DEPARTMENT OF THE ARMY
PINE BLUFF ARSENAL
PINE BLUFF, AR 71611

TECHNICAL MEMORANDUM # 20

OLD CHEMICAL MANUFACTURING SITE (AREA 5) CONTAMINATION SURVEY

WENDELL L. FORTNER
THOMAS E. SHOOK

12 May 1980

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TECHNOLOGY SUPPORT DIVISION
DIRECTORATE OF ENGINEERING & TECHNOLOGY

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APPROVED: _____
THOMAS E. SHOOK, Environmental Coordinator

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JOE G. JANSKI, PE, Director, Engineering & Technology

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1. ACKNOWLEDGEMENTS:

The authors acknowledge the contributions of USATHAMA, Glen E. Murtha, Richard Raburn, H. G. Deadman, Steve Lowrey, and Kenneth Mazander.

2. SUMMARY:

This survey has identified extensive contamination (arsenic, mercury, DDT, barium, lead, zinc, mustard and lewisite) of buildings, sewers and grounds in the old chemical manufacturing site (Area 5) at Pine Bluff Arsenal. The site and its buildings were used by the Government in 1942-43 to manufacture and fill mustard and lewisite munitions and by industry to manufacture DDT and chlorobenzene from 1950-1969.

A survey of Phillips Creek which drains the old chemical manufacturing site indicates that arsenic and DDT have migrated to the Arkansas River. A DDT clean-up and containment project was conducted by Pine Bluff Arsenal in 1975-1976 which cut off the major source of the 1950-1969 contamination (DDT) entering the Arkansas River through Phillips Creek. A MCA-83 project to contain hazardous chemical residue (T14200) has been staffed by PBA through ARRCOM and DARCOM which will construct sediment retention basins (SRB) that will contain the arsenic and other insoluable contaminants from the 1942-43 Area 5 production. However, a PBA MCA-83 project to demolish the source of contamination (the old contaminated buildings) at the site was rejected by ARRCOM. ARRCOM stated that future uses for the site should include the building demolition. However, the environmental impact, shown by this survey, of the Area 5 contaminated buildings indicates that the demolition of these buildings should not await other actions. The task is environmentally important and should be addressed by USATHAMA. USATHAMA's charter in the area is not clear since the proposed and existing SRB's will stop the off-post migration. The unsightly and unsafe source of hazardous contamination (Area 5 buildings) remains exposed to wildlife (birds, deer, etc.) at Pine Bluff Arsenal and should be removed. It is recommended that the responsible agency be identified for the destruction and removal of the building and sewers and that the contaminated waste be placed in a hazardous landfill (MCA-84 submission).

3. OBJECTIVES:

The objective of this survey was to determine the extent and location of contamination in the old abandoned chemical manufacturing site (Area 5) at Pine Bluff Arsenal.

4. INTRODUCTION.

The old chemical manufacturing site (Fig. 1-1), was used in 1942-43 for the manufacture and filling operations of mustard (H) and Lewisite (L) 1/. In support of the H and L operations, chlorine and arsenic trichloride were manufactured in the area. DDT and chlorobenzene were manufactured in the area from 1959 - 1969 by the Pine Bluff Chemical Co. (later, Niagara Chemical Company). All of the buildings, surrounding grounds, sewers and drainage ditches/creeks were contaminated during these operations. The initial survey in the area was conducted by PBA in 1974 where several hundred samples were taken on statistical grids of suspected contaminated areas and analyzed for both organic and inorganic contaminants. The 1974 survey showed a number of contaminants in the building (Table 1) and grounds. The gross contaminant in the subject area was DDT which had been discarded in large quantities during the manufacturing period. A DDT clean-up/storage and containment project was conducted by PBA in 1975-76 which constructed DDT sediment retention basins (SRB), removed high concentration DDT from the surfaces and placed the DDT in storage. In the 1978 and 1979 surveys, arsenic contamination was again found in the buildings and also in the drainage ditches/creeks. These surveys identified the old chemical manufacturing site as a major source of contamination found in Phillips Creek which empties into the Arkansas River. Therefore, in FY 79, USATHAMA and PBA conducted an intensive survey of the old chemical manufacturing site (Area 5) to determine the extent and location of contaminants in the site.

