2.0 INSTALLATION DESCRIPTION

Most of the information contained in this description of TEAD-S is compiled from the Remedial Investigation Report (Weston 1991), which is the most recently completed previous study of the site. The data in this section address RFI requirements and can be used to characterize the affected environment wherever further sampling or corrective action is proposed.

2.1 LOCATION

TEAD consists of three separate areas in West Central Utah. The North Area (TEAD-N) is 7 mi south of the Great Salt Lake and 35 mi southwest across the Oquirrh Mountains from Salt Lake City. The town of Tooele is adjacent to TEAD-N on the east. TEAD-S, which is the subject of this RFI, is located in a separate valley 17 mi south of TEAD-N. Both TEAD-N and TEAD-S are located in Tooele County. The third property controlled by TEAD is the Non-Tactical Generator and Rail Shop Division of the Maintenance Directorate, which is at Hill Air Force Base, 15 mi north of Salt Lake City in Weber County.

2.2 DEMOGRAPHICS OF THE SURROUNDING COMMUNITIES

According to the 1980 census, Tooele County, where TEAD-S is located, had a population of 26,033. Seventy-six percent of the county population is located in the cities of Tooele, Grantsville, and Wendover. In the vicinity of TEAD-S, there are four towns: Stockton, Rush Valley, Vernon, and Ophir. The total population of these towns is estimated at 1,000.

TEAD-S is surrounded mostly by federal land (administered by the Bureau of Land Management); some privately owned land, especially to the northwest around the settlements of Onaqui, Clover, and St. John; and a small amount of state land (BLM 1979) (Figure 2.2-1). Three industries, mining, agriculture, and government, are supported in the area. Deposits of precious metals have been mined from the Oquirrh Mountains east of TEAD-S for many years. In the mountains above TEAD-S are the Sacramento Mine on Mercur Creek and some abandoned mining towns. Minerals mined in the Mercur Creek area include gold, silver, arsenic, antimony, beryllium, and tellurium (EA 1988). Livestock grazing is common in the valley surrounding TEAD-S. Some crops are also raised, although these are mostly for personal consumption. The major industry in the area is the operation of several Department of Defense facilities. TEAD and Dugway Proving Ground (DPG) are major employers in Tooele County.

2.3 POTENTIAL WATER USE IN AND NEAR TEAD-S

Two water supply wells were installed in the northeastern portion of TEAD-S in 1942 and are still in use. These wells are 405 and 425 ft deep and are screened in alluvial gravels. In 1980, these wells were tested and rated at a combined capacity of 317 gallons per minute (gpm). A third water supply well was installed near SWMU 30 in 1972 for use at the Chemical Agent Munitions Disposal System (CAMDS; known releases SWMU 13). At the time of installation, this well was rated at 120 gpm. This well is no longer in use.

Utah Division of Water Rights records were reviewed by EBASCO in 1990 to determine the locations of wells and other water diversions outside the TEAD-S boundaries. Water rights within 3 mi of TEAD-S are listed in Table 2.3-1, and illustrated in Figure 2.3-1. Several of the illustrated locations are believed to be in error. For example, well 21 is shown in Township 5

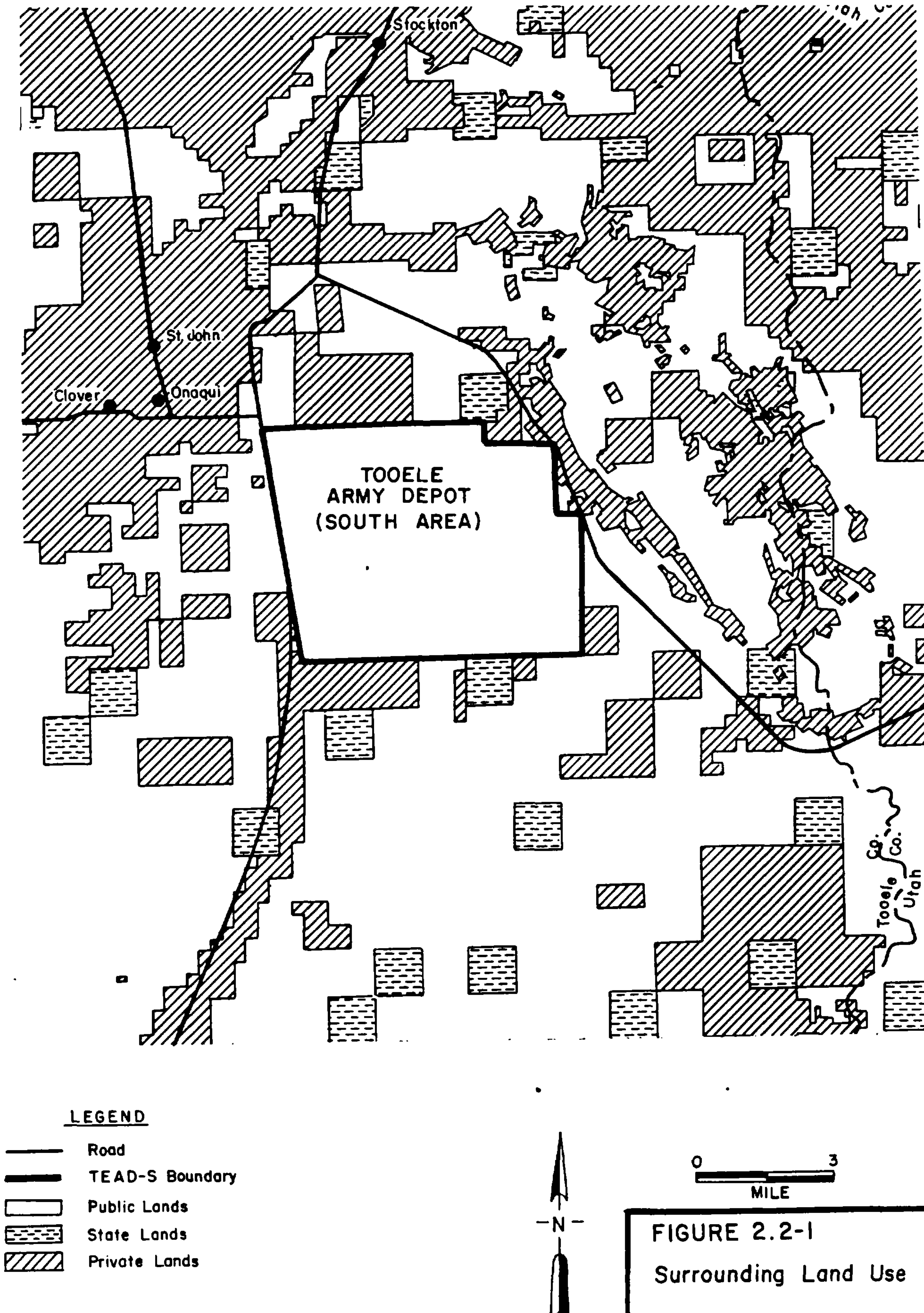

FIGURE 2.2-1

Surrounding Land Use

Tooele Army Depot - South Area
Prepared by: Ebasco Services Incorporated

Source: BLM 1979

TABLE 2.3-1. Water Rights Within Three-miles of Tooele Army Depot - South Area[1]

