5.15 SWMU 25: WEST DEMILITARIZATION AREA/DISPOSAL PITS

5.15.1 Site Description and Waste Generation

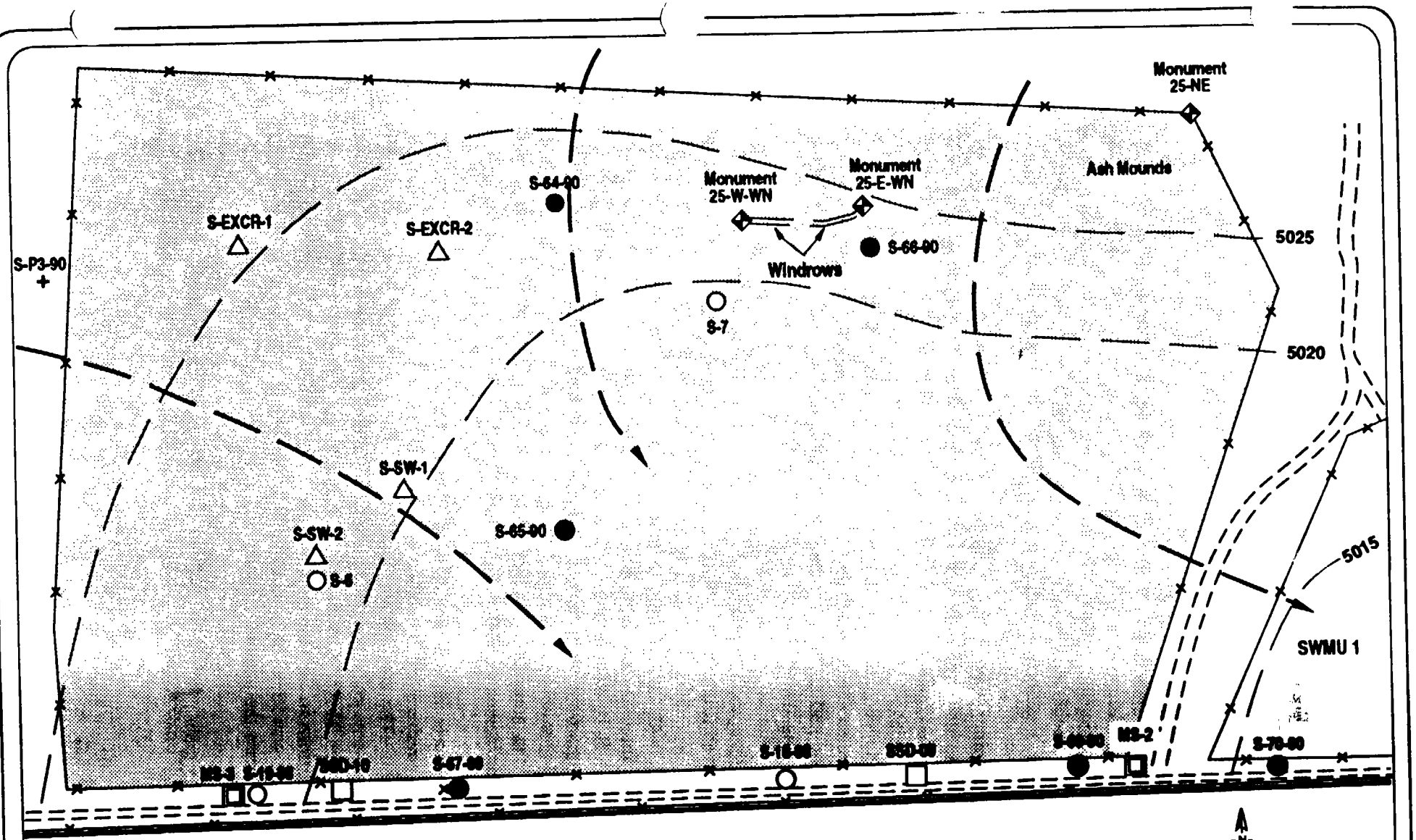
SWMU 25 occupies approximately 1,105 acres in the southwest portion of TEAD-S west of SWMU 1 (Figures 5.0-1 and 5.15-1). A variety of demilitarization and disposal activities were conducted at SWMU 25 from 1945 to 1978 (USAEHA 1986). The western part of SWMU 25 includes approximately 50 recently closed clusters of superimposed explosion craters, each cluster about 3.5 acres in area (EPIC 1986). NUS (1987) estimated one of the larger craters at 75 ft in diameter and 30 ft deep. Some of the explosion craters were deep enough to intersect the water table (USAEHA 1986). These pits were closed between 1987 and the time of the 1990 RFI-Phase 1 field program. The eastern part of SWMU 25 contains numerous covered munitions burning and disposal trenches (USAEHA 1986; NUS 1987).

Two piles of scrap munitions, referred to as windrows, are located in the north central portion of SWMU 25. Residual bomb and cluster parts from the demilitarization operations at SWMU 21 were piled in these windrows (USATHAMA 1979). According to USATHAMA (1979), the windrows contain tail sections of cluster bombs, cluster bars, nose plates, hangers, and fire bomb casings with M50-type thermate bombs. Some of the M50 bombs still contain live explosive charges.

The aerial Photography Interpretation Addendum (EPIC 1986) provided information on features visible in aerial photographs during 1952, 1959, and 1966. This study was a detailed analysis of an area referred to as the Burning/Burial Ground, including SWMUs 1, 8, 23, 25, 31, and 36. The features observed in the area now included in SWMU 25 are described below.

Only three trenches or possible burning areas are shown in a 1952 photograph of the eastern part of SWMU 25. By 1959, the eastern half of SWMU 25 contained numerous craters and large distributed areas of dark smudges possibly indicating burning. Thirty new trenches are seen in an area criss-crossed by roads. The windrow materials are visible in the 1959 photograph. By 1966, only three new trenches had been added (EPIC 1986).

In the northeast part of the site are two elongated mounds of unknown origin. The mounds are approximately 300 ft long, 40 ft wide, and 5 ft high (NUS 1987; EPIC 1986) and are composed of ash-like material interspersed with shrapnel and scrap metal (NUS 1987). A sign that reads "Danger, Buried Contaminated Chemical Munitions" is posted at the edge of one of the mounds (NUS 1987). At one time, TEAD-S personnel indicated that chemical agents had been burned and buried within the mounded areas (NUS 1987); however, a former employee (Barnes 1992) stated in an interview that only riot control agents were disposed of in SWMU 25. Residual material from the SWMU 22 settling basins was brought to the Demolition Area (SWMU 1 or SWMU 25) where it was burned and buried (USATHAMA 1979). Agent wastes and excess samples, possibly including mustard (H, HD, HT), AC, CK, and CG from the South Area



Source:
EBASCO Field Measurement
Basic Information Maps 1985
EA Engineering, Science, and Technology, Inc. 1988

Figure 5.15-1
Site Map
SWMU 25 - West Demilitarization Area/Disposal Pits
Tooele Army Depot - South Area
Prepared by: Ebasco Services Incorporated

EBASCO

Laboratory were also burned at the Demolition Grounds (SWMU 1 or 25) (USATHAMA 1979). During a site inspection, an area of stressed vegetation (approximately 1,000 ft by 500 ft) was noted between the eastern trenches and the windrows (NUS 1987).

5.15.2 Site Hydrogeology

SWMU 25 is located in a low-lying area in the southwestern part of TEAD-S. The elevation of the SWMU is approximately 5,045 ft above msl, with 10 ft vertical variations. The site is underlain by a Quaternary pediment and alluvial and playa deposits. Subsurface lithologic descriptions are from field boring logs (Appendix A) of monitoring wells located within or on the site perimeter (S-6, S-7, S-18-88, S-19-88, S-64-90, S-65-90, S-66-90, S-67-90, S-68-90) (Figure 5.15-1) and from sieve analyses of representative samples from the borings.

