2. ENVIRONMENTAL SETTING

This section presents the general environmental and physical setting of the Deseret Chemical Depot (DCD) and the immediately surrounding area. Discussions on the physiography and topography (Section 2.1), climate (Section 2.2), and demographics and land use (Section 2.3) are included. Sections 2.4 and 2.5 discuss the regional geology of Rush Valley and the major surface soils at DCD, respectively. Section 2.6 summarizes the regional hydrology, including the hydrogeology and surface water in the region. Ecological discussions of the regional and installation vegetation and wildlife are presented in Sections 2.7 and 2.8, respectively. Sources of the information presented in this section predominantly include the Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) conducted by EBASCO Services, Inc. (EBASCO 1993a); the Remedial Investigation (RI) report prepared by Roy F. Weston, Inc. (Weston 1991); the Group 3 Phase II RFI conducted by Science Applications International Corporation (SAIC 1995c); and Federal, state, and local governments.

2.1 PHYSIOGRAPHY AND TOPOGRAPHY

DCD encompasses 19,335 acres in the northern portion of Rush Valley and is located at an average elevation of approximately 5,240 feet above mean sea level (msl). The valley is bounded to the east by the Oquirrh Mountains, and to the north by the Stockton Bar, a Lake Bonneville Pleistocene depositional feature, and South Mountain, a relatively low-lying uplift. Rush Valley is located in the Lake Bonneville Basin, which is part of the Basin and Range physiographic province of Utah. This physiographic province is characterized by a series of elongated north-south trending mountain ranges separated by valleys. The Lake Bonneville Basin consists of isolated and alternated north-trending, block-faulted mountains and intermountain basins. Figure 2-1 shows the topography and location of DCD.

Rush Valley once was occupied by a shallow arm of the ancient Lake Bonneville, which rose to a maximum elevation corresponding to the current 5,200-foot topographic elevation contour that crosses DCD from northwest to southeast in the vicinity of solid waste management unit (SWMU) 9 (USATHAMA 1979). The surface elevations at DCD range from approximately 5,425 feet above msl in the northeastern portion of the installation to 5,050 feet above msl in the southwestern portion.

The moderately sloping topography of Rush Valley is the result of the lateral coalescence of a series of alluvial fans at the base of the surrounding mountain ranges, which slopes toward the axis of the valley. The alluvial fans are formed by the deposition of detritus by creek erosion. The fans merge at the base of the mountains, forming a bajada in the valley floor. DCD is positioned on a large alluvial fan originating from Ophir Creek.

2.2 CLIMATE

The climate of the Rush Valley area is characterized as semi-arid and temperate with limited precipitation. Summer is typically hot and dry, spring and fall are cool, and winter is moderately cold. The mean annual air temperature for the Tooele area averaged over a 30- year

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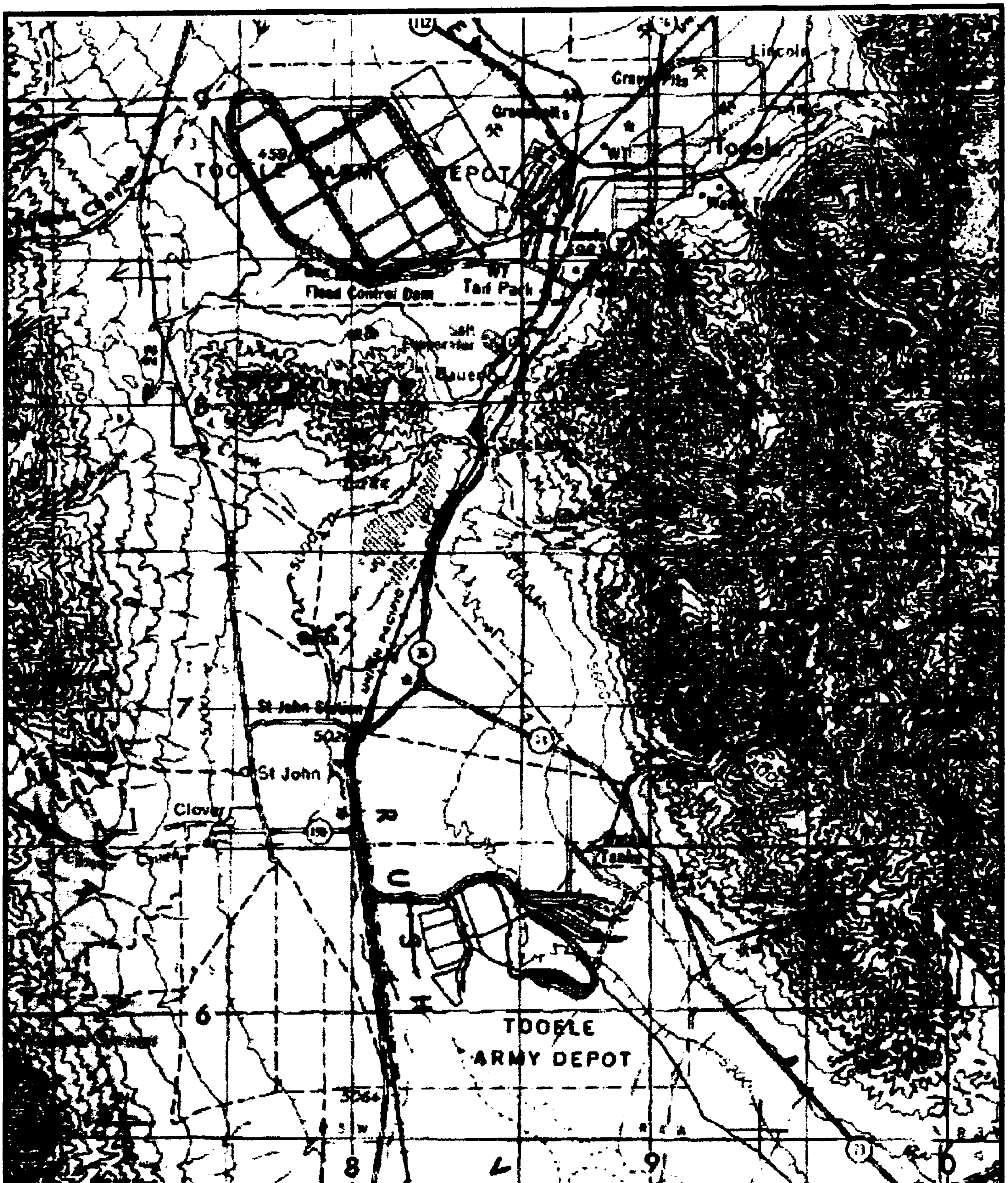


Deseret Chemical Depot
Tooele, Utah

TOPOGRAPHY IN THE VICINITY OF DCD

Figure:	Project:	File:	Date:
2-1	01-0827-03-6523-042	7109/RFITOPO	NOV. 2000

period (1961 to 1990) is 50.8°F. The lowest annual temperatures usually occur in January and the highest temperatures in July (UDAF 2000). The average growing season (frost-free days) extends from April 1 through October 25.

The mean annual precipitation for the Tooele area averaged over a 30- year period (1961 to 1990) is 18.51 inches. The wettest month is usually April and the driest months are June and July (Utah 1999). Rainfall is much greater in the adjacent mountain ranges to the east and west of DCD, where it averages 40 inches per year. Most of the precipitation in Rush Valley is in the form of snow from October to May.

The presence of the Great Salt Lake is the controlling factor in wind direction at DCD. Classical sea breeze circulation exists as a result of diurnal temperature changes. The surface temperature of the land changes during the day more rapidly than the surface of the lake, creating a temperature differential, and air masses move upslope from the north and toward DCD from the lake. At night, the land surface cools faster than the lake surface and air masses reverse direction and move from the south and away from DCD toward the lake.