WELL NO.	OWNER	USE	WATER RIGHT NO	QUANTITY (CFS and/or AC-FT)	DEPTH OF SOURCE (ft)	NORTH (ft)	EAST (ft)	CORNER	SECTION	TOWN-SHIP	RANGE
1	Ophir Creek Water Co.	Irrigation Domestic Stockwatering Other	[illegible]4267	11.000 2065.98	Ophir Creek	S 1700	E 0	N4	5	6S	4W
2	Georgia J. Russell	Domestic Stockwatering	15 2410	0.0150	344	N 600	W 245	SE	32	5S	4W
3	TEAD-S #1	Domestic Other	15 73	1.6300	404	S 1534	E 1957	NW	5	6S	4W
4	TEAD-S #2	Domestic Other	15 73	1.6300	428	S 1981	E 2214	NW	5	6S	4W
5	Ophir Creek Water Co.	Irrigation Domestic Stockwatering	15 2273	11.000	Ophir Creek	S 1580	E 175	N4	5	6S	4W
6	Gillmor	Stockwatering	15 86	0.2500	Ophir Creek	S 1585	E 2820	NW	5	6S	4W
7	Gillmor	Stockwatering	15 8	0.9500	Ophir Creek	S 1585	E 2820	NW	5	6S	4W
8	Barrick Resource	Domestic Mining	15 2922	1.0000	1000-1500	S 1800	E 2000	NW	4	6S	4W
9	Barrick Resource	Domestic Mining	15 2922	1.0000	1000	S 2600	W2800	NE	4	6S	4W
10	Barrick Resource	Domestic Mining	15 2922	1.0000	1000-1500	N 2431	W1851	SE	4	6S	4W
11	Barrick Resource	Domestic Mining	15 2922	1.0000	1000-1500	N 2431	W 1551	SE	4	6S	4W
12	Barrick Resource	Domestic Mining	15 2922	1.0000	1000-1500	S 3033	W 4892	NE	10	6S	4W
13	Barrick Resource	Domestic Mining	15 2922	1.0000	1000-1500	S 3387	W 5246	NE	10	6S	4W
14	Barrick Resource	Domestic Mining	15 2922	1.0000	1000-1500	S 1850	W 1400	NE	15	6S	4W

Water Rights Tooele South; Table 2.3-1
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TABLE 2.3-1. Water Rights Within Three-miles of Tooele Army Depot - South Area[1]

WELL NO.	OWNER	USE	WATER RIGHT NO.	QUANTITY (CFS and/or AC-FT)	DEPTH OF SOURCE (ft)	NORTH (ft)	EAST (ft)	CORNER	SECTION	TOWN-SHIP	RANGE
15	Barrick Resource	Domestic Mining	15 2922	1.0000	1000-1500	S 2300	W 200	NE	15	6S	4W
16	Barrick Resource	Other	15 2858	3.5000	Unknown	N 200	E 100	SW	14	6S	4W
17	TEADS CAMDS	Other	[a]8486	0.3340	Unknown	S 100	W 900	NE	23	6S	5W
18	Priority Minerals	Domestic Mining	15 3199		600-1200	N 1300	E 1400	SW	30	6S	4W
19	Priority Minerals	Domestic Mining	15 3199		600-1200	S 700	E 600	NW	31	6S	4W
20	Stookey Estate	Stockwatering	15 78	0.0150	50	S 1120	E 785	NW	31	6S	4W
21	Clark	Irrigation Domestic Stockwatering	15 1450	0.0150	Unknown	S 445	E 2370	NW	36	5S	5W[2]
22	BLM	Stockwatering	15 2114	0.0000	Stream	N 800	W 160	S4	33	5S	5W
23	Tooele County	Stockwatering	15 124	0.0150	365	S 1019	E 1233	NW	35	6S	4W
24	Stookey Estate	Stockwatering	15 179	0.0150	50	S 554	E 1536	W4	34	6S	5W
25	BLM	Stockwatering	15 183	0.0000	Wash	N 1046	W 371	SE	6	7S	4W
26	Daniel H Russell	Irrigation Domestic	15 79	1.5000	100	S 1756	W 3320	NE	5	6S	5W
27	Daniel H Russell	Irrigation Stockwatering	15 165	5.0000	105	S 600	W 1275	NE	5	6S	5W

Source: Utah Division of Water Rights.
a Amended.
1 Information is not field verified. Please refer to text.
2 Probably error.