Surficial soil is loose, light olive gray to brown, sandy silt and silty clay (ML, CL) with a trace of organic material. Loose to stiff, light olive gray to dark brown, sandy silt and silty clay (ML, CL) make up most of the unsaturated zone. The thickness of the unsaturated zone varies from 15 to 50 ft. Silty sand beds with traces of clay and gravel (SW, SP, SM, SC) are also common. Fine- to coarse-grained sand (SW, SP) and silty gravel (GP) are interbedded with the silts and clays in the unsaturated zone in the northern part of SWMU 25 in wells S-65-90 and S-66-90. In well S-66-90, the thin sand and gravel beds were nearly saturated and are generally underlain by beds of dry clay, suggesting that this is a perched water table.

Based on bore log descriptions, the saturated zone was characterized from approximately 15 to 95 ft below ground surface and is composed of stiff to hard, light gray to dark brown sand, sandy silt, and silty clay (SW, SP, SC, SM, ML, CL). The screened interval was 10 ft in wells S-64-90, S-65-90, S-67-90, and S-68-90, from 24 to 34, 15 to 25, 26 to 36, and 52 to 62 ft, respectively. The screened interval for Well S-66-90 was from 84 to 94 ft. Twenty-foot screens were used in wells S-6, S-7, S-18-88, and S-19-88, from 15 to 35, 32 to 52, 16 to 36, and 13 to 33 ft, respectively. One upgradient monitoring well was installed north of the cratered area (S-64-90). Four downgradient monitoring wells were installed, two south of the cratered area (S-65-90, S-66-90), and two at the southern TEAD-S boundary (S-67-90, S-68-90). These wells complement existing downgradient wells S-6, S-7, S-18-88, and S-19-88.

The groundwater potentiometric surface averages 25 ft from ground surface and varies from 38 ft at well S-68-90 in the southeastern corner of the SWMU to 15 ft at well S-6 in the west central part of the SWMU. The elevation of this surface averages 5,020 ft msl. Based on groundwater level measurements collected during the RFI-Phase I, groundwater flows south and southeast (Plate 3) and leaves TEAD-S at the southern boundary. This groundwater appears to occur under confined conditions in the eastern half of the SWMU. For example, in well S-66-90, the first water-bearing zone was found at a depth of 87 to 89 ft; however, water rose in the well to a depth of about 35 ft from the ground surface.

5.15.3 Previous Sampling and RFI-Phase I Sampling Results

Prior to the RFI-Phase I, two soil samples were collected south of SWMU 25 at the TEAD-S southern boundary, and four surface water samples were collected from two craters and two ditches in the west central part of the site. The soil samples were analyzed for explosives, metals, anions, and radionuclides. The surface water samples were analyzed for volatile and semivolatile organic compounds, explosives, metals, anions, and radionuclides. Groundwater samples were also collected from four monitoring wells. These groundwater samples were analyzed for volatile and semivolatile organic compounds, agent breakdown products, explosives, metals, anions, and radiological parameters. Detections in these previously collected samples are presented in Table 5.15-1.

During the same time period as the RFI-Phase I, the TEAD Ammunition Equipment Directorate (TEAD-AED) collected samples from the SWMU 25 windrows and slag piles to determine whether the demilitarization residue was a hazardous waste. The results of this sampling were included in a workplan that recommended additional sampling and analysis (TEAD-AED 1990). The TEAD-AED samples were collected from the top, middle, and bottom of the wastes and were analyzed for EP toxicity, 11 explosives, and solvents. None of the samples from the windrows and slag piles exhibited EP toxicity and no explosives were detected (Table 5.15-2). Low concentrations of solvents were detected in two out of six samples collected from the windrows and also in samples from the slag piles, but these results were not provided. TEAD-AED recommended that a minimum of ten additional samples be collected from the windrows to confirm these results.

During the RFI-Phase I, five additional monitoring wells were installed in SWMU 25, including one upgradient well (S-64-90), two south of the cratered area (S-65-90 and S-66-90), and two along the southern border (S-67-90 and S-68-90). Previously installed and newly installed monitoring wells were sampled, and these samples were analyzed for the full suite of groundwater analytes listed in Table 3.10-3, Section 3.10.10. The samples from wells S-19-88 and S-66-90 were analyzed for anions after the holding times for these samples had expired. Detections in the samples collected during the RFI-Phase I are presented in Table 5.15-3. Previous and RFI-Phase I sampling locations, detected compounds, and their associated concentrations are illustrated in Figures 5.15-2 through 5.15-6.

5.15.4 Contamination Assessment

In the two soil samples collected at the southern edge of the site, only nickel was detected above background levels. The surface water concentrations of inorganic analytes such as arsenic, chromium, copper, lead, zinc, fluoride, bromide, chloride, and sodium were generally similar to or lower than concentrations in other groundwater samples from the same area. Elevated concentrations of lead in surface water samples S-SW-1 and S-SW-2 are an exception and suggest a local-near surface source of lead. No organic analytes were detected in surface water samples.

TABLE 5.15-1 **Summary of Previous Analytical Investigations for SWMU 25: West Demilitarization Area/Disposal Pits**

Analytical Groups and Analytes Detected	SOIL (µg/g) SSD-09 (0.5 - 1.0 ft) 1988	SOIL (µg/g) SSD-10 (0.5 - 1.0 ft) 1988	SURFACE WATER (µg/l) S-EXCR-1 1987	SURFACE WATER (µg/l) S-EXCR-2 1987	SURFACE WATER (µg/l) S-SW-1 1982	SURFACE WATER (µg/l) S-SW-2 1982
Volatile Organics:	LT (u)	LT (u)				
Toluene (MEC6H5)			LT (u)	LT (u)	NA	NA
Semivolatile Organics:						
Bis (2-ethylhexyl) phthalate (B2EHP)	LT (u)	LT (u)	LT (3.0)	LT (3.0)	NA	NA
Butylbenzyl phthalate (BBZP)	LT (u)	LT (u)	LT (3.0)	LT (3.0)	NA	NA
2-Methylphenol (2MP)	LT (u)	LT (u)	LT (u)	LT (u)	NA	NA
Unknowns[c]						
Agent Breakdown Products:	NA	NA			NA	NA
Isopropylmethyl phosphonic acid (IMPA)			NA	NA		
Explosives:						
2,4-Dinitrotoluene (24DNT)	LT (0.42)	LT (0.42)	LT (2.2)	LT (2.2)	LT (u)	LT (u)
2,4,6-Trinitrotoluene (246TNT)	LT (1.9)	LT (1.9)	LT (6.3)	LT (6.3)	LT (1.0)	LT (1.0)
Metals (total or total/dissolved):						
Antimony (Sb)	LT (25)	LT (25)	LT (7.0)	LT (7.0)	NA	NA
Arsenic (As)	LT (5.7)	LT (5.7)	70 (2.5)	30 (2.5)	18 (4.0)	100 (4.0)

c The identity or concentrations of these compounds cannot be conclusively determined and reporting limits have not been established

NA Not analyzed

LT Less than

u Detection limit unavailable

( ) Detection limit

µg/g microgram per gram

µg/l microgram per liter

References: 1982 data - Ertec 1982
1987 data - EA Engineering 1988
1988 data - Weston 1991