2.3 DEMOGRAPHICS AND LAND USE

The 1997 population of Tooele County was 32,321 with approximately 80 percent of the population located in the cities of Tooele, Grantsville, and Wendover. The nearest city to DCD is Tooele, which is approximately 17 miles northwest of the facility. Tooele was recorded as having a population of 19,937 in 1997 (Tooele 2000). Four towns are located in the vicinity of DCD: Stockton, Rush Valley, Vernon, and Ophir. The total population of these towns is estimated to be 1,000. Other than these locations, Rush Valley is used primarily for farming or livestock grazing.

DCD is surrounded primarily by Federal land (administered by the Bureau of Land Management [BLM]); a small amount of state land; and some privately owned land around the settlements of Onaqui, Clover, and St. John. Employment opportunity in the area is generally limited to mining, agriculture, and government. Deposits of precious metals have been mined from the Oquirrh Mountains east of DCD; minerals mined in the Mercur Creek area include gold, silver, arsenic, antimony, beryllium, and tellurium (EAES&T 1988). Livestock grazing is common in the valley surrounding DCD and some crops also are raised; however, the major employer in the area is the operation of several U.S. Department of Defense (DOD) facilities, which include DCD and Dugway Proving Ground (DPG).

2.4 REGIONAL GEOLOGY

Information on the regional geology of Rush Valley (Section 2.4.1) and the geology that underlies DCD (Section 2.4.2) is provided below.

2.4.1 Regional Geology of Rush Valley

Rush Valley is located in the Basin and Range Physiographic Province, which is characterized by large en-echelon fault blocks bounded by a normal fault system that trends generally north to south. An older mountain building episode intensely deformed and metamorphosed the rocks within the ranges before block faulting occurred. Movement along the faults has been extensive since the late Miocene Epoch (5 to 23 million years ago), with areas exhibiting hundreds to thousands of feet of displacement (EAES&T 1988). The fault system is responsible for the internal drainage of the Great Basin, in which extensive alluvial and lacustrine deposits have accumulated over down-dropped fault blocks.

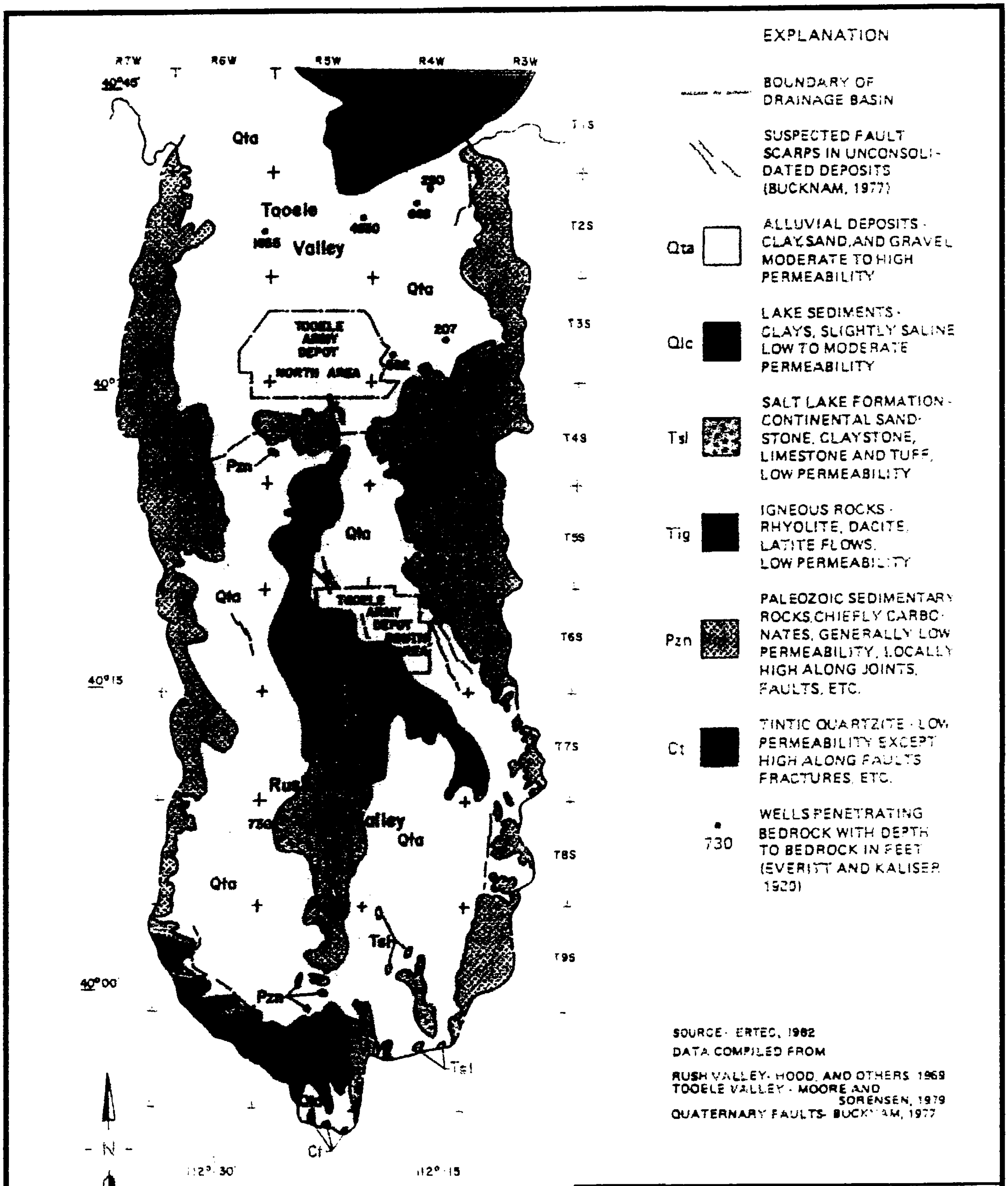
The Stansbury Mountains to the west, Oquirrh Mountains to the east, and South Mountain to the north are composed primarily of alternating beds of quartzite and limestone of late Mississippian, Pennsylvanian, and early Permian age. These beds are extensively folded and faulted. Some Cambrian quartzite is present in the Stansbury Mountains. Gravity surveys and faults in the Rush Valley basin suggest that the valley is not a single down-faulted structural depression, but rather a complex collection of troughs and ridges caused by several down-faulted blocks (ERTEC 1982). Figure 2-2 shows the geology of the Rush Valley region.

The Lake Bonneville Basin is bounded on the north and east by the Great Salt Lake and the Oquirrh Mountain fault block, on the south by the Sheeprock and Tintic Mountain fault blocks, and on the west by the Stansbury Mountains fault block. Displacement along the control faults has been extensive, exposing rocks ranging in age from Cambrian (approximately 600 million years ago) to Tertiary and Quaternary (65 million years ago to the present). Interspersed within these rocks are Tertiary igneous rocks that formed during fault displacement. Rush Valley is separated from the rest of the Lake Bonneville Basin by South Mountain and an unconsolidated depositional feature known as the Stockton Bar.

Rush Valley is filled with a thick sequence of unconsolidated sediments of the Tertiary and Quaternary periods. The older Tertiary sediments comprise the Salt Lake Group and consist of moderately consolidated sand, gravel, silt, and clay, with an abundance of volcanic ash (Everitt and Kaliser 1980). These sediments were deposited by mountain drainages and as lake bed deposits in the large intermountain Lake Bonneville of the late Tertiary period (EAES&T 1988).

