 31.



14. Photo taken near southwest corner od dump, wetlands area between Indiana Road and the railroad track. Photo looks northwest. Photo 24 of 31.

15. Photo looks south at City Drain canal, a wetlands area, on the south side of Indiana Avenue, across from the dump off-site and west of I-215. Drain goes under the road and then continues through the RRD site. Photo 25 of 31.

16. Photo taken from Chestnut Street, looking east-northeast, at western area of landfill, west of I-215. Landfill is past the fence, which has 3 strands of barbed wire on top. Photo's 26, 27, 28 of 31.

17. Photo taken looking east from northwest corner of RRD site. An observed release to the soil occurred in a barrow pit past the fence. The pit was an old bottle-collecting site before the fence was installed June of 1995. Photo 29 of 31.

18. Photo looks south onto landfill and shows the City Drain. Note the crane on the west bank. Area is fenced. Photo 30 of 31.

19. Photo looks south from 500 South street at the northern access to the RRD and its gate. A camera monitors access through this gate. Photo 31 of 31.