Analytical Groups and Analytes Detected	SOIL (µg/g) SSD-09 (0.5 - 1.0 ft) 1988	SOIL (µg/g) SSD-10 (0.5 - 1.0 ft) 1988	SURFACE WATER (µg/l) S-EXCR-1 1987	SURFACE WATER (µg/l) S-EXCR-2 1987	SURFACE WATER (µg/l) S-SW-1 1982	SURFACE WATER (µg/l) S-SW-2 1982
Metals (total or total/dissolved), Cont'd:						
Barium (Ba)	NA	NA	31 (3.4)	65 (3.4)	NA	NA
Beryllium (Be)	LT (0.33)	LT (0.33)	LT (0.83)	LT (0.83)	LT (0.40)	2.6 (0.40)
Cadmium (Cd)	LT (0.70)	LT (0.70)	LT (12)	LT (12)	LT (u)	LT (u)
Chromium (Cr)	19 (3.5)	18 (3.5)	LT (11)	LT (11)	26 (20)	45 (20)
Copper (Cu)	21 (3.8)	22 (3.8)	LT (21)	LT (21)	9.0 (6.0)	23 (6.0)
Lead (Pb)	6.6 (4.8)	6.3 (4.8)	3.6 (1.5)	1.7 (1.5)	160 (30)	150 (30)
Mercury (Hg)	LT (0.10)	LT (0.10)	LT (1.1)	LT (1.1)	LT (u)	LT (u)
Nickel (Ni)	13 (4.8)	19 (4.8)	LT (65)	LT (65)	7.0 (4.0)	LT (4.0)
Selenium (Se)	LT (2.1)	LT (2.1)	LT (u)	LT (u)	NA	NA
Silver (Ag)	LT (0.65)	LT (0.65)	GT 4.0 (0.14)	2.3 (0.14)	LT (u)	LT (u)
Sodium (Na)	NA	NA	3,300,000 (450)	470,000,000 (450)	64,000 (1000)	4,400,000 (1000)
Thallium (Tl)	LT (7.9)	LT (7.9)	LT (1.7)	LT (1.7)	NA	NA
Zinc (Zn)	LT (52)	LT (52)	20 (14)	30 (14)	3.0 (3.0)	LT (3.0)
Anions:	NA	NA				
Bromide (Br)			300 (240)	GT 2000 (240)	NA	NA

NA Not analyzed
GT Greater than
LT Less than
u Detection limit unavailable
( ) Detection limit
µg/g microgram per gram
µg/l microgram per liter

References: 1982 data - Ertec 1982
1987 data - EA Engineering 1988
1988 data - Weston 1991

Analytical Groups and Analytes Detected	SOIL (µg/g) SSD-09 (0.5 - 1.0 ft) 1988	SOIL (µg/g) SSD-10 (0.5 - 1.0 ft) 1988	SURFACE WATER (µg/l) S-EXCR-1 1987	SURFACE WATER (µg/l) S-EXCR-2 1987	SURFACE WATER (µg/l) S-SW-1 1982	SURFACE WATER (µg/l) S-SW-2 1982
Anions, Cont'd:						
Chloride (Cl)			9,800,000 (75)	2,100,000,000 (75)	GT 34,000 (100)	21,000 (100)
Fluoride (F)			LT (360)	LT (360)	LT (1000)	2400 (1000)
Orthophosphate (PO_4ORT)			LT (57)	LT (57)	NA	NA
Sulfate (SO_4)			3,400,000 (4700)	2,300,000 (4700)	16,000 (1000)	GT 20,000 (1000)
Nitrite (NO_2)					LT (900)	LT (900)
Nitrate (NO_3)					1100 (1000)	LT (1000)
Nitrate-nonspecific (NIT)			60 (+24)	40 (+24)		
Radionuclides (pCi/g and pCi/l):						
Gross alpha (ALPHAG)	LT (v)	LT (v)	LT 160 (u)	LT 80 (u)	LT (3.0)	29±16 (3.0)
Gross beta (BETAG)	LT (v)	LT (v)	190±120 (u)	130±60 (u)	10±6.0 (u)	34±7.0 (u)
Uranium - Total (µg/g)	6.6 (v)	4.0 (v)	NA	NA	NA	NA
Uranium - 234	0.90±0.20 (v)	1.4±0.30 (v)	NA	NA	NA	NA
Uranium - 235	0±0.20 (v)	0.16±0.10 (v)	NA	NA	NA	NA
Uranium - 238	0.90±0.20 (v)	1.4±0.30 (v)	NA	NA	NA	NA

NA Not analyzed
GT Greater than
LT Less than
pCi/g picocuri per gram
pCi/l picocuri per liter
u Detection limit unavailable
v Detection limit for radionuclides varies for each sample
( ) Detection limit
µg/g microgram per gram
µg/l microgram per liter

References: 1982 data - Ertec 1982
1987 data - EA Engineering 1988
1988 data - Weston 1991

TABLE 5.15-1 **Summary of Previous Analytical Investigations for SWMU 25: West Demilitarization Area/Disposal Pits**

GROUNDWATER(µg/l)

Analytical Groups and Analytes Detected	S-18-88 1988	S-19-88 1988	S-6 1982	S-6 1987	S-6 1988	S-7 1982	S-7 1987	S-7 1988
Volatile Organics:								
Toluene (MEC6H5)	LT (5.0)	LT (5.0)	NA	8.0 (u)	LT (5.0)	NA	LT (u)	LT (5.0)
Semivolatile Organics:								
Bis (2-ethylhexyl) phthalate (B2EHP)	LT (10)	LT (10)	NA	LT (3.0)	LT (10)	NA	6.0[a] (3.0)	LT (10)
Butylbenzyl phthalate (BBZP)	LT (10)	LT (10)	NA	5.0[a] (3.0)	LT (10)	NA	7.0[a] (3.0)	LT (10)
2-Methylphenol (2MP)	LT (10)	LT (10)	NA	LT (u)	LT (10)	NA	5.0 (u)	LT (10)
Unknowns[c]								
Agent Breakdown Products:			NA			NA		
Isopropylmethyl phosphonic acid (IMPA)	16,000 (470)	LT (4,700)		NA	13,000 (470)		NA	LT (470)
Explosives:								
2,4-Dinitrotoluene (24DNT)	LT (0.60)	LT (10)	LT (u)	3.3 (2.2)	LT (10)	LT (u)	LT (2.2)	LT (0.60)
2,4,6-Trinitrotoluene (246TNT)	LT (0.80)	LT (0.80)	LT (1.0)	LT (6.3)	LT (0.80)	LT (1.0)	LT (6.3)	0.90 (0.78)
Metals (total or total/dissolved):								
Antimony (Sb)	8.5/11 (3.0)	7.4/9.2 (3.0)	NA	7.1 (7.0)	11/4.3 (3.0)	NA	LT (7.0)	8.4/LT (3.0)
Arsenic (As)	210/270 (5.0)	120/130 (5.0)	110 (4.0)	420 (2.5)	330/440 (5.0)	20 (4.0)	54 (2.5)	42/45 (5.0)

a Probably due to laboratory contamination
c The identity or concentrations of these compounds cannot be conclusively determined and reporting limits have not been established
NA Not analyzed

µg/l microgram per liter
LT Less than
u Detection limit unavailable
( ) Detection limit

References: 1982 data - Ertec,1982
1987 data - EA Engineering 1988
1988 data - Weston 1991

GROUNDWATER (µg/l)