The younger Quaternary sediments unconformably overlie the Tertiary deposits and consist of interlayered and unconsolidated sand, gravel, silt, and clay that were deposited after Lake Bonneville and during Pleistocene and recent alluvial activity. The thickness of the valley sediments ranges from a few feet at the margins of the valley to more than 8,000 feet in the north central portion of the valley (Everitt and Kaliser 1980). The contact between the Tertiary and Quaternary sediments was reported to be between 800 and 900 feet below land surface (BLS) (ERTEC 1982).

Regional basin and range tectonism and volcanism have resulted in the formation of a variety of mineral deposits that are mined in the mountains surrounding Rush Valley. Mining in the Oquirrh Mountains east of DCD is ongoing in the areas surrounding the towns of Ophir and Mercur.



Deseret Chemical Depot
Tooele, Utah

GEOLOGY OF TOOELE AND RUSH VALLEY, UTAH

Figure:	Project:	File:	Date:
2-2	01-0827-03-6523-042	7109/RFIGEO	NOV. 2000

2.4.2 DCD Geology

DCD is underlain by alluvial, colluvial, and lacustrine deposits of Tertiary and Quaternary age eroded primarily from the Oquirrh and Stansbury Mountain ranges. These materials are composed of quartzite, sandstone, and limestone, and extend to a depth of 500 feet or more at some locations where the deposits rest on Paleozoic bedrock (EAES&T 1988). The lithology beneath DCD is similar to that found elsewhere in the Tooele and Rush Valleys. Figure 2-3 presents a map of the surficial geology at DCD.

Alluvial and lacustrine depositional environments alternated several times during the Tertiary and Quaternary ages as a result of Lake Bonneville water level changes. As the rock record shows, alluvial processes dominated around the basin margins while the lacustrine processes dominated toward the center of DCD (EBASCO 1993a).

DCD is underlain by unconsolidated material typical of alluvial fan deposits in a semi-arid environment. The valley fill consists of poorly sorted material ranging from silt to gravel and cobbles. Sediments predominantly consist of gravel, sand, and silt that vary laterally in coarseness and thickness. Sediments in the northeastern and central areas of DCD are generally silt, fine sand, and gravel. However, sediments in the south and west areas of DCD consist of finer silty clay and clayey silt with some sand. Near surface sediments are typically yellowish brown with varying amounts of brown, yellow, and orange quartzite and dark gray limestone.

Erosion and deposition of the alluvium has been influenced by climate, precipitation rates, and periods of inundation by Lake Bonneville. As a result, the alluvial deposits at DCD have been reworked, making lateral correlations between units difficult. Although the alluvium has been influenced by the activities mentioned above, continuous fine-grained layers of silty clay and clayey silt have been logged in soil borings at DCD. The lithologic units are composed of varying fractions of clayey silt, silty clay, and fine to coarse sand. In general, the permeability of these units is relatively low, and they may act to impede the downward groundwater movement.

The geologic record of Rush Valley indicates that the depositional environment of the area was a semi-arid alluvial fan system that experienced episodic events of flood discharge influence by the slow but continual regression of Lake Bonneville. Under these conditions, fluvial and debris flow deposits inter-fingered with finer-grained alluvial plain or lacustrine facies. Figure 2-4 shows the relationship between adjacent alluvial fans that overlie the northern portion of DCD and the associated intermittent surface water bodies. The Ophir Creek alluvial fan, which influences the areas of SWMU 19, 20, and 33, laterally grades into the alluvial fan deposits derived from adjacent feeding streams. Facies relations between coalescing fans is complex and may vary within SWMU boundaries because of the various ages, stages of activity, and sizes of adjacent fans. At DCD, the unconsolidated deposits related to the fan system range to more than 400 feet thick and consist primarily of clays, silts, sands, and gravels. In addition to the potential lateral grading into adjacent alluvial fans, the distal edge of the Ophir Creek alluvial fan may have potentially graded into other depositional environments (i.e., river or lacustrine environments) (EBASCO 1993a).

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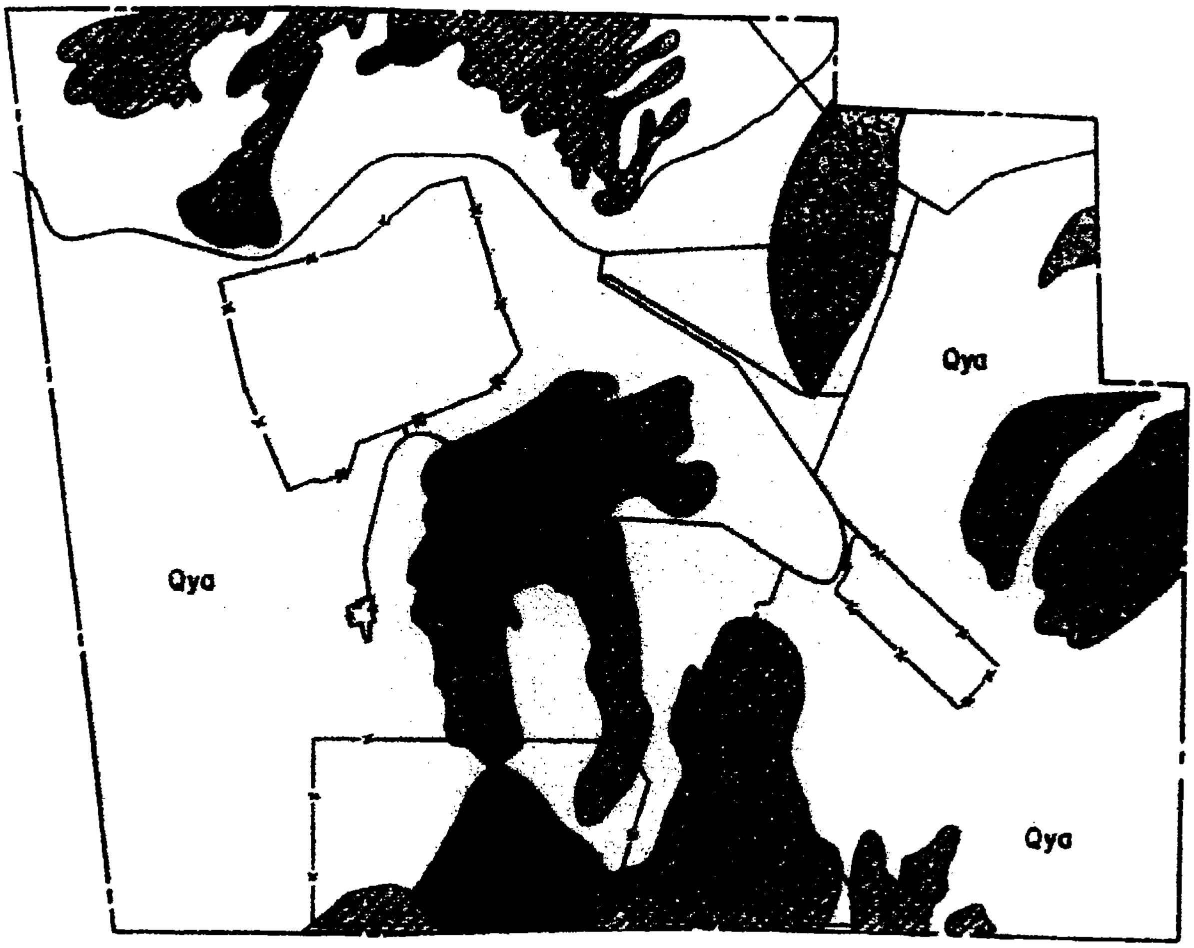