CFS Cubic feet per second
AC-FT Acre-feet

Water Rights Tooele South; Table 2.3-1
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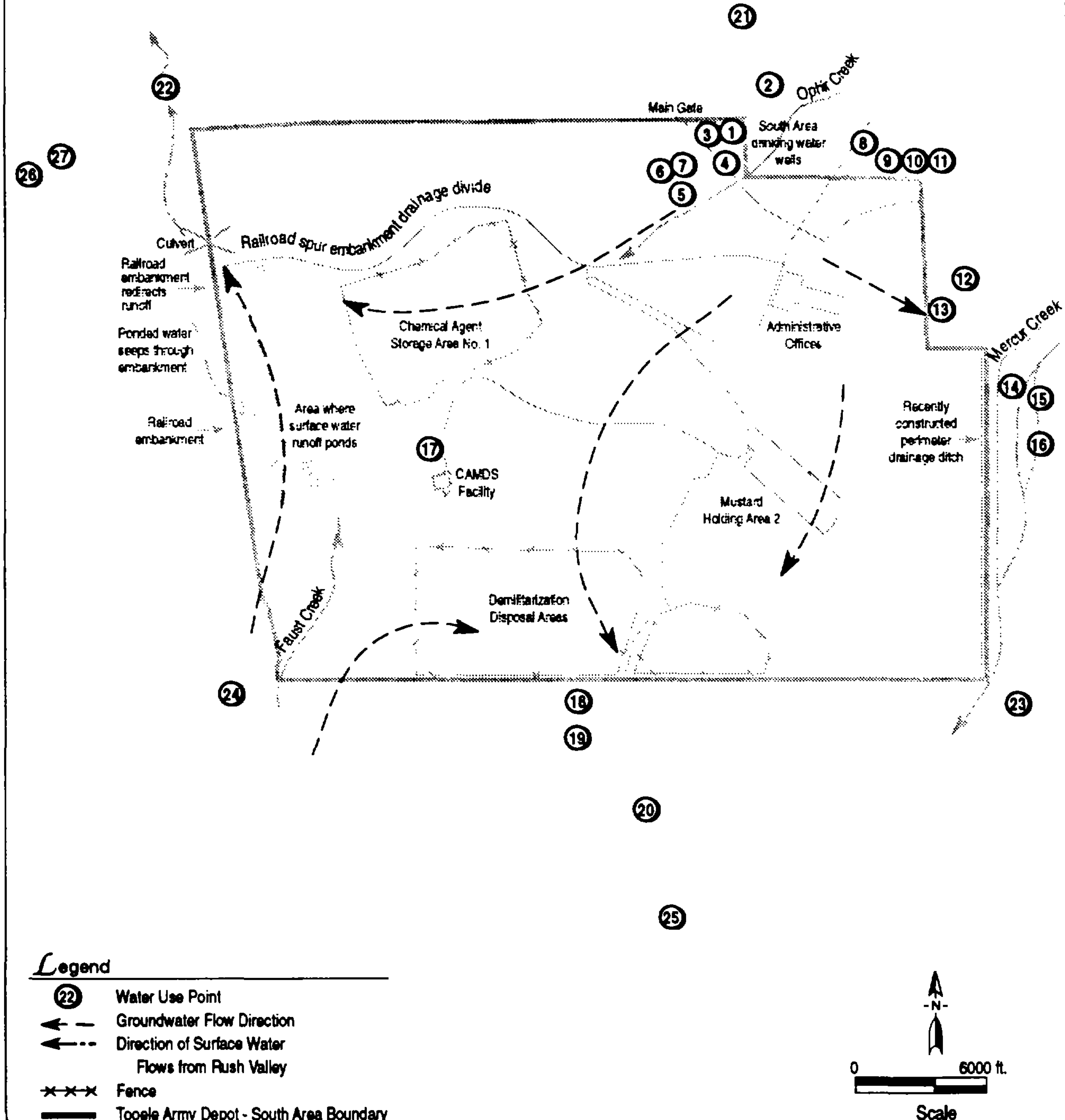


Source:

Utah Division of Water Rights
Weston 1991

Figure 2.3-1

Water Use

Tooele Army Depot - South Area
Prepared by: Ebasco Services Incorporated

EBASCO

South, Range 5 West. No structures are found near the well coordinates, although structures are found near the same coordinates in Township 5 South, Range 6 West. Therefore, the recorded range may be incorrect. Wells 18 and 19 (Figure 2.3-1), owned by Priority Minerals, are shown along the southern perimeter of TEAD-S. Since no mining is believed to occur in this area, these reported locations are also believed to be incorrect.

The majority of wells and water diversions are located along the base of the Oquirrh Mountains, east and upgradient of the facility. Stock watering wells occur south of SWMU 25, and several wells owned by mining interests are located east and northeast of the TEAD-S administration area and SWMUs 26 and 27.

Except for off-site well 2, which was drilled to a 344-ft depth, wells to the northeast of TEAD-S produce from 1,000 ft below the ground surface and, therefore, are probably screened below the aquifer interval monitored on site nearby at SWMU 26, where monitoring wells are screened only as deep as 285 ft. Well 20, south of SWMU 1, and well 24, southwest of the site, produce from a 50-ft depth. Table 2.3-1 lists the permitted usage rates at each well.

2.4 SITE LAYOUT

TEAD-S is located in Rush Valley, with the Oquirrh Mountains to the east and the Stansbury Mountains to the west. Most of the site is on sloping ground on the east side of the valley. The south and west parts of the site occupy the relatively level valley center (Plate 1). Two-lane state highways pass near the site on the north, east, and west sides. The Union Pacific railroad uses the tracks adjacent to the western boundary of the installation.

The entrance to TEAD-S is at the northeast corner of the site, from Highway 73, which is located along the east side of Rush Valley. In the northeast part of the site, near the entrance gate, are former housing areas and currently active administrative buildings and warehouses. To the west is a chemical storage area (SWMU 11), where chemical agent is housed in storage igloos, and to the south is the Mustard Holding Area (SWMU 9), where agent is no longer stored. In the southwest part of the site is a small CAMDS, operated as a prototype for a larger plant that is being constructed near the Chemical Storage Area to destroy the agent stockpile at the site. Along the southern edge of the site are two large Demilitarization Areas/Disposal Pits (SWMUs 1 and 25) where open burning, open detonation, and munitions burial have occurred in the past, and a smaller Demilitarization Area (SWMU 31), which is the current site of open detonation. Vegetation changes still outline former storage magazine areas crossed by roads or railroad tracks in the central part of the site.

2.5 HISTORY

The construction of Deseret Chemical Depot, now TEAD-S, began in 1942 and was completed in 1943. It predominantly sustained a chemical munitions mission. In 1955, the Deseret Chemical Depot was placed under the command of TEAD and underwent a major expansion. At this time, it was renamed the Deseret Depot Activity.

TEAD-N was established by the Army Ordnance Department on April 7, 1942, as Tooele Ordnance Depot (TOD). On August 1, 1962, TOD was redesignated TEAD. The depot was a World War II reserve installation and was used primarily for storing stocks for the Benicia Arsenal and the Stockton Ordnance Depot, through which World War II supplies, automotive combat vehicles, and ammunition were shipped to the Pacific theater of operations. This storage included munitions filled with mustard agent, but the last of these munitions were moved to TEAD-S by 1977 (USATHAMA 1979).

After World War II, TOD's mission was gradually altered and expanded to include the support of other Army installations in the western United States. Over time, the North Area assumed the missions of Ogden Arsenal (Ogden, Utah), Benicia Arsenal (near Sacramento, California) and Mount Ranier Ordnance Depot (near Tacoma, Washington). These added missions included guided missile rebuild, tire and tube rebuild, calibration of test equipment, and other maintenance.

In addition to assuming these administrative responsibilities, TEAD has been assigned responsibility for various tenant activities in both the North and South Areas. The Chemical Demilitarization Field Office was established at TEAD in January 1974, replacing the Edgewood Arsenal Technical Representative Office. This field office of the Program Manager for Chemical Demilitarization is responsible for advising and assisting all chemical demiliatarization at Dugway Proving Ground and Umatilla Depot Activity, with TEAD acting as the liaison office between the Program Manager and the installation commanders. In recent years, TEAD has also established a host-tenant relationship with the Defense Supply Agency, Defense Property Disposal Office. This office is responsible for all property disposal activities at TEAD (Inland Pacific Engineering 1982).