Analytical Groups and Analytes Detected	S-18-88 1988	2-19-88 1988	S-6 1982	S-6 1987	S-6 1988	S-7 1982	S-7 1987	S-7 1988
Metals (total or total/dissolved), Cont'd:								
Barium (Ba)	NA	NA	NA	10 (3.4)	NA	NA	100 (3.4)	NA
Beryllium (Be)	1.0/LT (0.50)	LT (0.50)	LT (0.40)	LT (0.83)	LT (1.0)	LT (0.40)	LT (0.83)	3.0/LT (0.10)
Cadmium (Cd)	9.7/LT (5.1)	14/17 (5.1)	LT (u)	LT (12)	LT (5.1)	LT (u)	LT (12)	LT (5.1)
Chromium (Cr)	LT (38)	LT (38)	LT (20)	LT (11)	LT (38)	LT (20)	LT (11)	LT (38)
Copper (Cu)	8.4/4.7 (1.8)	4.1/4.7 (1.8)	LT (6.0)	LT (21)	11/8.9 (1.8)	LT (6.0)	90 (21)	4.7/3.1 (1.8)
Lead (Pb)	8.7/LT (2.5)	2.9/LT (2.5)	LT (30)	3.4 (1.5)	4.3/4.6 (2.5)	LT (30)	4.9 (1.5)	4.0/LT (2.5)
Mercury (Hg)	LT (0.20)	LT (0.20)	LT (u)	LT (1.1)	0.50/LT (0.2)	LT (u)	LT (1.1)	LT (0.20)
Nickel (Ni)	21/LT (9.6)	LT (9.6)	LT (4.0)	LT (65)	LT (9.6)	11 (4.0)	LT (65)	LT (9.6)
Selenium (Se)	17/18 (5.0)	90/110 (5.0)	NA	LT (u)	LT (50)	NA	LT (u)	LT (5.0)
Silver (Ag)	0.60/0.50 (0.19)	0.50/0.40 (0.19)	LT (u)	GT 4.0 (0.14)	2.1/LT (0.19)	LT (u)	1.7 (0.14)	2.2/1.5 (0.19)
Sodium (Na)	NA	NA	5,200,000 (1000)	5,700,000 (450)	NA	2,100,000 (1000)	2,000,000 (450)	320,000/2,800,000
Thallium (Tl)	LT (5.0)	LT (4.7)	NA	LT (1.7)	LT (5.0)	NA	3.2 (1.7)	LT (4.7)
Zinc (Zn)	1100/470 (17)	420/1100 (17)	2.0 (3.0)	30 (14)	35/18 (17)	12 (3.0)	120 (14)	20/LT (17)

NA Not analyzed
GT Greater than
LT Less than
u Detection limit unavailable
( ) Detection limit
µg/l microgram per liter

References: 1982 data - Ertec 1982
1987 data - EA Engineering 1988
1988 data - Weston 1991

GROUNDWATER (µg/l)

Analytical Groups and Analytes Detected	S-18-88	S-19-88	S-6			S-7		
	1988	1988	1982	1987	1988	1982	1987	1988
Anions:								
Bromide (Br)	LT (130,000)	LT (130,000)	NA	390 (240)	LT (50)	NA	700 (240)	LT (50)
Chloride (Cl)	23,000,000 (75)	4,300,000 (75)	GT 17,000 (100)	12,000,000 (5000)	11,000,000 (75)	GT 17,000 (100)	4,400,000 (5000)	4,900,000 (75)
Fluoride (F)	NA	NA	2700 (1000)	1500 (360)	LT (100)	1800 (1000)	600 (360)	LT (50)
Orthophosphate (PO_4 ORT)	NA	NA	NA	180 (57)	NA	NA	80 (57)	NA
Sulfate (SO_4)	670,000 (130,000)	2,300,000 (130,000)	GT 19,000 (1000)	4,500,000 (4700)	4,400,000 (130,000)	GT 19000 (1000)	420,000 (4700)	770,000 (130000)
Nitrite (NO_2)			LT (900)			LT (900)		
Nitrate (NO_3)			LT (1000)			12000 (1000)		
Nitrate-nonspecific (NIT)	LT (5000)	LT (5000)		110 (+24)	LT (5000)		18,000 (+24)	LT (5000)
Radionuclides (pCi/l):								
Gross Alpha (ALPHAG)	**LT 110 (v)**	**LT 96 (v)**	**LT (3.0)**	**250±150 (u)**	**200±160 (v)**	**LT (3.0)**	**LT 65 (u)**	**LT 91 (v)**
Gross Beta (BETAG)	**87±52 (v)**	**82±44 (v)**	**31±7.0 (6.0)**	**LT 180 (u)**	**LT 130 (v)**	**17±6.0 (6.0)**	**LT 73 (u)**	**LT 63 (v)**
Uranium - Total	**27 (v)**	**8.9 (v)**	**NA**	**NA**	**40 (v)**	**NA**	**NA**	**6.2 (v)**

NA Not analyzed
GT Greater than
LT Less than
pCi/l picocurie per liter
u Detection limit unavailable
v Detection limit for radionuclides varies for each sample
( ) Detection limit
µg/l microgram per liter

References: 1982 data - Ertec 1982
1987 data - EA Engineering 1988
1988 data - Weston 1991

TABLE 5.15-2 **TEAD-AED Analytical Results for SWMU 25: Windrows and Ash Piles**

Analytical groups and Analytes Detected	A-West Bottom EP 12	A-Middle Bottom EP 13	A-East Bottom EP 14	B-West Top EP 8	B-East Mid EP 9	C-West Top EP 7	C-Middle Bottom EP 10	C-East Mid EP 11	D-West Top EP 6	D-East Mid EP 5
EP Toxic Metals (mg/l):										
Arsenic (As)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Barium (Ba)	80.34	2.05	32.72	25.46	52.7	12.46	5.49	48.5	90.92	21.34
Cadmium (Cd)	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.02
Chromium (Cr)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Lead (Pb)	0.01	0.01	0.01	0.01	0.01	2.33	0.01	0.01	0.01	0.01
Mercury (Hg)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Selenium (Sc)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Silver (Ag)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
pH:	9.7	9.3	9.8	9.8	9.8	9.5	9.4	10.4	10	9.5