Legend

Qb	Shore Deposits: A Thin Veneer of Gravel, Sand, and Silt
QToa	Alluvium, Ranging From Coarse Gravel Near Mountains to Sand and Silt Toward Basin Center
QTp	Pediment Cut on Salt Lake Group Capped With Alluvium (QToa)
Qya	Alluvium, Mostly Very Thin Sheets of Sand or Silt
P	Playa, Flat Plain of Silt or Clay

- N -

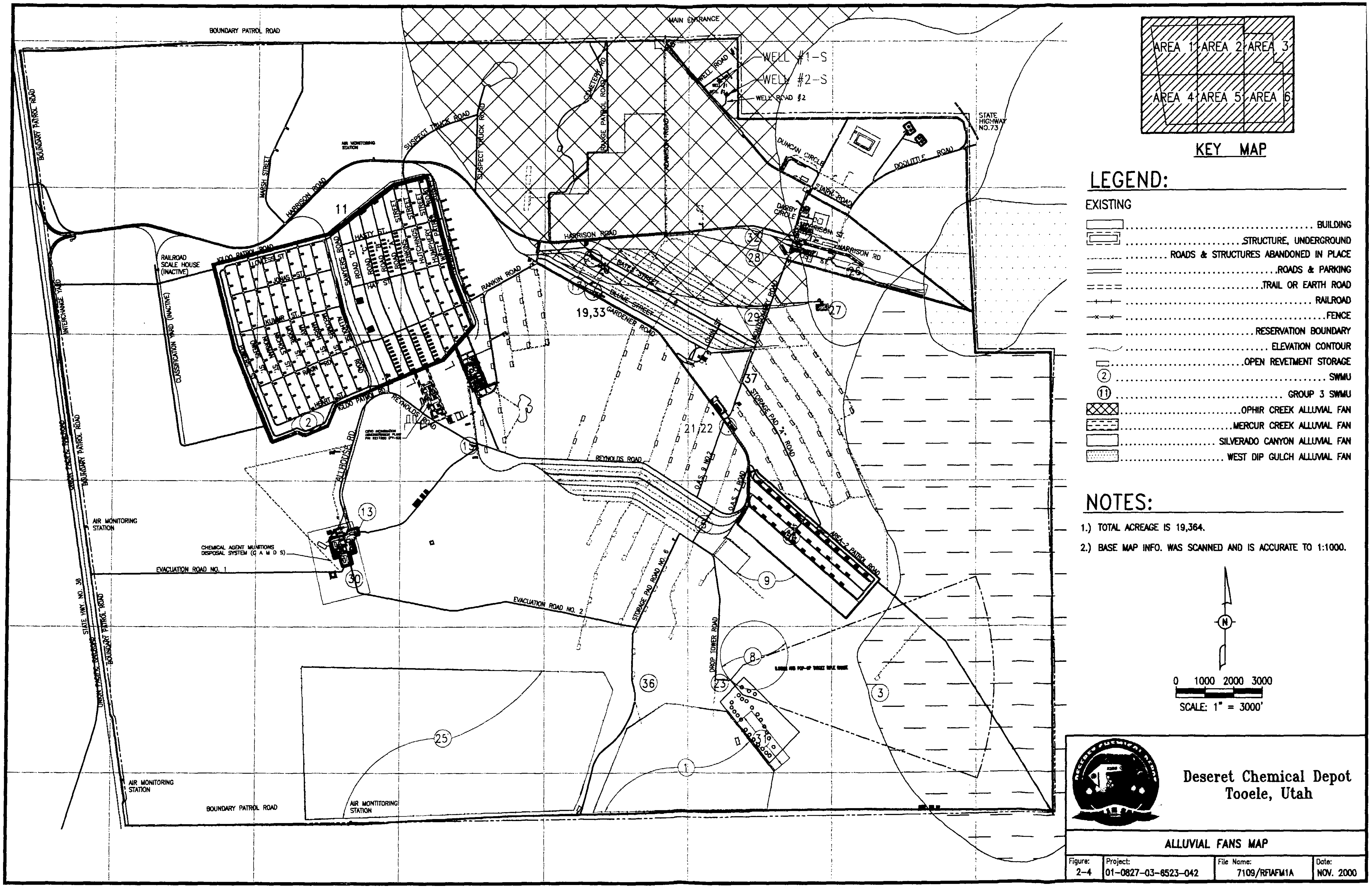
0 5000
Approximate Scale in Feet

Source: EA 1988; Compiled From Utah Geological and Mineral Survey, 1980

Deseret Chemical Depot
Tooele, Utah

SURFICIAL GEOLOGY OF DCD

Figure:	Project:	File:	Date:
2-3	01-0827-03-6523-042	7109/RFISURF	NOV. 2000


KEY MAP
AREA 1 AREA 2 AREA 3
AREA 4 AREA 5 AREA 6
LEGEND:
EXISTING
BUILDING
STRUCTURE, UNDERGROUND
ROADS & STRUCTURES ABANDONED IN PLACE
ROADS & PARKING
TRAIL OR EARTH ROAD
RAILROAD
FENCE
RESERVATION BOUNDARY
ELEVATION CONTOUR
OPEN REVETMENT STORAGE
SWMU
GROUP 3 SWMU
OPHIR CREEK ALLUVIAL FAN
MERCUR CREEK ALLUVIAL FAN
SILVERADO CANYON ALLUVIAL FAN
WEST DIP GULCH ALLUVIAL FAN
NOTES:
1.) TOTAL ACREAGE IS 19,364.
2.) BASE MAP INFO. WAS SCANNED AND IS ACCURATE TO 1:1000.
0 1000 2000 3000
SCALE: 1" = 3000'
Deseret Chemical Depot
Tooele, Utah
ALLUVIAL FANS MAP
Figure: 2-4
Project: 01-0827-03-6523-042
File Name: 7109/RFIAFM1A
Date: NOV. 2000
BOUNDARY PATROL ROAD
MAIN ENTRANCE
WELL #1-S
WELL #2-S
WELL ROAD #2
STATE HIGHWAY NO.73
DUNCAN CIRCLE
DOOLITTLE ROAD
DARBY CIRCLE
HARRISON ROAD
HARRISON RD
RANKIN ROAD
BLUME STREET
GARDENER ROAD
REYNOLDS ROAD
STORAGE PAD "A" ROAD
AREA-2 PATROL ROAD
EVACUATION ROAD NO. 1
EVACUATION ROAD NO. 2
STORAGE PAD ROAD NO. 6
DROP TOWER ROAD
SUSPECT TRUCK ROAD
RANGE PATROL ROAD
CEMETERY RD
MARSH STREET
AIR MONITORING STATION
RAILROAD SCALE HOUSE (INACTIVE)
CLASSIFICATION YARD (INACTIVE)
INTERCHANGE YARD
IGLOO PATROL ROAD
SAWYERS ROAD
REYNOLDS ROAD
ALLHOUSE RD
CHEMICAL AGENT MUNITIONS DISPOSAL SYSTEM (C A M D S)
STATE HWY. NO. 36
UNION PACIFIC RAILROAD
11
19,33
21,22
37
2
13
30
9
8
3
23
36
25
1
31
26
27
28
29
32

2.5 SOILS

The primary surface soils in the DCD area include the Birdow, Bramwell, Cliffdown, Hiko Peak, Skumpah, Taylorsflat, Timpie, and Tooele soils. Land features include Pits and Slickens and Mine Dumps (USSCS 1991). Figure 2-5 is a map of the surface soils and land features at DCD. The soils consist primarily of gravelly loam, loam, or fine sand and reflect the topographic position and parent material from which they were developed. As is typical of soils in semi-arid climates, the soils at DCD have not developed easily distinguishable diagnostic horizons. The soils are generally thick (1.5 to 5 feet), moderately permeable, and usually have a pH greater than 7.0. The potential of the soils for wind erosion is slight and their potential for water erosion is moderate (USSCS 1991). Table 2-1 summarizes the characteristics of the soil types at DCD. Although eight main soil series have been identified throughout the facility, each mapped series includes series that are too small to map. These included series differ from the larger units primarily in grain size (texture). In addition to the inclusion of soils throughout DCD, many of the natural soils have been influenced by construction activities associated with the facility.