1/ Installation Assessment of Pine Bluff Arsenal Records Evaluation Report #113, August 1977, by D.A.Office of the Project Manager for Chemical Demilitarization & Installation Restoration, Aberdeen Proving Ground, MD 21010

5. DISCUSSION:

a. The old chemical manufacturing site (Area 5) and its drainage streams were surveyed to determine the type, extent and location of contamination from the site. All analytical analysis methods used were approved by USATHAMA's Analytical Systems working group (ASWG) and published by PBA, except the GC-MS scan method which was developed after the ASWG was discontinued by USATHAMA. Sediment and water samples were taken along Phillips Creek (Fig. 2) from the Arkansas River to the old chemical manufacturing site. The data indicated high concentrations of arsenic in the sediment and unfiltered water near the old chemical manufacturing site and the old mustard demilitarization area near the TSY. The arsenic level in the sediment at the junction of the Arkansas River and Phillips Creek was significantly higher than the up-river (EB-1) sediment sample (Fig. 2) These data indicate that sediment containing arsenic is entering the Arkansas River from the old chemical manufacturing site through Phillips Creek.

b. Survey of Building Contamination: Twelve buildings were sampled at several locations and the samples analyzed for arsenic, mercury, mustard, DDT, nitrogen mustard, thiodiglycol and organic compounds (GC-MS). The data are reported in Tables 2 - 10, which report high concentrations of arsenic, mercury and DDT in all of the building. Mustard (120 ppb) was found in only one sample (A-5021) in Building 54-140. The GC-MS scan reports a positive identification of lewisite in four samples (A-5022, A-5023, A-5024, and A-5027), from Building 54-140 and a CN-like compound in three samples (A-5022, A-5023 and A-5025) from Building 54-140 and one sample (A-5058) from Building 54-280. The GC-MS scan also identified the presence of an unknown organic compound, which had a group of peaks with 85 as the base ion, in three samples (A-5022, A-5023 and A-5027) from Building 54-140, two samples (A-5030 and A-5031) from Building 54-260, one sample (A-5058) from Building 54-280, one sample (A-5046) from Building 54-350, two samples (A-5036 and A-5037) from Building 54-360 and one sample (A-5013) from Building 54-440. The identification of this unknown organic was beyond the scope and funding of the survey. Thiodiglycol and nitrogen mustard were not present in any of the samples analyzed during the survey. Buildings (54-290, 54-291, 54-292 and 54-293), used to store arsenic trichloric had previously been sampled and analyzed for arsenic. The combined residue from these buildings contained 12,000,000 ppb arsenic. These buildings were sealed and further sampling was not considered necessary. These buildings contain the skeletons of pigeons and other birds who came to roost and never left. All of the buildings in this survey area have been fenced and signs posted to warn personnel of the hazards; however, wildlife (i.e., deer and birds) are exposed to the contaminants of these buildings. Rainwater continues to flush the contaminants from the buildings into Phillips Creek which empties into the Arkansas River.

c. Survey of Soil Samples around the Area 5 Buildings: A soil core was taken from each side of each of the buildings in the old chemical manufacturing site (Figs. 3-1 & 3-2). Three samples from each core (surface, 0'-5', & 5'-10') were extracted and analyzed for arsenic, mercury, mustard and DDT. The results of the analyses are reported in Tables 11 - 20. Arsenic contamination was found in core samples around all buildings

(6,000 - 3,800,000 ppb) except Buildings 54-140, 54-420 and 54-440. Mercury contaminated soil was found around all of the buildings with a range of 180 - 20,100 ppb. No mustard contamination was found in the soil samples. DDT contamination was found around all buildings at all three levels ranging from 270 ppb to 13,000,000 ppb.

d. Survey of Sewer Lines (both Industrial & Contaminated): Both industrial and contaminated sewer lines were excavated and samples taken at points marked on the sewer line map (Figs. 3-1 & 3-2). The data are reported in Tables 21 - 24. A GC-MS scan was run on all liquid samples and arsenic, mercury, mustard and DDT analysis were run on all solid/sediment samples. Arsenic was found in both industrial and contaminated sewer samples ranging from 0 - 2,400,000 ppb. The mercury contamination ranged from 0 - 8,000,000 ppb. No mustard was found in any of the sewer samples. The DDT contamination ranged from 0 - 5,500,000 ppb.