TEAD-S has been used since the 1940s for storage, renovation, disposal, and burial of many types of chemical agent munitions. These munitions included mustard (H, HD, and HT), Lewisite (L), Sarin (GB), Tabun (GA), VX, Phosgene (CG), O-chlorobenzylidene malononitrile (CS), cyanogen chloride (CK), FS, HC smoke, white phosphorus (WP), thermate, and napalm (NUS 1987). These agents are identified in Table 2.5-1. There is no indication that biological or radiological munitions have been stored at TEAD-S (USATHAMA 1979).

Only minute quantities of sealed radioactive materials have been used at TEAD for equipment calibration, industrial radiography, liquid level detectors, static eliminator brushes, etc. These materials include iridium 192, cobalt 60, nickel 63, carbon 14, polonium 210, cesium 137, hydrogen 3, nickel 63, promethium 147, krypton 85, plutonium 239, and radium 226. These materials are more likely to have been used at TEAD-N than at TEAD-S, since TEAD-S has been used mainly for munitions storage and disposal rather than for industrial operations. However, the Ammunition Radiographic Facility, which contained an industrial x-ray unit, was once located in Building S-554 (SWMU 21).

Table 2.5-1
Chemical Agents at
Tooele Army Depot

Common Name	Chemical Name and Formula	Use(s)
H (Mustard)	Bis(2-chloroethyl)sulfides $(ClCH_2CH_2)_2S$	Blister Agent
L (Lewisite)	Dichloro(2-chlorovinyl)arsine $ClCH:CHAsCl_2$	Blister Agent
HD (Distilled Mustard)	Bis(2-chloroethyl)sulfide $(ClCH_2CH_2)_2S$	Blister Agent
GB (Sarin)	Isopropyl methyl phosphonofluoridate CH_3 P(O) (F) OCH $(CH_3)_2$	Nerve Agent
VX	o-ethyl-s-(2-diisopropylaminoethyl) methyl phosphonothiolate $CH_3P(O)(C_2H_5O)SCH_2CH_2N\text{-}CH(CH_3)2\text{-}_2$	Nerve Agent
GA (Tabun)	Ethyl N, N-dimethyl phosphoramidocyanidate $C_2H_5OP(O)(CN)N(CH_3)_2$	Nerve Agent
CG (phosgene)	Carbonyl chloride $COCl_2$	Choking Agent
CS	o-chlorobenylidene malononitrile) ClC_6H_4 CHC $(CN)_2$	Riot Control Agent
CK	Cyanogen chloride CNCL	Blood Agent
FS	Sulfur Trioxide-Chlorosulfonic Acid Solution (55-45 by wt.)	Smoke
HC	Mix of aluminum, zinc oxide and hexachloroethane	Smoke
WP	White Phosphorus (P_4)	Smoke
Thermate	Thermite $(Fe_2O_3 + Al)$ with Nitrate, Sulfur, and Binder	Incendiary Mix
M1 and M2 Thickeners (Napalm)	Mixed aluminum soap (50% coconut oil acids) (25% naphthenic acids) (25% oleic acid)	Incendiary Thickner

Source: NUS, 1987.

Pesticides, herbicides, and fertilizers have been used throughout the installation by trained Army employees. These chemicals are identified in the Installation Assessment (USATHAMA 1979). Parts of TEAD-S have been leased for explosives testing and other parts for livestock grazing (USATHAMA 1979).

2.6 CLIMATE

The climate of Rush Valley is semi-arid with four well-defined seasons. The summer is hot and dry, the spring and fall are generally cool, and the winter is moderately cold. The average monthly temperature ranges from a high of 75 degrees Fahrenheit (°F) in July, to a low of 28°F in January (EA 1988). Winds are usually light, with an average annual velocity of 9 mi per hour. The local wind that circulates through the valley is caused by the uneven heating and cooling of the land and the surface temperature of the Great Salt Lake (EA 1988). The prevailing wind direction in Rush Valley during the summer is from south to north toward the lake. During winter the prevailing wind direction is from north to south into the valley (EA 1988). Some day-to-night variations also occur, depending on the lake temperature in relation to the land temperature at a given time.

Low humidity is characteristic of the valley climate, where the average relative humidity is 44 percent (USATHAMA 1979). The annual precipitation is 10 to 12 inches in Rush Valley, with nearly half the total annual precipitation occurring as snowfall between early fall and late spring. The summers are generally dry with occasional showers and thunderstorms. This general year-round lack of precipitation is due to the mountain barriers that restrict the movement of moisture into Rush Valley. An average annual precipitation of 40 inches per year occurs in the mountains surrounding Rush Valley (Montgomery 1989). Most of this precipitation falls above an elevation of 5,500 feet (ft) (USATHAMA 1979).

2.7 PHYSIOGRAPHY

Rush Valley is a part of the Basin and Range Physiographic Province. This province is characterized by a series of elongated north-south trending mountain ranges separated by valleys. In Rush Valley, the mountains are flanked by alluvial fans sloping toward the axis of the valley. TEAD-S is positioned on a large fan originating from Ophir Creek (Plate 1).

The drainage basin that includes Rush Valley is approximately 40 mi long, and the valley floor is approximately 30 mi long and 14 mi wide. This valley was once occupied by a shallow arm of the ancient Lake Bonneville, which rose to a maximum elevation corresponding to the current 5,200-ft topographic elevation contour that crosses TEAD-S from northwest to southeast in the vicinity of SWMU 9 (USATHAMA 1979). The surface elevations range from approximately 5,425 ft above mean sea level (msl) in the northeast part of the site to 5,050 ft msl in the southwestern part. The Oquirrh Mountains to the east of TEAD-S reach an elevation of 10,630 ft.

2.8 SOILS AND GEOLOGY

2.8.1 Soils

Two poorly developed soil types occur at TEAD-S: colluvial and alluvial deposits with moderate to high permeability, and lake bed sediments with a low to moderate permeability. With a deficiency of water, dry soils do not develop strong diagnostic horizons except for salt crusts or a concretionary layer. During dry periods, water is drawn upward through the soil by capillary action and evaporates either in the soil profile or at the ground surface. Dissolved mineral matter is precipitated when the soil water evaporates. Calcium carbonate (caliche), or in this case a lime-cemented hardpan, may accumulate in this manner as layers in desert soils.