2.6 HYDROGEOLOGY

The regional hydrogeology and surface water are discussed in Section 2.6.1 and the hydrogeology and surface water at DCD are discussed in Section 2.6.2.

2.6.1 Regional Hydrogeology and Surface Water

The groundwater system at DCD is part of a regional system that includes Rush Valley and Tooele Valley. Streams that flow from the mountains onto more permeable basin sediments typically recharge groundwater within the regional flow system. Groundwater recharge areas are along the basin margins where surface water (from rainfall and snowmelt), flowing down the mountains, meets the valley floor. Groundwater generally flows inward from the basin margins toward the center of the valley and then northward toward the Great Salt Lake.

Recharge in the area of the Ophir Creek alluvial fan at DCD apparently is responsible for a regional groundwater flow divergence. Northwest of DCD, groundwater flows north toward Rush Lake, the lowest point in Rush Valley. Previous investigations indicate that groundwater discharges from Rush Valley north under and through the Stockton Bar into Tooele Valley. In the southeastern part of DCD, groundwater flows south and east. This groundwater eventually discharges from Rush Valley to the east through the unconsolidated alluvium and structurally deformed Paleozoic rock of the Oquirrh and East Tintic Mountains between Five Mile Pass and Ten Mile Pass (EBASCO 1993a).

Rush Valley is part of a large drainage basin known as the Great Salt Lake Basin. This basin has no outlet for surface water. Some of the precipitation that falls onto the mountains encircling Rush Valley flows to lower elevations in streams. Most of these streams are intermittent and flow only in direct response to snowmelt and summer rainfall.

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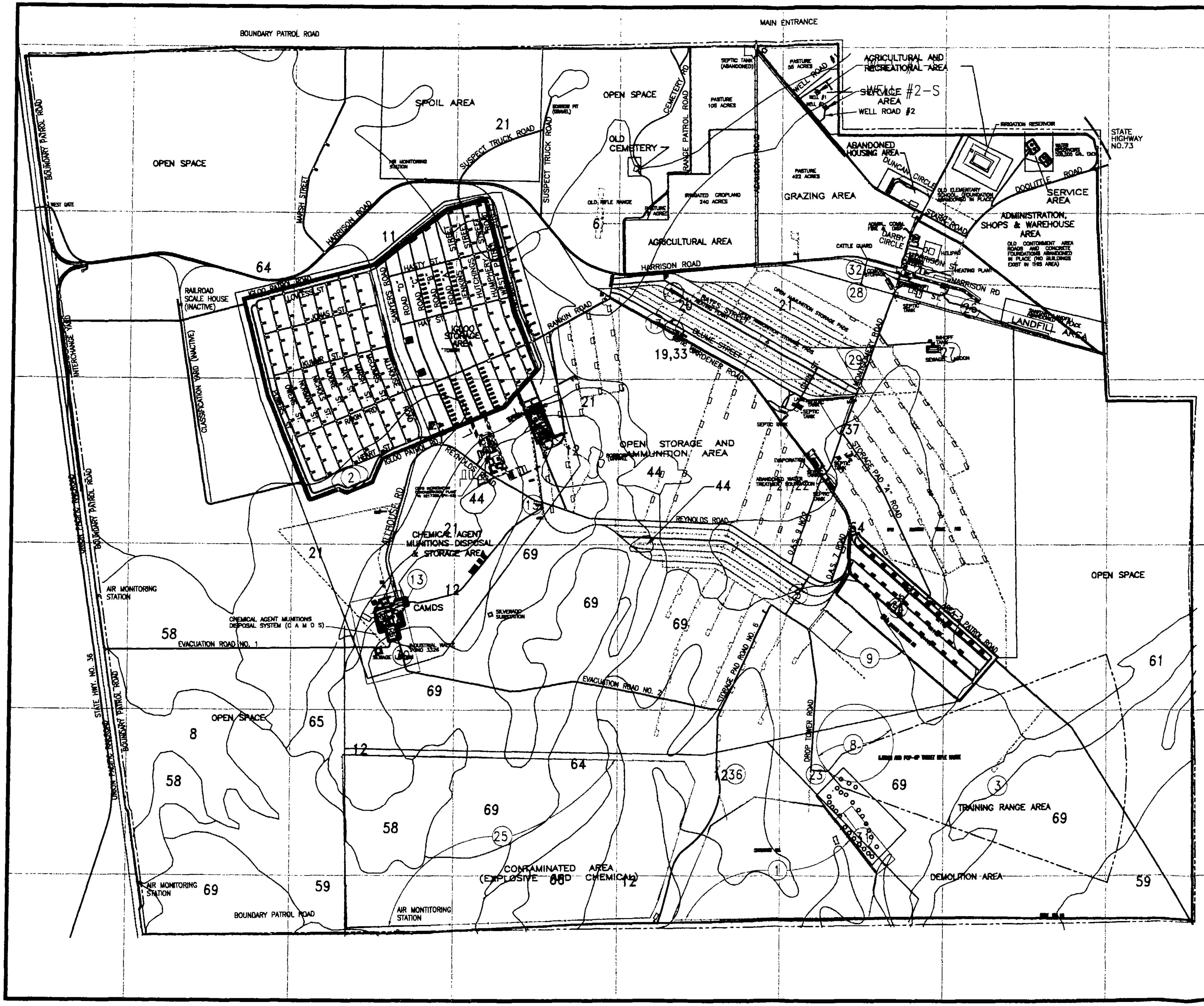

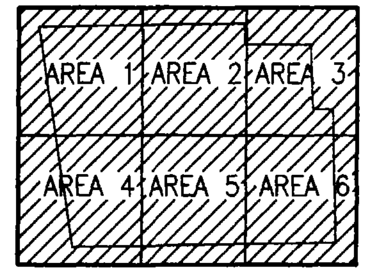

KEY MAP

LEGEND:

EXISTING

- BUILDING
- STRUCTURE, UNDERGROUND
- ROADS & STRUCTURES ABANDONED IN PLACE
- ROADS & PARKING
- TRAIL OR EARTH ROAD
- RAILROAD
- FENCE
- RESERVATION BOUNDARY
- OPEN REVETMENT STORAGE
- ② .... SWMU
- ⑪ .... GROUP 3 SWMU
- SOIL CONTOUR
- 6 .... SOIL TYPE

NOTES:

1.) TOTAL ACREAGE IS 19,364.
2.) BASE MAP INFO. WAS SCANNED AND IS ACCURATE TO 1:1000.