6. RECOMMENDATIONS AND CONCLUSIONS: The old chemical manufacturin site buildings, sewers and grounds are grossly contaminated with arsenic, DDT and mercury from previous government and industrial operations in the area. Lesser quantities of lewisite and other organic contamination were found and only one sample contained musta The surveys have shown that the old chemical manufacturing site is a source of arsenic (not contained) and DDT (contained by SRB's) contamination in Phillips Creek which enters the Arkansas River.

A FY 83 project to contain the hazardous chemical material run-off has been prepared and staffed through ARRCOM and DARCOM by PBA. The contaminated buildings should be removed with the rubble being placed in a hazardous landfill. An estimate for the building destruction has been made ($2.9 million).

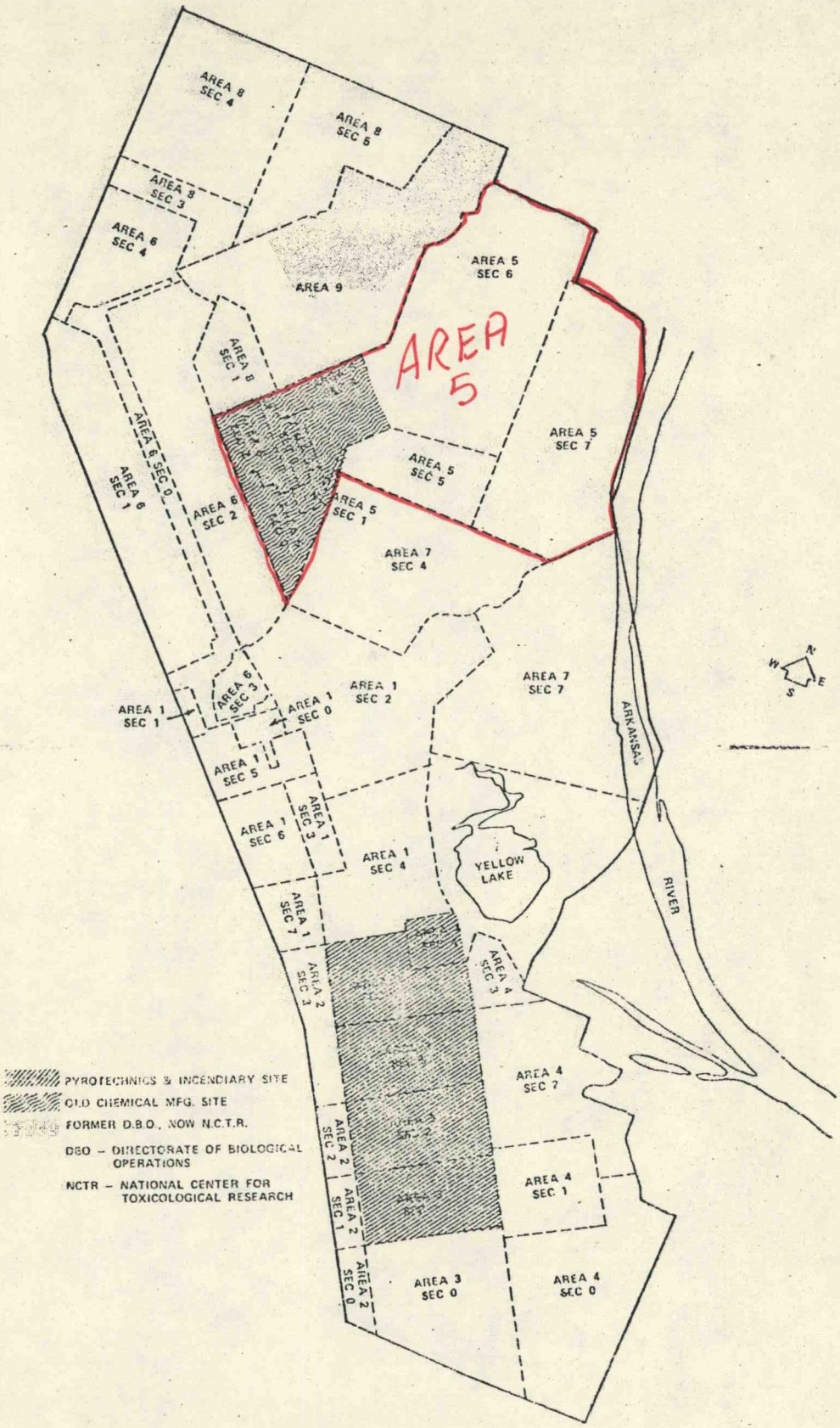
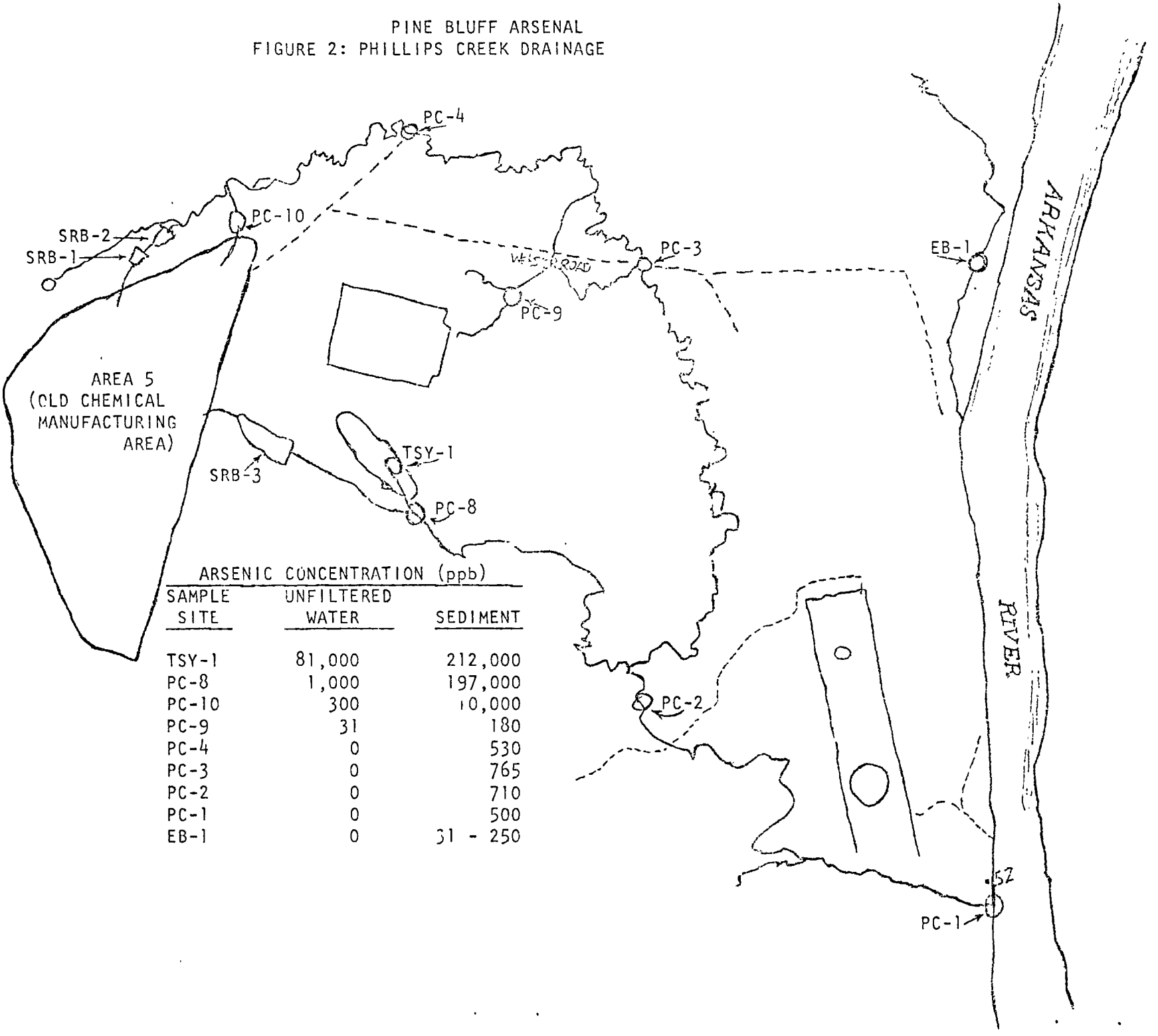