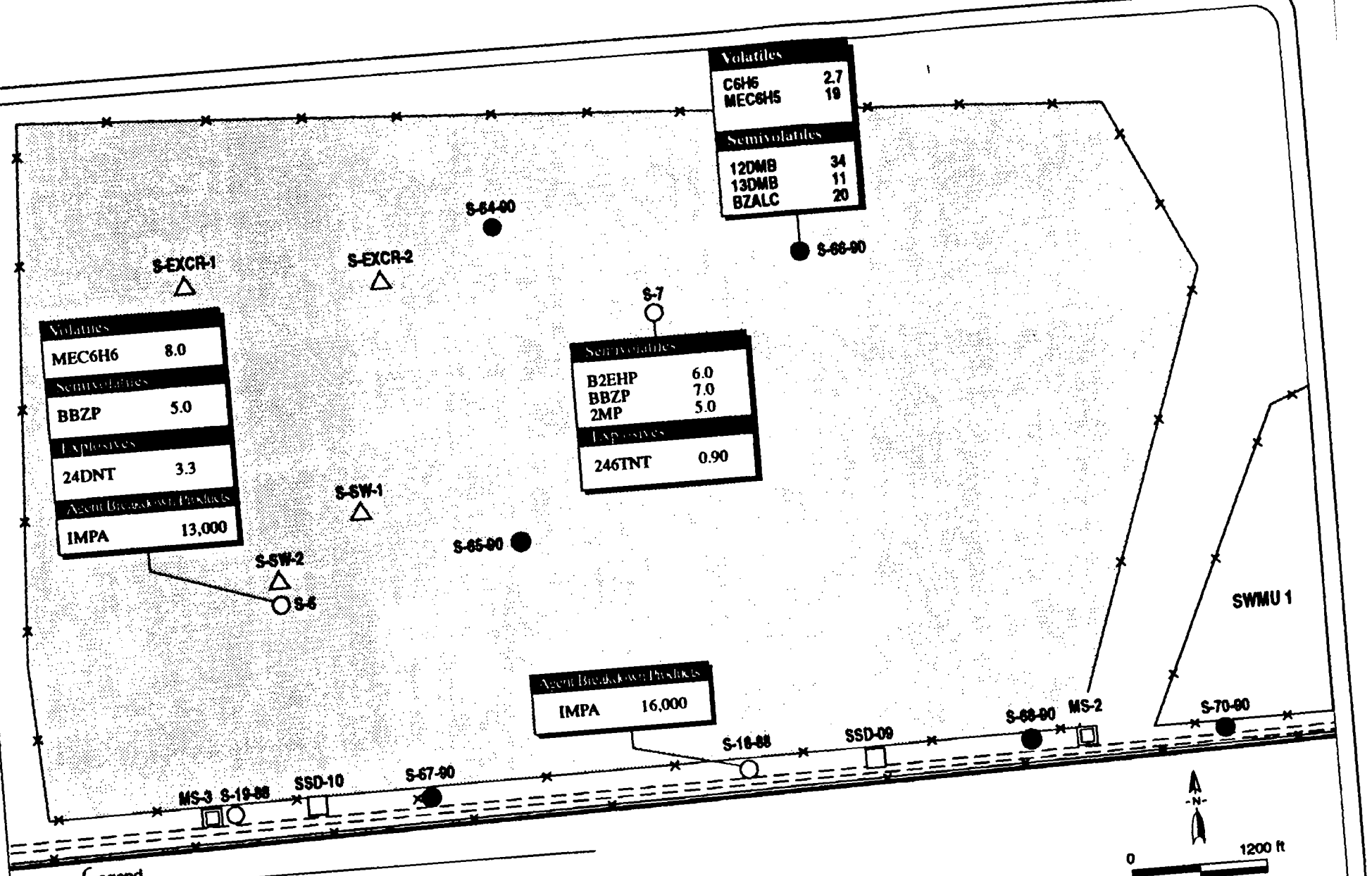
mg/l Milligram per liter

TABLE 5.15-3 **Summary of RFI-Phase I Investigations for SWMU 25: West Demilitarization Area/Disposal Pits**

GROUNDWATER (µg/l)

Analytical Groups and Analytes Detected	S-18-88	S-19-88	S-6	S-7	S-64-90	S-65-90	S-66-90	S-67-90	S-68-90
Volatile Organics:									
Benzene (C6H6)	LT 2.4	LT 2.4	LT 2.4	LT 2.4	LT 2.4	LT 2.4	2.7	LT 2.4	LT 2.4
Toluene (MEC6H5)	LT 8.7	LT 8.7	LT 8.7	LT 8.7	LT 8.7	LT 8.7	19	LT 8.7	LT 8.7
Unknowns							83		
Semivolatile Organics:									
1,2-Dimethylbenzene (12DMB)	NA	NA	NA	LT 2.0	LT 2.0	NA	34	NA	NA
1,3-Dinitrobenzene (13DNB)	NA	NA	NA	LT 2.0	LT 2.0	NA	11	NA	NA
Benzyl alcohol (BZALC)	LT 10	LT 10	LT 10	LT 10	LT 10	LT 10	20	LT 10	LT 10
Unknowns			6.0					5.0	
Metals:									
Arsenic (As)	140	180	420	48	72	180	53	450	160
Copper (Cu)	LT 8.1	LT 8.1	26	LT 8.1	LT 8.1	LT 8.1	LT 8.1	LT 8.1	LT 8.1
Lead (Pb)	LT 3.8	1.6*	LT 2.5	2.2	LT 3.8	2.1	LT 1.3	4.2*	2.7
Mercury (Hg)	LT 0.24	LT 0.24	LT 0.24	LT 0.24	LT 0.24	LT 0.24	LT 0.24	LT 0.24	0.67
Selenium (Se)	LT 9.1	120	51	LT 3.0	32	LT 3.0	LT 3.0	13	21
Sodium (Na)	5,700,000	1,600,000	5,000,000	2,000,000	5,700,000	2,300,000	1,400,000	6,700,000	2,500,000
Anions:									
Bromide (Br)	**4,800**	**2,900**	**6,300**	**5,300**	**11,000**	**2,900**	**2,400**	**6,000**	**2,500**
Chloride (Cl)	**12,000,000**	**4,800,000**	**11,000,000**	**5,200,000**	**15,000,000**	**4,900,000**	**3,600,000**	**10,000,000**	**3,000,000**
Fluoride (F)	**55,000**	**LT 140,000**	**LT 360,000**	**LT 360,000**	**LT 360,000**	**LT 14,000**	**14,000**	**LT 3,600**	**LT 14,000**
Radionuclides (pCi/l):									
Gross alpha (ALPHAG)	710*	LT 0.10	57	14	300	65	130	630*	580
Gross beta (BETAG)	LT 0.30	150	220	120	390	220	LT 0.30	LT 0.30	480
Uranium (U)	42	7.6	4.2	5.7	8.8	4.3	12	34	8.5

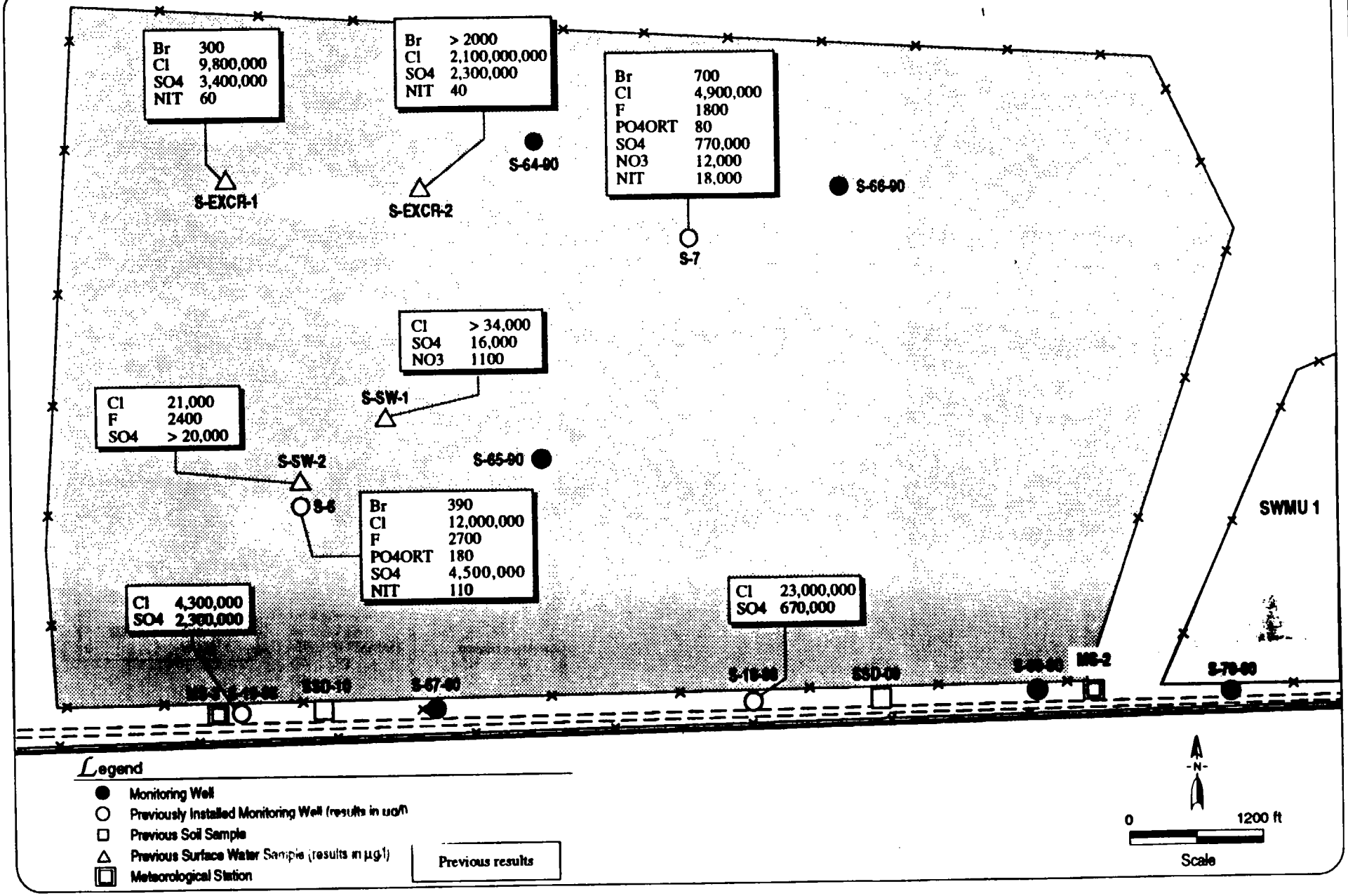
* Detected in associated method blank
NA Not analyzed
LT Less than
pCi/l Picocurie per liter
µg/l Microgram per liter