SOILS CLASSIFICATIONS:

6.	BIRDOW LOAM
8	BRAMWELL SILTY CLAYEY LOAM
12.	CLIFFDOWN GRAVELLY SANDY LOAM
21.	HIKO PEAK GRAVELLY LOAM
44.	PITS
58.	SKUMPAH SILT LOAM, WET
59.	SKUMPAH SILT LOAM, SALINE
61.	SLICKENS AND MINE DUMPS
64.	TAYLORSFLAT LOAM
65.	TAYLORSFLAT LOAM, SALINE
66.	TIMPIE SILT LOAM
69.	TOOELE FINE SANDY LOAM

0 1000 2000 3000

SCALE: 1" = 3000'

Deseret Chemical Depot
Tooele, Utah

SOILS CLASSIFICATION MAP

Figure:	Project:	File Name:	Date:
2-5	01-0827-03-6523-042	7109/RFISCM1	NOV. 2000

Table 2-1. General Characteristics of Surface Soil of Group 3 SWMU Investigation Area
Deseret Chemical Depot, Tooele, Utah

Mapping Unit	Soil Type	Origin	General Location	Texture	Depth (feet BLS)	Soil pH	Permeability	Infiltration Rate (cm/sec)
Abela Complex. included in this unit are Borvant, Birdow, and Erda soils.	Borvant	Developed in alluvium derived predominantly from limestone.	Shallow soil over a carbonate cemented hardpan on fan terraces of short or medium length, convex, 2 to 15 percent slopes at elevations of 5,200 to 6,500 feet above msl.	Gravely loam Very gravely loam Indurated	0 to 0.5 0.5 to 1.5 1.5	7.4 to 9.0 7.9 to 9.0 —	Moderate Moderate —	4.2×10^{-4} to 1.4×10^{-3} 4.2×10^{-4} to 1.4×10^{-3} —
	Birdow	Developed in alluvium derived predominantly from limestone and quartzite.	Flood plains, stream terraces, and alluvial fans on long, linear, or slightly concave 1 to 4 percent slopes at elevations from 4,250 to 6,200 feet above msl.	Loam Loam	0 to 2.3 2.3 to 5	7.4 to 8.4 7.9 to 9.0	Moderate Moderate	4.2×10^{-4} to 1.4×10^{-3} 4.2×10^{-4} to 1.4×10^{-3}
	Erda	Developed in alluvium and lacustrine sediments derived from mixed rock types.	Alluvial fan terraces and lake terraces on 1 to 5 percent slopes at elevations of 4,250 to 6,000 feet above msl.	Silt loam Silt loam Silt loam, silty clay loam	0 to 1 1 to 3 3 to 5	7.4 to 8.4 7.9 to 9.0 7.9 to 9.0	Mod. slow Mod. slow Mod. slow	1.4×10^{-4} to 4.2×10^{-4} 1.4×10^{-4} to 4.2×10^{-4} 1.4×10^{-4} to 4.2×10^{-4}
Berent-Hiko Peak Complex. Included in this unit is Taylorsflat.	Berent	Eolian sands derived from mixed rock types.	Hummocky vegetated sand dunes and fan terraces up to 30 percent slopes at elevations of 4,500 to 5,800 feet above msl.	Loamy find sand Fine sand	0 to 0.5 0.5 to 5	7.4 to 8.4 7.9 to 9.10	Rapid Rapid	4.2×10^{-3} to 1.4×10^{-2} Greater than 1.4×10^{-2}
	Hiko Peak	Developed in alluvium from mixed rock types.	Alluvial fan terraces on medium length convex, 2 to 15 percent slopes at elevations of 4,400 to 6,000 feet above msl.	Gravely loam Very gravely loam Very gravely loam	0 to 0.5 0.5 to 1 1 to 5	7.9 to 8.4 7.9 to 9.0 8.5 to 9.0	Mod. rapid Mod. rapid Mod. rapid	1.4×10^{-3} to 4.2×10^{-3} 1.4×10^{-3} to 4.2×10^{-3} 1.4×10^{-3} to 4.2×10^{-3}
	Taylorsflat	Alluvium and lacustrine sediments derived from mixed rock types.	Lake terraces and alluvial fan terraces on medium length, linear to convex, 1 to 5 percent slopes at elevations of 5,000 to 6,000 feet above msl.	Loam Loam Loam Loam	0 to 0.5 0.5 to 1 1 to 4 4 to 5	7.9 to 8.4 7.9 to 8.4 8.5 to 9.0 8.5 to 9.0	Mod. slow Mod. slow Mod. slow	4.2×10^{-4} to 1.4×10^{-3} 1.4×10^{-4} to 1.4×10^{-3} 1.4×10^{-4} to 1.4×10^{-3} 1.4×10^{-4} to 1.4×10^{-3}
Bramwell	Bramwell	Developed in alluvium and lacustrine sediments derived from mixed rock sources.	Low lake terraces and stream terraces on 0 to 2 percent slopes at elevations of 4,200 to 5,300 feet above msl.	Silt loam Silt loam Silty clay loam Silty clay loam	0 to 0.5 0.5 to 1.7 1.7 to 3.0 3.0 to 5.0	> 7	Mod. slow Mod. slow Mod. slow Mod. slow	1.4×10^{-4} to 4.2×10^{-3} 1.4×10^{-4} to 4.2×10^{-3} 1.4×10^{-4} to 4.2×10^{-3} 1.4×10^{-4} to 4.2×10^{-3}

Table 2-1. General Characteristics of Surface Soil of Group 3 SWMU Investigation Area Deseret Chemical Depot, Tooele, Utah (Continued)

Mapping Unit	Soil Type	Origin	General Location	Texture	Depth (feet BLS)	Soil pH	Permeability	Infiltration Rate (cm/sec)
Cliffdown	Cliffdown	Developed in alluvium derived from sedimentary rocks.	Alluvial fan terraces on medium to long, linear or convex 2 to 15 percent slopes.	Sandy loam Gravelly loam	0 to 0.5 0.5 to 5	> 7	Mod. rapid Mod. rapid	1.4×10^{-3} to 4.2×10^{-3} 1.4×10^{-3} to 4.2×10^{-3}
Lodar-Lundy	Lodar-Lundy	Developed in residuum and colluvium derived dominantly from limestone.	Mountainsides on convex, short to medium length slopes at elevations of 6,000 to 8,000 feet above msl.	Cobbly loam Cobbly loam	0 to 0.75 0.75 to 1.5	> 7	Moderate Moderate	4.2×10^{-4} to 1.4×10^{-3} 4.2×10^{-4} to 1.4×10^{-3}
Logan	Logan	Developed in alluvium derived from mixed rock sources.	Alluvium derived flood plains 0 to 1 percent slopes, on linear to slightly concave slopes that are medium in length at elevations of 4,200 to 5,500 feet above msl.	Silt loam Silty clay loam	0 to 1.2 1.2 to 5	> 7	Mod. slow Mod. slow	1.4×10^{-4} to 4.2×10^{-4} 1.4×10^{-4} to 4.2×10^{-4}
Skumpah	Skumpah	Developed in alluvium and lacustrine sediments derived from mixed rock sources.	Depressioned areas of lake terraces on long and linear slopes, 0 to 1 percent.	Silty clay loam Silty clay loam Silt loam	0 to 0.6 0.6 to 2.5 2.5 to 5.0	> 7	Mod. slow Mod. slow Mod. slow	1.4×10^{-4} to 4.2×10^{-4} 1.4×10^{-4} to 4.2×10^{-4} 1.4×10^{-4} to 4.2×10^{-4}
Theriot	Theriot	Developed on hillsides and mountainsides from residuum and colluvium derived dominantly from limestone.	Hillside and mountainside on 15 to 70 percent slopes that are short and convex.	Gradually loam Cobbly loam	0 to 0.5 0.5 to 1.4	> 7	Moderate Moderate	4.2×10^{-4} to 1.4×10^{-3} 4.2×10^{-4} to 1.4×10^{-3}
Timpie	Timpie	Formed in lacustrine and alluvium sediments derived dominantly from limestone and quartzite.	Lake terrace and alluvial fan terraces on long and linear to slightly convex, 0 to 3 percent, slopes at elevations of 4,300 to 5,300 feet above msl.	Silt loam Silt loam Silt loam	0 to 0.5 0.5 to 1.2 1.2 to 5	> 7	Mod. slow Mod. slow Mod. slow	1.4×10^{-4} to 4.2×10^{-4} 1.4×10^{-4} to 4.2×10^{-4} 1.4×10^{-4} to 4.2×10^{-4}
Tooele	Tooele	Formed in eolian material, lacustrine sediments and alluvium derived from mixed rock sources.	Lake terraces and alluvium fan terraces on long and linear to slightly convex, 0 to 5 percent slopes at elevations of 4,300 to 6,000 feet above msl.	Sandy loam Sandy loam Sand	0 to 0.25 0.25 to 3.5 3.5 to 5.0	> 7	Mod. rapid Mod. rapid Mod. rapid	1.4×10^{-3} to 4.2×10^{-3} 1.4×10^{-3} to 4.2×10^{-3} 1.4×10^{-3} to 4.2×10^{-3}