The soil classification for the colluvial and alluvial deposits, which are predominant at the site, is Neola gravelly loam (USATHAMA 1979). The texture of the alluvium ranges from coarse gravel near the mountains to sand and silt toward the basin center. This material is moderately saline and alkaline, with occasional lime-cemented gravelly hardpan within 20 inches of the surface and a gravelly loam underneath. The lake bed sediments, which are somewhat saline and alkaline, consist of a deep, silty clay loam with occasional high concentrations of soluble minerals and thin layers of sand.

2.8.2 Geology

Rush Valley is located in the Great Basin section of 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 (Figure 2.8-1). 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 hundreds to thousands of feet of displacement in places (EA 1988). As a whole, 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 large interior drainage basin (Great Salt Lake 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 Prepaleozoic and 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 in the fault block mountains simultaneously with fault displacement (EA 1988). To the north of TEAD-S, Rush Valley is now separated from the rest of the Great Salt Lake Basin by South Mountain and an unconsolidated depositional feature known as the Stockton Bar.

The valley fill consists of deposits of two ages: an older sequence of Tertiary age and a younger sequence of Quaternary age. The older sequence comprises the Salt Lake Group and consists of

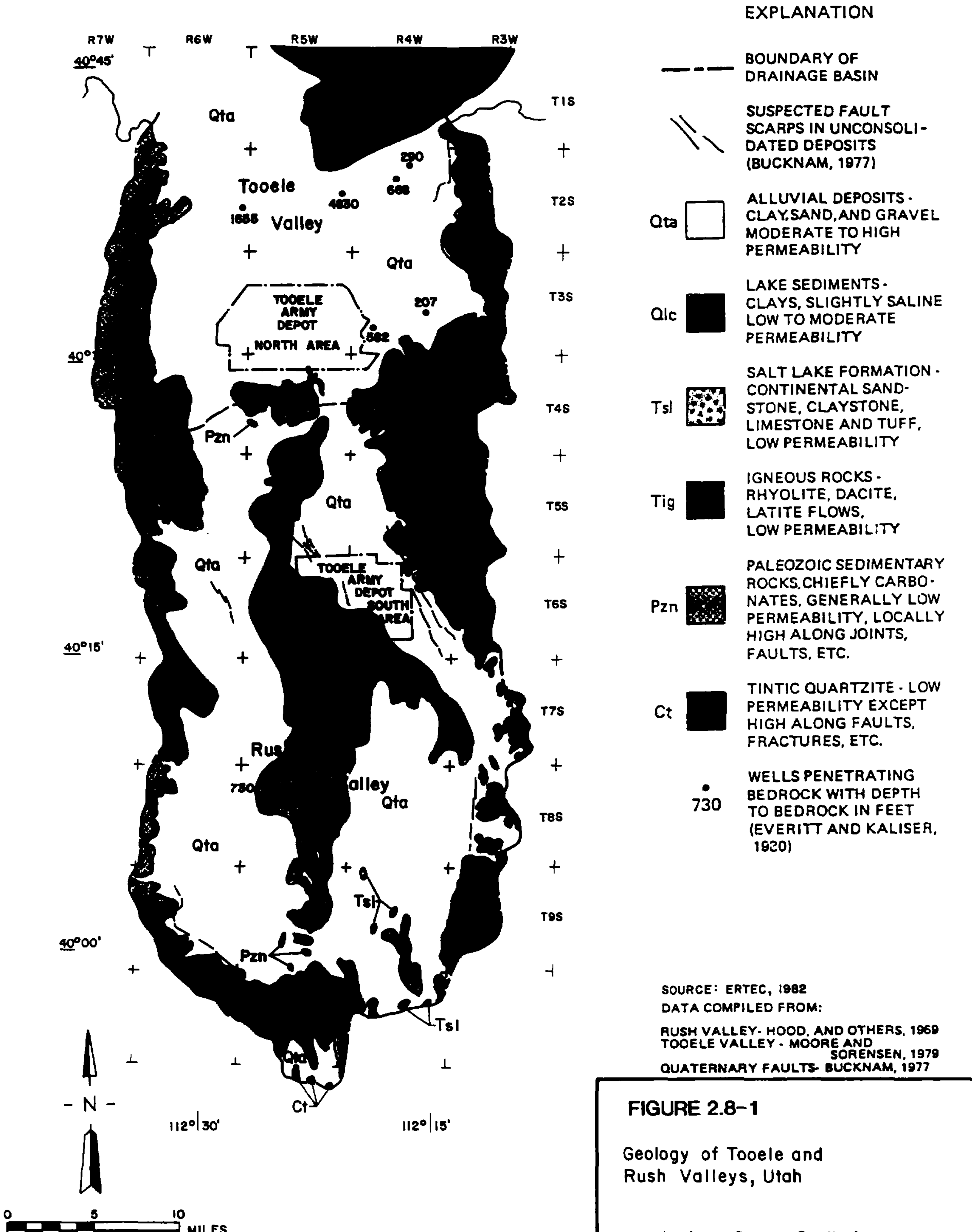
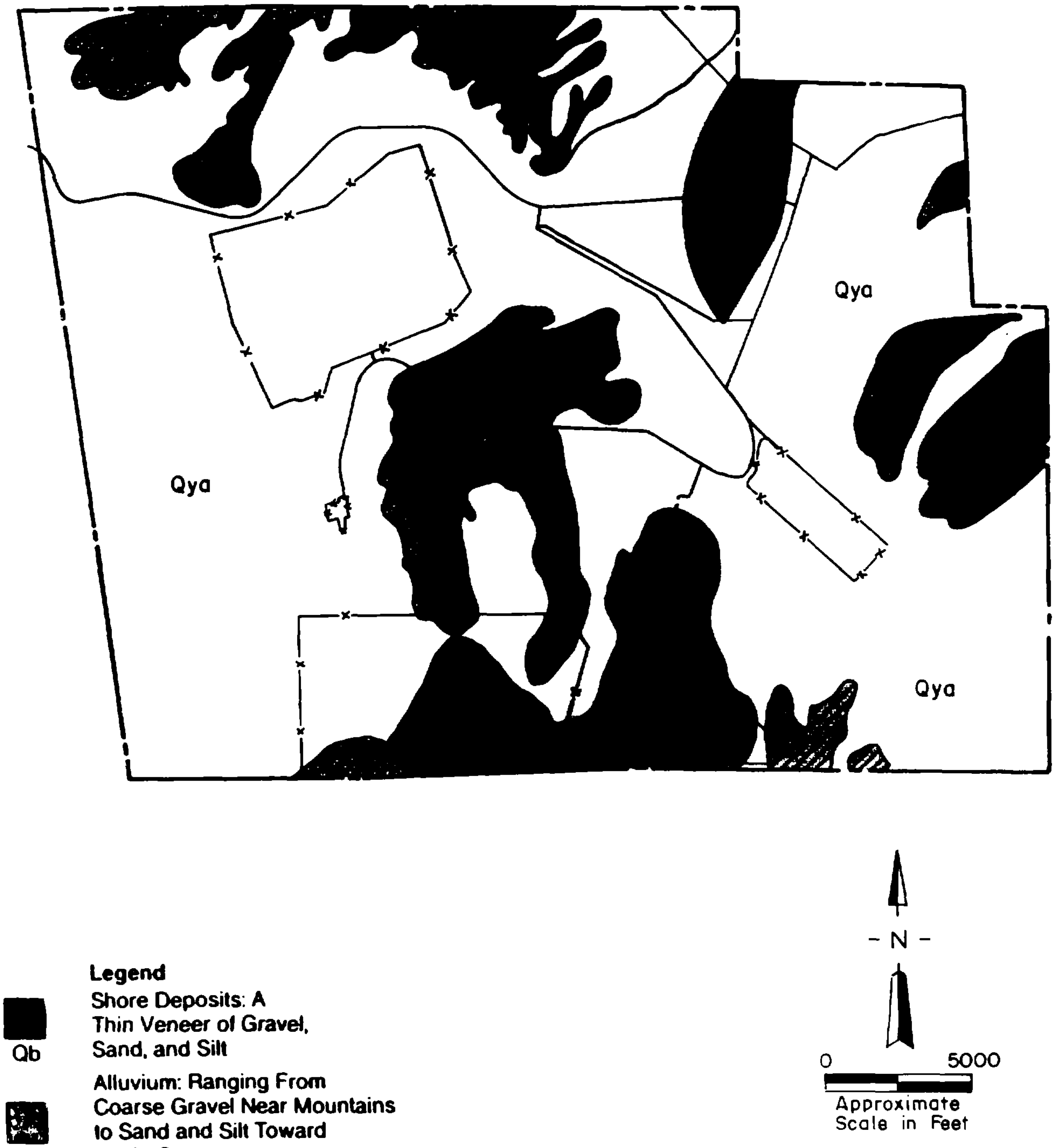