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

Figure 5.15-2
SWMU 25 - West Demilitarization Area/Disposal Pits
Organics and Explosives

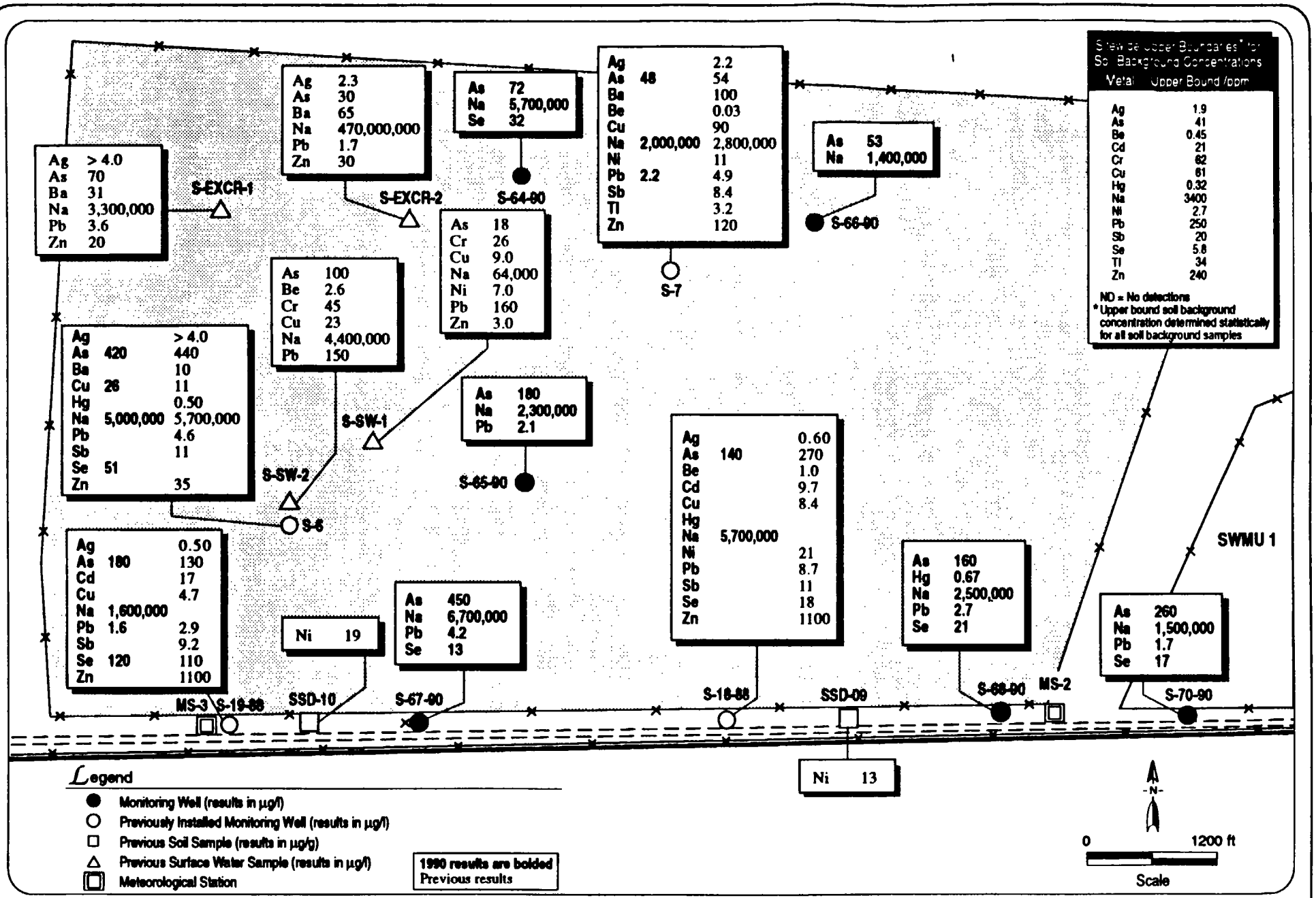
EBASCO



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

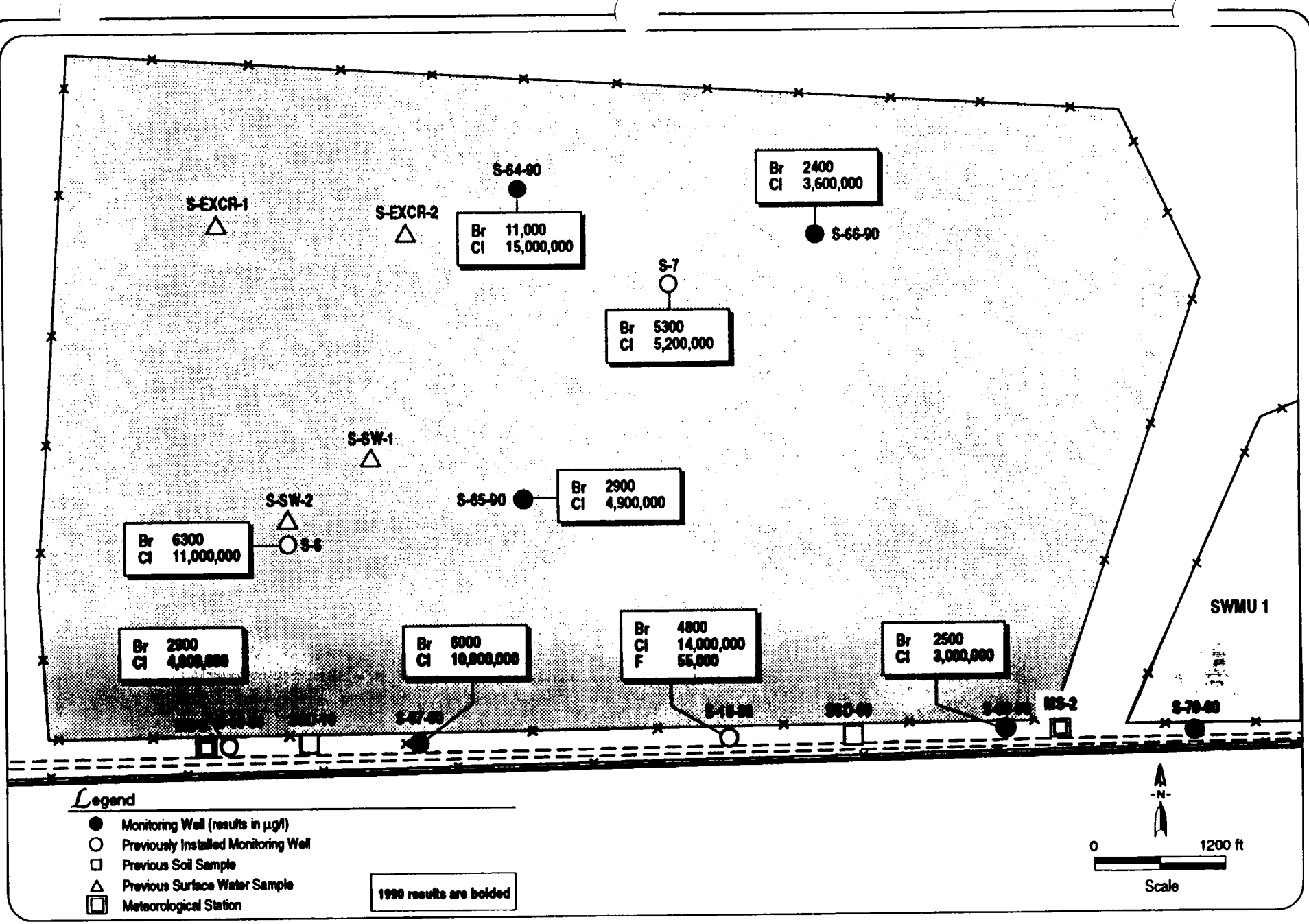
Figure 5.15-3
SWMU 25 - West Demilitarization Area/Disposal Pits
Inorganics - Previous