The principal intermittent streams in the northern part of Rush Valley are Ophir Creek and Mercur Creek flowing from the Oquirrh Mountains to the east and Clover Creek from the Stansbury Mountains to the west. Faust Creek flows north through the center of the valley, collecting water from Ophir, Mercur, and Clover Creeks, and carrying surface water from numerous other tributaries in the south half of Rush Valley. Most of the surface water from these streams recharges the groundwater, is lost through evaporation, or is used for irrigation. A small amount of surface water reaches playas south and southeast of DCD. Some of the surface water also flows into Rush Lake, at the northern boundary of the valley. This lake also is fed by springs, where groundwater discharges into the surface water system (EBASCO 1993a).

2.6.2 DCD Hydrogeology and Surface Water

As part of the RFI Phase I and previous field investigations, 73 monitoring wells and 3 piezometers have been installed at DCD. All wells were installed to intercept the shallowest aquifer beneath the site and allow the detection of possible groundwater contamination in this zone. Depth to groundwater ranged from 7 feet in the southwestern portion to 289 feet in the topographically high northeastern portion of DCD. Figure 2-6 presents a potentiometric contour map based on comprehensive data collected in July 1990 from all available wells that shows the general groundwater flow directions at DCD.

Groundwater recharge from Ophir Creek also may contribute to the higher water table in the northern part of DCD. Offsite wells located within 1 mile northeast and east of DCD are all at depths greater than 1,000 feet BLS with one exception. One well located approximately 1 mile northeast of the main installation gate is 344 feet BLS with a flow rate of 0.015 cubic feet per second (UDWR 1990, 1993). This well is listed by the Utah Division of Water Rights (UDWR) as most likely not in existence or abandoned (UDWR 1990, 1993). It is unlikely that any of these offsite wells would affect the first encountered aquifer in the northeastern portion of DCD.

Groundwater flow velocities vary across DCD depending upon local hydraulic conductivity and hydraulic gradient. The higher velocities occur in locations where groundwater flows through relatively coarse-grained aquifer material, such as sand and gravel. These areas are located approximately in the northeastern half of DCD, where the aquifer material is of alluvial origin. Lower groundwater flow velocities occur in the southwestern portions of DCD, where fine-grained sand, silt, and clay aquifer materials are present. These lower groundwater flow velocities are associated with lake bed sediments that are present beneath the central valley floor (EBASCO 1993a).

The topography at DCD slopes gently from the northeast to the southwest, with moderate gradients of 5 percent in the northeast. The southwestern portion of the site is nearly flat. No perennial streams exist at DCD; however, intermittent streams originating in the mountains surrounding Rush Valley sometimes flow in response to snowmelt and summer rainfall. Ophir Creek and Mercur Creek flow southwest from the Oquirrh Mountains onto DCD. Most of the water in these drainages is diverted before it reaches DCD. Ophir Creek water is diverted for irrigation and Mercur Creek is channeled onto a diversion ditch at the eastern boundary of the Depot.

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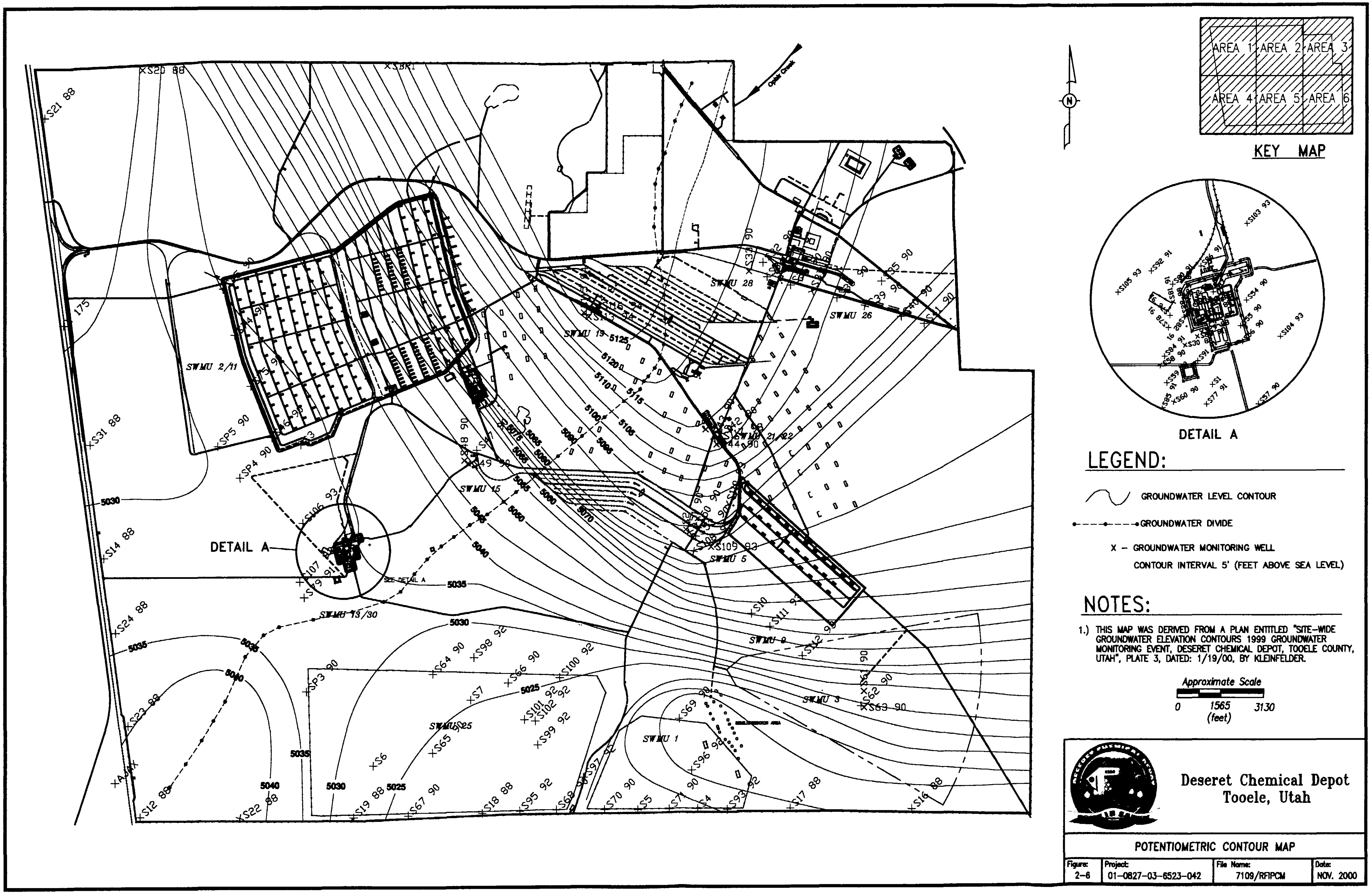
AREA 1
AREA 2
AREA 3
AREA 4
AREA 5
AREA 6
KEY MAP
N
DETAIL A
LEGEND:
GROUNDWATER LEVEL CONTOUR
GROUNDWATER DIVIDE
X – GROUNDWATER MONITORING WELL
CONTOUR INTERVAL 5' (FEET ABOVE SEA LEVEL)
NOTES:
1.) THIS MAP WAS DERIVED FROM A PLAN ENTITLED "SITE-WIDE GROUNDWATER ELEVATION CONTOURS 1999 GROUNDWATER MONITORING EVENT, DESERET CHEMICAL DEPOT, TOOELE COUNTY, UTAH", PLATE 3, DATED: 1/19/00, BY KLEINFELDER.
Approximate Scale
0
1565
3130
(feet)
Deseret Chemical Depot
Tooele, Utah
POTENTIOMETRIC CONTOUR MAP
Figure: 2-6
Project: 01-0827-03-6523-042
File Name: 7109/RFIPCM
Date: NOV. 2000
SWMU 2/11
SWMU 15
SWMU 19
SWMU 28
SWMU 26
SWMU 21
SWMU 22
SWMU 5
SWMU 13/30
SWMU 9
SWMU 25
SWMU 1
SWMU 3
DETAIL A
SEE DETAIL A
Ophir Creek
5030
5035
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5115
5120
5125