FIGURE 1-1 FORMER PRODUCTION SITES AT PBA 1/

PINE BLUFF ARSENAL
FIGURE 2: PHILLIPS CREEK DRAINAGE

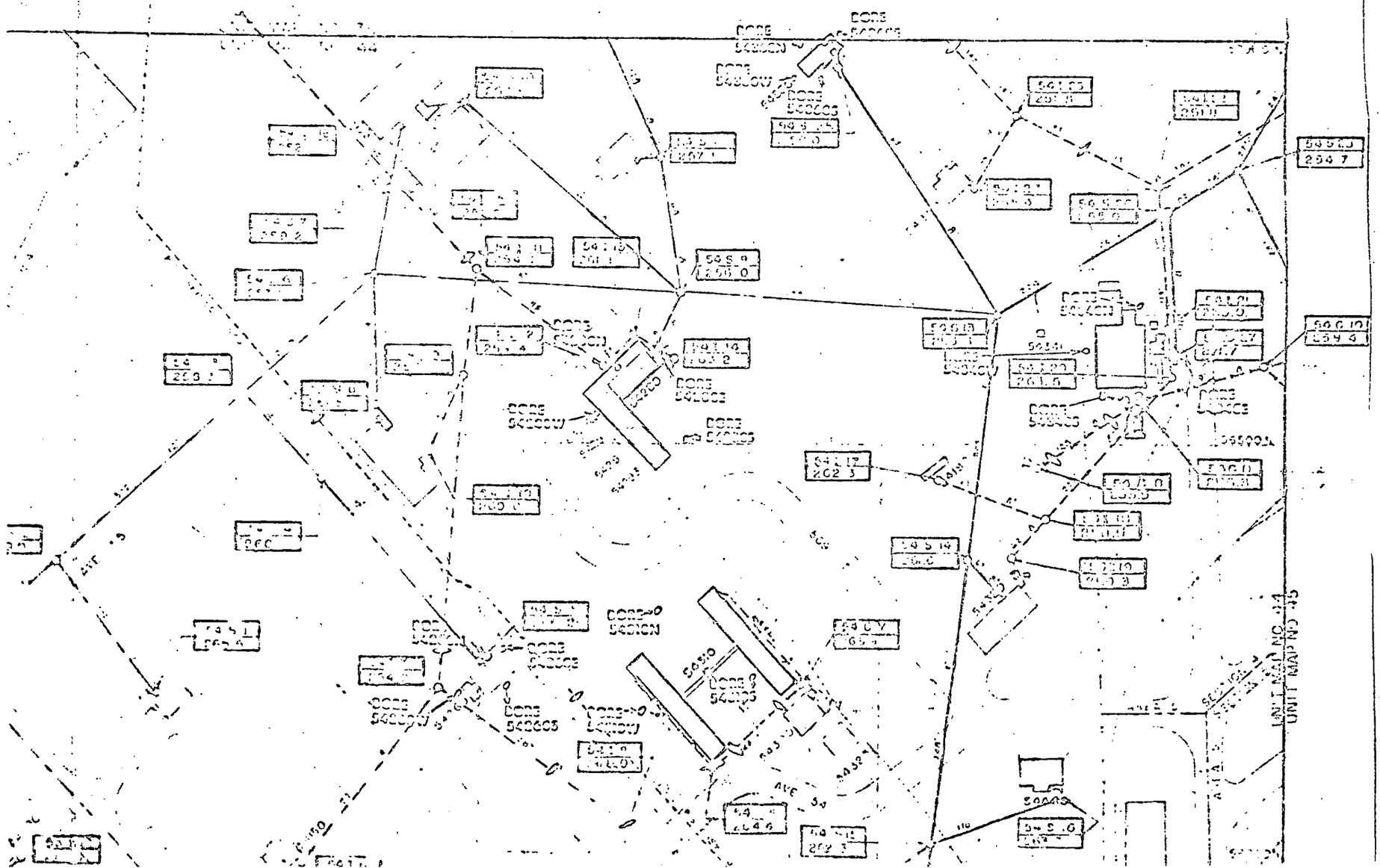


ARSENIC CONCENTRATION (ppb)

SAMPLE SITE	UNFILTERED WATER	SEDIMENT
TSY-1	81,000	212,000
PC-8	1,000	197,000
PC-10	300	10,000
PC-9	31	180
PC-4	0	530
PC-3	0	765
PC-2	0	710
PC-1	0	500
EB-1	0	31 - 250