FIGURE 2.8-1

Geology of Tooele and Rush Valleys, Utah

Tooele Army Depot - South Area
Prepared by: Ebasco Services Incorporated



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

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

FIGURE 2.8-2

Surficial Geology of TEAD-S

Tooele Army Depot - South Area
Prepared by: Ebasco Services Incorporated

moderately consolidated sands, gravels, silts, and clays with an abundance of volcanic ash. These sediments were deposited by mountain drainages and as lake bed deposits in the large intermountain Lake Bonneville of the late Tertiary period (EA 1988).

The younger, Quaternary age sequence of the valley fill unconformably overlies the Salt Lake Group and consists of unconsolidated sand, gravel, silt, and clay. This sequence includes post-Lake Bonneville, Pleistocene alluvium and Recent alluvial, lake bed, and dune sand deposits (EA 1988).

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 TEAD is ongoing in the areas surrounding the towns of Ophir and Mercur.

TEAD-S is underlain by alluvial, colluvial, and lacustrine deposits of Tertiary and Quaternary age eroded primarily from the Oquirrh Mountains (Figure 2.8-2). These deposits extend to a depth of 500 ft or more where they rest on carbonate rocks of Paleozoic age (EA 1988). As the Lake Bonneville water level rose and fell, alluvial and lacustrine depositional environments alternated several times during the Tertiary and Quaternary ages, with alluvial processes dominating around the basin margins and the lacustrine processes dominating toward the center of the site.

2.9 SURFACE WATER

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 on 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.

The principal intermittent streams in the northern part of Rush Valley are Ophir Creek and Mercur Creek entering 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 either recharges the groundwater, is lost through evaporation, or is used for irrigation. A small amount of surface water from these streams reaches playas south and southeast of the site. Most of the surface water flows into Rush Lake, at the northern boundary of the valley. Rush Lake is also fed by springs, where groundwater discharges into the surface water system.

The land surface at TEAD-S slopes gently from the northeast to the southwest, with moderate gradients of 5 percent in the northeast to nearly flat in the southwest. Plate 1 shows the topographic relief of the site. Ophir Creek and Mercur Creek flow southwest from the Oquirrh Mountains onto TEAD-S, and Faust Creek enters the southwest corner of the site and flows north

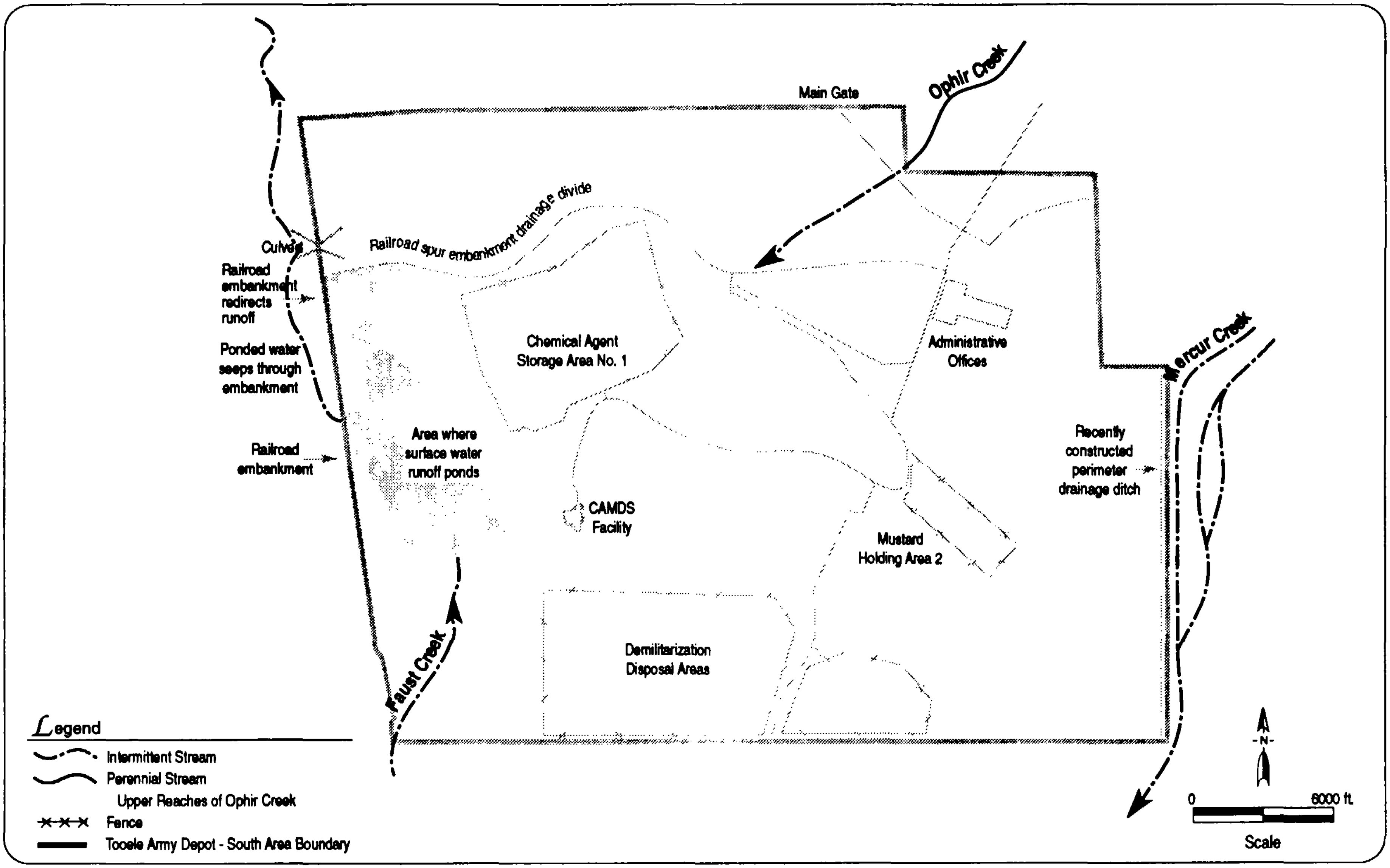
(Figure 2.9-1). Most of the water in Ophir and Mercur Creeks is now diverted before it reaches the site. Ophir Creek water is diverted for irrigation; however, Ophir Creek was observed to be flowing through the north part of TEAD-S during EBASCO's initial site visit in August 1989. Mercur Creek is channeled into a diversion ditch at the eastern boundary of the site. This ditch carries the water to the playa area to the south rather than across the site.