Faust Creek, carrying surface water flow from the south half of Rush Valley, enters the southwestern corner of DCD and is dammed in the west central portion of the Depot by the intersection of two railroad embankments. Faust Creek continues north through the valley on the west side of the north-south embankment. When stream flow is high, Faust Creek overflows its banks and water is ponded against the embankments.

2.7 VEGETATION

The climate across DCD is relatively constant, and the diversity and distribution of plant species vary with the changing soil types. Therefore, plant species are categorized with respect to the soil types and associated environments in which they grow. The following sections discuss the flora within the dominant soil series on DCD. Figure 2-5 lists the soil series at DCD. No endangered plant species have been identified at DCD.

2.7.1 Regional Vegetation

DCD is located in the Intermountain Sagebrush Province, an area dominated by sagebrush at lower elevation biomes. The vegetation type has been characterized as Bonneville-Saltbush-Greasewood, which is characteristic of most of western Utah. Important plants in this region are shadscale, fourwing saltbush, rabbitbrush, spineless hop-sage, and horsebrush. To varying degrees, all of these shrubs tolerate alkali, which is a mixture of soluble salts found in the local soils that often limits plant growth. This tolerance is essential to the survival of these shrubs on poorly drained soils that are widespread in the region. In areas where salt concentration is very high, even these shrubs are unable to grow; in their stead, communities dominated by greasewood or saltgrass appear. Although sagebrush is the dominant plant, it may or may not be present due primarily to varying past and present land use. In areas protected from fire, prairie type grasses or mixed-prairie types gradually become dominant.

2.7.2 Flora Composition and Habitats

The vegetation of DCD is a sagebrush community with desert shrub communities on the valley floor. The plant communities are typical of the region. The distribution of the sagebrush and desert shrub communities is influenced at DCD by environmental changes in geomorphology, soil salinity, and soil drainage. In general, geomorphology, salinity, and soil drainage differ from the northeastern corner to the southwestern corner of the installation. Well-drained soils distributed on alluvial material characterize the northeastern half of the installation and poorly drained soils distributed on the valley floor characterize the southwestern corner. Soil salinity varies from relatively low to high in a northeast-to-southwest trend across the installation. Vegetation communities and the species that comprise them have responded through time to these environmental gradients.

Eighteen distinct vegetation types were identified on DCD. Each vegetation type can be placed into one of six habitat types on the basis of its physiognomy or visual aspects. These habitat types include upland shrub, upland grass, salt shrub, alkali meadow, riparian, and human-altered.

The vegetation types initially were defined using Soil Conservation Service (SCS) plant associations (SCS no date), dominant structures (e.g., tree, shrub, and grass), and dominant species (e.g., 60 percent of one species indicates a dominant shrub type). These types were verified later in the field during a site-wide survey (EBASCO 1994b). A delineation of vegetation surrounding the Group 3 SWMU was conducted during the Phase IIA activities. Generally, vegetation consisted of bunchgrasses with a mixture of annual forbes and grasses. Disturbed areas where no vegetation was evident primarily consisted of roadways, abandoned roadways, and building parameters. Because actual vegetation types reflect responses to physical man-made disturbance, different successional stages and responses to different disturbance regimes are incorporated in the natural landscape.

2.8 WILDLIFE

Common wildlife that inhabit DCD include mule deer, black-tailed jack rabbits, desert cottontail rabbits, coyotes, burrowing owls, horned larks, meadowlarks, and western kingbirds. The Environmental Assessment presents a complete listing of the animal species found on DCD (ERTEC 1982). One threatened specie (i.e., the bald eagle) has been identified as a possible inhabitant of the facility grounds.

2.8.1 Regional Wildlife

Only a few large mammals live in this region, including the mule deer, mountain lion, bobcat, and badger, which are occasionally found. The most common species are small mammals, such as ground squirrels, jackrabbits, kangaroo mice, pocket gophers, pocket mice, wood rats, and kit fox. Some ground squirrels that inhabit the lower elevation biomes, especially the Townsend ground squirrel, become dormant during the hot dry summer.

DCD harbors a large and diverse winter raptor community. These raptors, including the threatened bald eagle, have migrated from northern regions of the United States and Canada to find appropriate habitat (e.g., trees, prey, and solitude) in the area of DCD to establish winter roosts. DCD also provides appropriate nesting habitat during the summer for species such as the golden eagle, red-tailed hawk, ferruginous hawk, American kestrel, and great horned owl.

2.8.2 Threatened and Endangered Species

One threatened specie is known to occur in the vicinity of DCD: the bald eagle. The bald eagle habitat in the area is considered critical. It encompasses an extensive area in Utah, including DCD. The area needed by the bald eagle to roost, hunt, live without disruption, and find shelter is relatively large and encompasses many smaller habitat types (USFWS 2000). Roosting bald eagles have been observed during winter ecological surveys along Mercur Creek and in the elm tree directly north of SWMU 1 and west of SWMU 31. For most of the year, Mercur Creek is a dry creek bed leaving Mercur Canyon east of DCD and extending to the eastern border of the installation. Several bald eagles also have been observed along the east side of Rush Lake, north of DCD, and in the area directly north of the DCD northern boundary.

The State of Utah threatened species list includes the ferruginous hawk. This species was observed at the Depot during ecological surveys and is a confirmed summer resident breeding bird in Rush Valley, the valley in which DCD is located. The ferruginous hawk is highly sensitive to human development. Table 2-2 lists all species of concern at DCD and their Federal and state regulatory status. No endangered species are known to occur on or in the vicinity of DCD.

Table 2-2. Federal and State of Utah Status for DCD Species of Concern
Deseret Chemical Depot, Tooele, Utah

Common Name	Species Name	Federal Status[a]	State Status[b]
Bald eagle	*Haliaeetus leucocephalus*	Threatened	Threatened
Peregrine falcon	*Falco peregrinus*	Delisted	Endangered
Ferruginous hawk	*Buteo regalis*	—	Threatened
Black tern	*Childonias niger*	—	Declining population
Long-billed curlew	*Numenius americanus*	—	Declining population, limited distribution
Swainson's hawk	*Buteo swainsoni*	—	Declining population

[a] U.S. Fish and Wildlife Service website: www.fws.gov/

[b] Quinney Professorship for Wildlife Conflict Management. Endangered and Threatened Animals of Utah Jack H. Berryman Institute, U.S. Fish And Wildlife Service, Utah Department of Natural Resources, Division of Wildlife Resources, Utah State University Extension Service. 1998.