FIGURE 3-1

OLD CHEMICAL MANUFACTURING SITE CONTAMINATION SURVEY
BORINGS (●) & SEWER (I) SAMPLING LOCATIONS



OLD CHEMICAL MANUFACTURING SITE CONTAMINATION SURVE
BORINGS (o) & SEWER (I) SAMPLING LOCATIONS

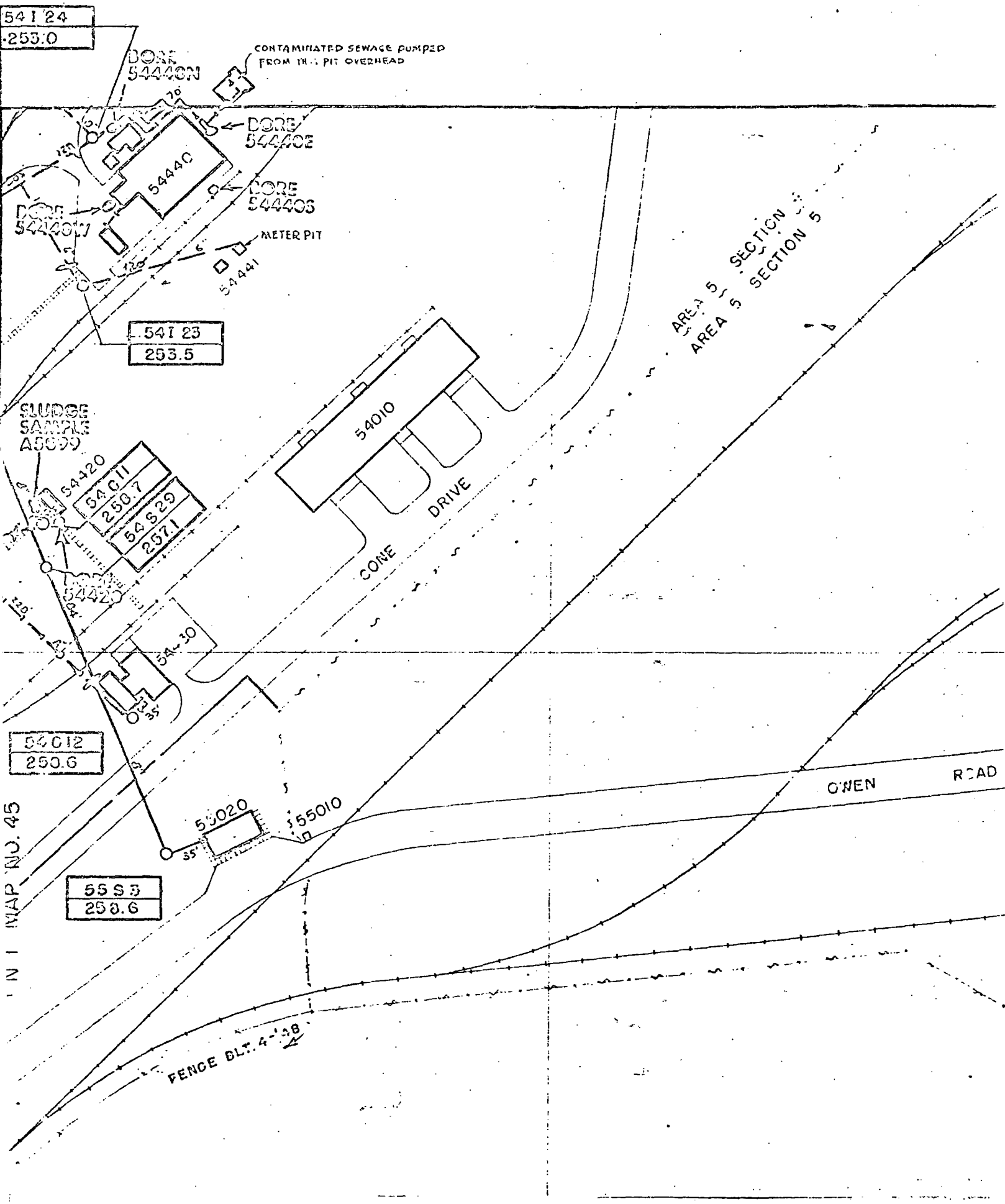


TABLE 1: BUILDINGS CONTAMINATION ANALYSIS RESULTS (1974)