Faust Creek, carrying flow from the south half of Rush Valley, enters the southwest corner of the site and is dammed in the west central part of the site by the intersection of two railroad embankments (Figure 2.9-1). The Faust Creek channel continues north through the valley on the west side of the north-south embankment. The north-south embankment was constructed for the Union-Pacific Railroad. The east-west embankment is part of a spur that leads east and northeast through and beyond the site. When stream flow is high, Faust Creek overtops its banks and water is ponded against the embankments. During a previous investigation (Weston 1991), Faust Creek flowed until late May, and several hundred acres of land between CAMDS and the embankment junction were flooded with up to 5 ft of water until early August 1989. However, during the RFI-Phase I in the summer of 1990, no flooding occurred.

2.10 GROUNDWATER

Groundwater at TEAD-S occurs generally under unconfined conditions, with local areas of semiconfined conditions. The groundwater system at TEAD-S is part of a regional system that includes Rush Valley and Tooele Valley. Groundwater within the regional flow system is typically recharged by streams that flow from the mountains onto more permeable basin sediments. These streams typically disappear due to complete infiltration and evaporation as they travel across the sediments that slope from the mountain front toward the center of the valley. The groundwater generally moves from these recharge areas toward and then along the valley axis.

A regional groundwater divergence exists in Rush Valley, as discussed by Hood, Price, and Waddell (1969). Recharge in the area of the Ophir Creek alluvial fan at the site is apparently responsible for this flow direction divergence. From the northwestern part of TEAD-S, groundwater flows north toward Rush Lake, the lowest point in Rush Valley. Hood, Price, and Waddell (1969) indicate that a "small but significant amount" of groundwater discharges from Rush Valley north under and through the Stockton Bar into Tooele Valley. The rest of the groundwater in the Rush Lake area is lost to evapotranspiration due to shallow depths to groundwater and the presence of numerous phreatophytes in the Rush Lake area. In the southeastern part of the site, 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 (Hood, Price, and Waddell 1969).



Source:

Weston 1991

Figure 2.9-1

Surface Water

Tooele Army Depot - South Area
Prepared by: Ebasco Services Incorporated

EBASCO

During the RFI-Phase I and previous field investigations, 73 monitoring wells and 3 piezometers were installed at TEAD-S. The wells were drilled to the top of the shallowest aquifer to detect possible contamination of this groundwater zone. Depths to groundwater ranged from as deep as 289 ft in the topographically high northeastern portion of TEAD-S to as shallow as 7 ft in the southwestern portion of the site. During the RFI-Phase I, four rounds of water levels were collected from these wells. Appendix B lists the well data and water level data for measurements collected in April, August, and October 1990 and February 1991. Plates 2, 3, 4, and 5 illustrate the interpreted potentiometric surface for each set of measurements. Plates 4 and 5 contain more data points than Plates 2 and 3 because RFI-Phase I well installation occurred between April and August 1990. General groundwater flow directions for TEAD-S are shown in Figure 2.10-1.

In the eastern part of TEAD-S, the potentiometric surface is apparently affected by local recharge and possibly off-site discharge (Plates 3 and 4). A higher water table is interpreted along a line between SWMUs 28 and 32, 21 and 22, and 5. This linear trend may indicate recharge along the length of the trend from leakage from a water main that parallels Montgomery Road, or at discrete points along the trend from building discharge. Discharge from buildings to ditches is known to have occurred at SWMUs 5 and 22. Groundwater recharge from Ophir Creek may also contribute to the higher water table in the northern part of the site. Groundwater use associated with water rights directly northeast and east of TEAD-S (Table 2.3-1; Figure 2.3-1) may cause drawdown of the water table there and contribute to the east to southeast hydraulic gradient in the eastern part of the site.

Groundwater flow velocities vary across the site according to hydraulic conductivity and hydraulic gradient. The higher velocities occur in locations where groundwater flows through relatively coarse-grained (more conductive) aquifer material such as gravel and sand in areas of large hydraulic gradients. These areas are located approximately in the northeast half of TEAD-S, where the aquifer material is of alluvial origin. Lower groundwater flow velocities occur in the southwest portions of TEAD-S where finer-grained (less conductive) sand, silt, and clay aquifer materials and lower hydraulic gradients occur. These lower groundwater flow velocities are associated with lake bed sediments that are present beneath the central valley floor.

Between May 1988 and July 1990, groundwater levels declined by an average of 1.87 ft. However, comparing October 1988 to October 1990 levels, the decline was only 0.69 ft. The water level at well S-12 varied more than at any other TEAD-S monitoring well during this 2-year period, exhibiting a decline of approximately 6 ft from May 1988 to July 1990.