EBASCO



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

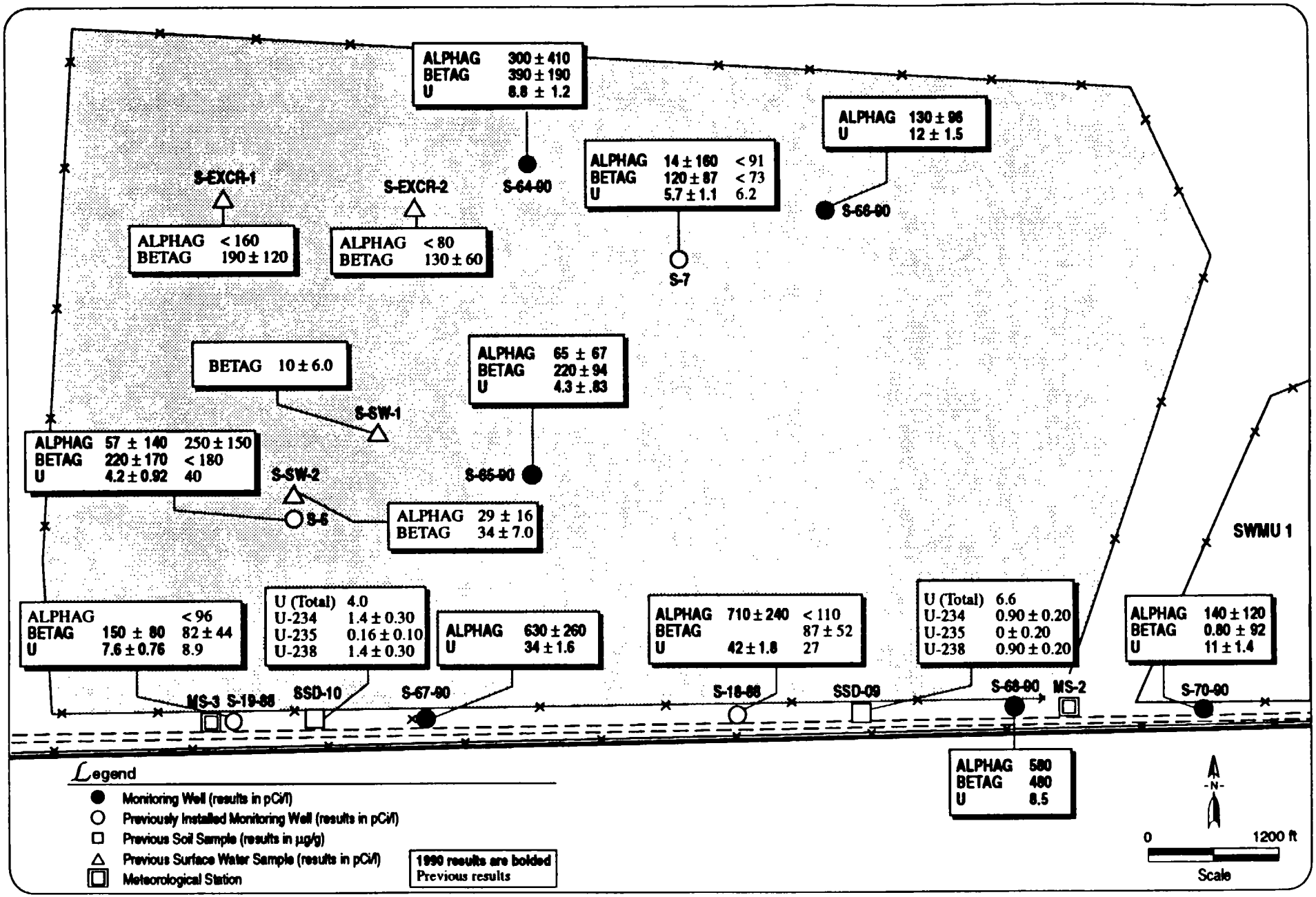
Figure 5.15-4
SWMU 25 - West Demilitarization Area/Disposal Pits
Metals



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

Figure 5.15-5
SWMU 25 - West Demilitarization Area/Disposal Pits
Anions

EBASCO



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

Figure 5.15-6
SWMU 25 - West Demilitarization Area/Disposal Pits
Radionuclides

Toluene, phthalates, 2,4-dinitrotoluene, and IMPA were previously detected at monitoring well S-6. Phthalates, 2-methyl-phenol, and a very low level of 2,4,6-trinitrotoluene were previously detected at well S-7. IMPA was previously detected at monitoring well S-18-88, at the southern SWMU 25 boundary, by a method that was not USATHAMA certified. The phthalates are probably related to rubber gloves or plastics used in the well casings or in sampling or laboratory analytical equipment. The other compounds may be a result of open burning and open detonation in the cratered area. However, none of these compounds were detected in the same wells during the RFI-Phase I or in new monitoring well S-66-90, also installed downgradient from the cratered area. The RFI-Phase I detection limit for IMPA in well S-66-90 was 1000 µg/l, well below the previously detected level of 13,000 µg/l. The previous agent breakdown product analytical method was designated method 99 by USATHAMA, indicating that the results may have failed USATHAMA QA/AC protocols.

During the RFI-Phase I, fuel-related organic compounds such as 1,2-dimethyl benzene, 1,3-dimethylbenzene, benzene, toluene, and benzyl alcohol were detected in a sample from monitoring well S-66-90. This well is located just downgradient of the windrows, where the depth to groundwater is approximately 30 ft. These detections are attributed to the use of fuels for incinerating the munitions and munitions fragments in the windrows. Toluene and benzyl alcohol were previously detected in downgradient wells located along the southern boundary of SWMU 1, suggesting either a similar use of fuels in SWMU 1 or migration of these contaminants from SWMU 25.

Inorganic groundwater quality data from each well were compared to concentrations typical of the water quality zone in which the well was located to determine which analytes occurred at elevated concentrations. Wells located in the north and central portion of SWMU 25 are located in zone II, and wells in the southwestern portion of SWMU 25 are in zone III. Inorganic constituents in both of these zones exhibit a wide range of concentrations, especially in zone III.