MEAN/MAXIMUM CONCENTRATIONS, PPM

Bldg. No.	No. of Samples	Ba	As	Hg	Pb	Zn	Mustard	CS	CN	DDT	Hex	
		1.1	NIL	7.8	2.0	7.7	0	0	0	-	0	MEAN
53-900	2	1.6	NIL	15.6	4.0	15.4	0	0	0	-	0	MAX
		3.0	NIL	15.3	0.25	0.5	0	0	0	23.4	0	MEAN
54-130	2	3.0	NIL	18.4	0.5	0.5	0	0	0	27.8	0	MAX
		1.1	NIL	6.4	0.8	0.5	0	0	0	0	0	MEAN
54-131	2	1.6	NIL	12.3	1.6	1.0	0	0	0	0	0	MAX
		4.3	NIL	14.4	1.2	1.8	0	0	0	2.7	0	MEAN
54-270	8	6.3	NIL	34.6	3.1	6.8	0	0	0	4.4	0	MAX
		2.9	402	7.1	0.86	0.14	0	0	0	2.7	0	MEAN
54-280	8	4.1	402	14.8	1.0	0.5	0	0	0	11.3	0	MAX
		1.5	12,000	6.8	1.3	1.0	0	0	0	-	0	MEAN
54.290	2	2.4	12,000	13.6	2.0	2.0	0	0	0	-	0	MAX
		0.85	12,000	10.6	71.7	155.6	0	0	0	-	0	MEAN
54-291	2	1.1	12,000	13.4	140	311.1	0	0	0	-	0	MAX
		2.2	12,000	11.4	49.4	144.3	0	0	0	-	0	MEAN
54.292	2	2.8	12,000	12.5	96.7	288.5	0	0	0	-	0	MAX
		2.15	12,000	7.6	1.05	1.15	0	0	0	-	0	MEAN
54-293	2	2.6	12,000	12.4	1.1	2.3	0	0	0	-	0	MAX
		3.35	NIL	7.7	NIL	NIL	0	0	0	18.0	0	MEAN
54-310	2	4.1	NIL	9.2	NIL	NIL	0	0	0	34.9	0	MAX
		1.3	NIL	4.98	22.9	20.96	0	0	0	22.3	0	MEAN
54-140	31	1.8	NIL	13.0	534.3	139.5	0	0	0	90.5	0	MAX
		0.97	NIL	5.9	1.87	0.17	0	0	0.14	4.6	0	MEAN
54-160	3	1.8	NIL	12.0	5.1	0.5	0	0	0.7	4.6	0	MAX
		1.8	NIL	6.5	NIL	0.5	0	0	0	25.5	0	MEAN
54-161	1	1.8	NIL	6.5	NIL	0.5	0	0	0	25.5	0	MAX

TABLE 1 (Con't): BUILDINGS CONTAMINATION ANALYSIS RESULTS (1974)

Bldg. No.	No. Of Samples	Ba	As	Hg	Pb	Zn	Mustard	CS	CN	DDT	Hex	
		MEAN/MAXIMUM CONCENTRATIONS, PPM										
		2.18	NIL	3.18	9.9	20.95	0	0	0	16.3	0	MEAN
54-240	29	4.8	NIL	18.0	103.5	156.6	0	0	0	75.1	0	MAX
		1.8	NIL	16.0	92.8	114.7	-	-	-	-	-	MEAN
54-241	2	3.1	NIL	31.9	184.2	228.8	-	-	-	-	-	MAX
		2.35	NIL	11.75	1.85	1.80	-	-	-	-	-	MEAN
54-261	2	2.6	NIL	16.8	2.1	3.1	-	-	-	-	-	MAX
		1.6	NIL	7.4	1.3	1.05	0	0	0	8.1	0	MEAN
54-262	2	3.2	NIL	14.3	2.1	1.6	0	0	0	8.1	0	MAX
		2.77	NIL	2.83	2.73	5.7	0	0	0	4.5	0	MEAN
54-329	3	3.0	NIL	8.5	7.7	17.1	0	0	0	8.8	0	MAX
		2.03	0.2	3.45	2.63	21.35	0	0	0	3.58	0	MEAN
54-340	32	4.6	6.5	21.2	36.0	192.0	0	0	0	45.6	0	MAX
		2.5	NIL	10.0	NIL	0.5	0	0	0	4.6	0	MEAN
54-341	2	2.5	NIL	10.0	NIL	0.5	0	0	0	9.0	0	MAX
		2.3	NIL	11.8	1.25	NIL	0	0	0	0.15	0	MEAN
54-350	2	2.6	NIL	13.9	1.5	NIL	0	0	0	0.2	0	MAX
		3.1	132.3	1.28	2.7	11.3	0	0	0	0.63	0	MEAN
54-362	4	3.6	257.0	5.1	4.6	28.7	0	0	0	0.9	0	MAX
		1.65	NIL	2.75	1.5	4.0	0	0	0	0.75	0	MEAN
54-430	2	1.8	NIL	5.5	2.5	7.5	0	0	0	0.8	0	MAX
		1.65	NIL	14.2	0.75	0.25	0	0	0	0.15	0	MEAN
54-431	2	1.8	NIL	21.3	1.0	0.5	0	0	0	0.3	0	MAX
		1.41	NIL	1.90	0.85	1.83	0	0	0	3.95	0	MEAN
54-440	32	6.7	NIL	31.4	3.6	11.5	0	0	0	38.4	0	Max
		1.15	NIL	2.8	30.5	2.0	0	0	0	10.25	0	MEAN
[illegible]	2		[illegible]		60.5	[illegible]	0	0	[illegible]	[illegible]	0	