Short-term (possibly seasonal) variations in groundwater levels can range up to 6 ft in monitoring wells at TEAD-S. However, no large-scale variation in groundwater flow directions has been noted. The potentiometric surfaces, presented in Plates 2, 3, 4, and 5, indicate that groundwater in the vicinity of SWMUs 2, 11, 19, and 20 flows toward the southwest, and groundwater in the vicinity of SWMUs 1, 3, 4, 5, 8, 9, 21, 22, 23, 25, 26, 27, 31, 34, 36, and 37 flows to the

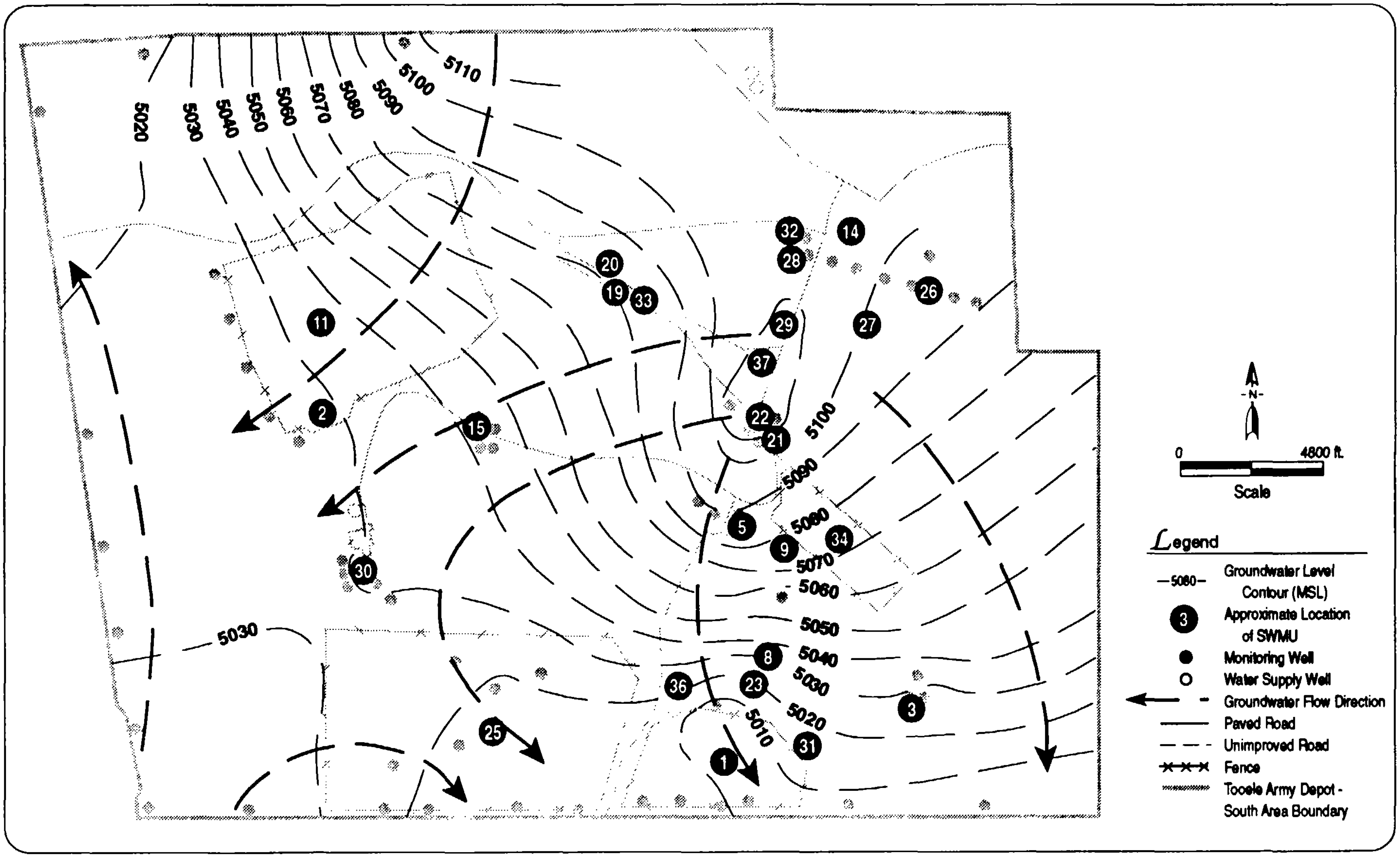


Figure 2.10-1
General Groundwater Flow Directions, July 1990
Tooele Army Depot - South Area
Prepared by: Ebasco Services Incorporated

EBASCO

southeast. Because SWMUs 14, 15, 28, 29, 30, and 32 are located very close to a line of groundwater divergence, the direction of flow away from these SWMUs may vary with changing water levels.

2.11 VEGETATION AND WILDLIFE

The climate of Rush Valley profoundly influences the flora and fauna in the vicinity of the TEAD-S. The lack of precipitation during the summer months limits plant life to drought resistant or tolerant species. Near the southwest corner of TEAD-S, vegetation is made up of alkaline-tolerant species. These plant types help define the ecological niches available to animal species. In general, the animals present at the site are hibernators, estivators, diurnals, or nocturnals, or have physiological adaptations that enable them to survive drought, heat, cold, and snow.

TEAD-S is an Artemisia Biome characterized by sagebrush and saltbrush. A few trees and shrubs have been planted near the northeast entrance for landscaping the administrative area and abandoned residential areas. Halogeton, a toxic plant, occurs across the site.

The vicinity of TEAD-S is inhabited by a wide variety of animal species, including nine species of lizard and the Great Basin gopher snake. Mammals in the area include the mule deer, antelope, wapiti (elk), fox, bobcat, rabbit, rodents, and coyotes. A wide variety of birds inhabit the TEAD-S area, including migrant, winter resident, summer resident, and permanent resident birds.

Two threatened or endangered species are known to occur in the vicinity of TEAD-S: the bald eagle and the peregrine falcon. The bald eagle habitat in the area is considered critical. It encompasses an extensive area in Utah, including TEAD-S. The area needed by the bald eagle to roost, hunt, live without disruption, and find shelter is relatively large and encompasses many smaller habitats. Peregrine falcons have been sighted in the area. The range of peregrine falcons has been shrinking due to housing and agricultural pressure. Its prey is being depleted by the use of pesticides and rodenticides.

There is no hunting allowed at TEAD-S (USATHAMA 1979), although fishing is permitted in the small pond located in the northeast corner of the site to the north of the main gate. Detailed information about the environmental setting of TEAD-S is available in the Draft Environmental Impact Statement for the disposal of chemical agents and munitions stored at TEAD (PMCD 1989).