Arsenic was elevated in wells in and bordering zone III. Selenium was detected at an elevated concentration in well S-19-88 in the southwestern corner of the site. Since this well is not downgradient from parts of the site that are expected to be contaminant sources, and considering the large natural concentration variations in this groundwater quality zone, the high selenium is not believed to indicate a contaminant source in SWMU 25.

Bromide was detected at elevated levels in wells S-7 and S-64-90 in north central SWMU 25. Sodium and chloride were also elevated in this area (well S-64-90). This portion of the site has been included in zone II but is near zone III; therefore, these anion levels may be appropriate for the general location. Chromium was previously measured once at an elevated concentration, but the high level has not been confirmed by subsequent sampling. Gross beta radiation was detected at an elevated level in well S-64-90. Because this is an upgradient well and because of its proximity to zone III where higher gross beta radiation concentrations are expected, this is not considered to indicate contamination.

5.15.5 Recommendations

A Phase II program is recommended at SWMU 25 in the formerly cratered area, in the windrows area, at the ash mounds, and in the area of munitions disposal pits (Figure 5.15-7). Phase I and Phase II data collected in these areas should be used in a human health and ecological risk assessment. For this risk assessment, present and reasonably expected future uses of the area should be researched. Habitat mapping and key species identification begun site-wide as part of the RFI-Phase II for known releases units will be expanded for the SWMU 25 risk assessment.

Because of the multiple sources in this SWMU, all existing and proposed Phase II monitoring wells should be sampled for volatile and semivolatile organics, explosives, agent breakdown products, anions, and metals. Slug tests are recommended in all Phase I and Phase II wells for estimating migration rates of any detected groundwater contaminants. A limited air monitoring program is also recommended because of the nature of the multiple sources.

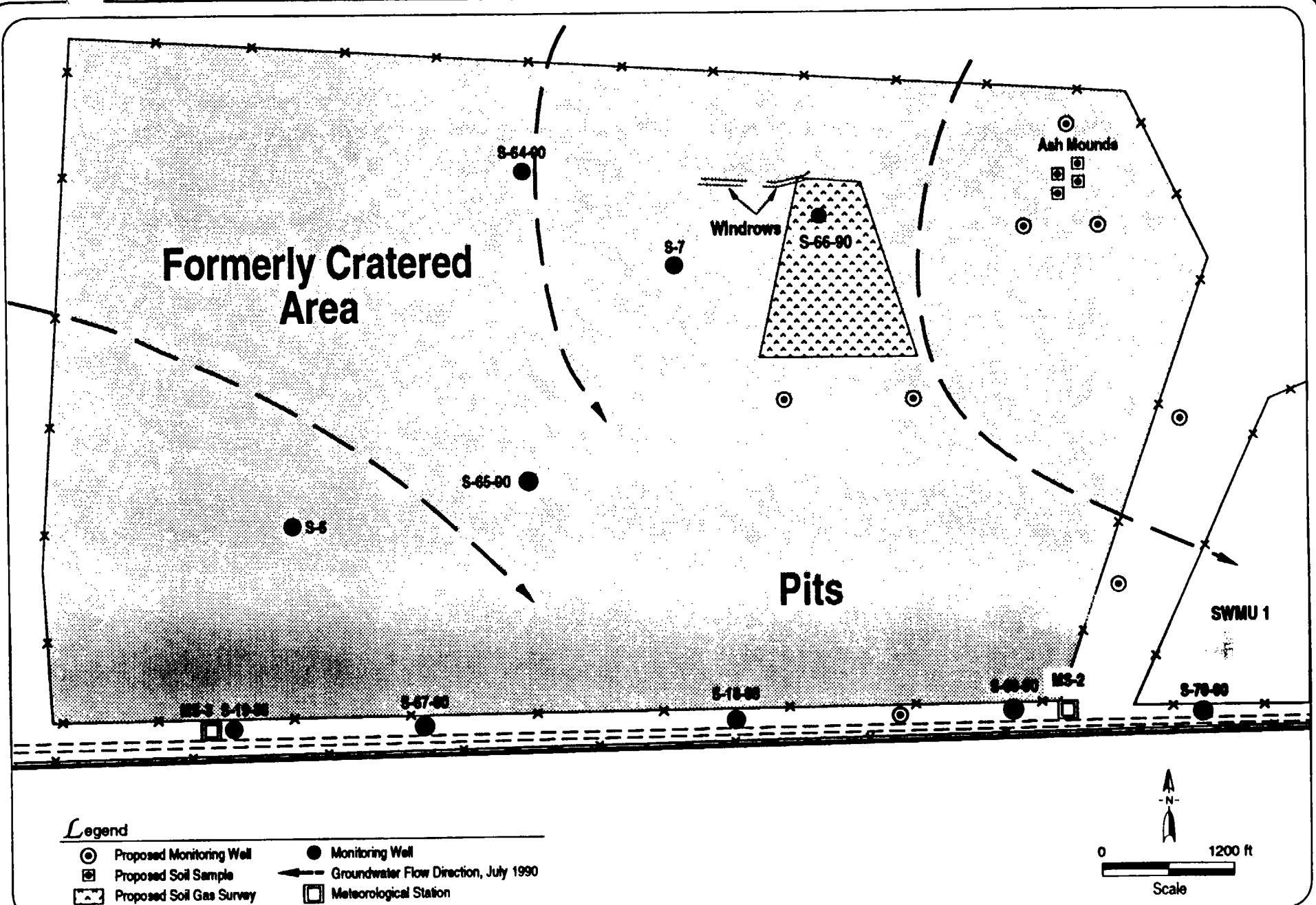
In the windrows area, an interim measure to clean up the munitions debris is already being prepared (TEAD-AED 1990). In addition, soil and soil gas sampling and installation of two additional downgradient groundwater monitoring wells are recommended to investigate the extent of fuel-related compounds detected in samples from well S-66-90. Soil gas samples in this area should be analyzed for benzene, toluene, and xylenes.

Samples in and below the ash mounds are recommended to be collected from two borings. The samples should be collected at the 0- to 2-inch, 6- to 12-inch, and 2- to 3-ft depth intervals. If the ash mounds extend deeper than about 2 ft, the 2- to 3-ft samples should be collected from soil beneath the ash. One upgradient and two downgradient wells are recommended to monitor groundwater in this area. All ash, soil, and water samples should be analyzed for organics, explosives, agent breakdown products, and metals.

In the southeastern part of this SWMU, munitions disposal pits similar to those found in SWMU 1 should be inventoried, excavated, and sampled to detect any contaminant releases. Surficial soil samples should also be collected in the vicinity of the disposal pits and analyzed for organics, PCBs, explosives, agent breakdown products, and metals. This disposal pit investigation should be conducted as outlined for SWMU 1 in Section 5.1.5. Two new monitoring wells are suggested between SWMUs 1 and 25 to help determine whether contaminants from these disposal pits or upgradient SWMU 25 sources are entering SWMU 1 groundwater.

Monitoring wells should also be installed in the southeast corner of SWMU 25 to detect possible migration of groundwater contaminants along the southern boundary of the installation.

In the formerly cratered area, monitoring well resampling, air monitoring, ecological habitat mapping, and explosive risk determination will be conducted as part of the SWMU 25 Phase II program.



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

Figure 5.15-7
SWMU 25 - West Demilitarization Area/Disposal Pits
Proposed Sampling Locations

EBASCO

Sporadic detections of low concentrations of 2,4,6-trinitrotoluene, toluene, IMPA, phthalates, and 2-methyl-phenol will be re-evaluated after groundwater resampling in Phase II.