TABLE 1 (Con't): BUILDINGS CONTAMINATION ANALYSIS RESULTS (1974)

MEAN/MAXIMUM CONCENTRATIONS, PPM

Bldg. No.	No. Of Samples	Ba	As	Hg	Pb	Zn	Mustard	CS	CN	DDT	Hex	
		1.8	NIL	3.5	0.5	0.5	0	0	0	0.8	0	MEAN
54-442	2	1.8	NIL	3.5	0.5	0.5	0	0	0	0.8	0	MAX
		2.25	NIL	2.0	6.15	25.55	0	0	0	0.4	0	MEAN
54-449	2	2.7	NIL	4.0	11.8	50.6	0	0	0	0.4	0	MAX
		3.8	NIL	2.3	0.5	0.25	-	0	0	0.35	0	MEAN
54-450	2	4.6	NIL	2.6	0.5	0.5	-	0	0	0.4	0	MAX
		2.65	NIL	1.25	0.75	0.75	-	0	0	0.25	0.4	MEAN
54-460	2	3.5	NIL	1.5	1.0	1.0	-	0	0	0.3	0.8	MAX
		1.95	NIL	1.25	0.25	0.25	0	0	0	0.2	0	MEAN
54-461	2	2.1	NIL	2.5	0.5	0.5	0	0	0	0.2	0	MAX
		7.9	51.9	NIL	15.55	105.35	0	0	0	0.25	0	MEAN
54-700	2	12.6	103.8	NIL	29.1	208.2	0	0	0	0.5	0	MAX

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TABLE 2 : AREA 5 BUILDING CONTAMINATION SURVEY (SUMMARY)

BUILDING NUMBER	CONCENTRATION RANGE (PPB)						
	ARSENIC	MERCURY	BARIUM	D D T	MUSTARD	Z I N C	L E A D
54-140	8,000- 420,000	750- 9,550	1,300-1,800	27-330,000,000	0 - 120	20,960 - 139,500	1,870 - 5,100
54-240	5,000- 77,500	8,000-65,600	2,180-4,800	5,900- 22,000,000	NIL	20,950 - 156,600	9,900 - 103,500
54-260	33,000- 730,000	8,550-31,800	1,600-3,200	19,000- 370,000	NIL	1,050 - 3,100	1,300 - 2,100
54-280	1,200-4,020,000	13,000-13,900	2,900-4,100	14,000- 17,000	NIL	140 - 500	860 - 1,000
54-290 - 293	520,000-12,000,000	6,800-13,600	1,100-2,800	--------	NIL	1,000 - 311,100	1,050 - 140,000
54-310	430,000- 1,000,000	0- 350	3,350-4,100	160,000- 1,600,000	NIL	NIL	NIL
54-340	12,500- 1,620,000	300-31,800	2,030-4,600	560- 59,000,000	NIL	21,350 - 192,000	2,630 - 36,000
54-360	130,000- 2,200,000	2,800- 9,700	3,100-3,600	6,700- 14,000	NIL	11,300 - 28,700	2,700 - 4,600
54-440	5,000- 5,000	NIL	1,410-6,700	46,000- 76,000	NIL	1,820 - 11,500	850 - 3,600

AREA 5 SAMPLING AND ANALYSIS

TABLE 3 : BUILDINGS & SUMPS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			1/ GC/MS	As	Hg	H	DDT	HN	THIO
54-140	A-5021	Floor Gutters Dock - SE	---------	7.7×10^4	750	1.2×10^2	2.0×10^7	-----	-----
54-140	A-5022	Floor Gutters Room - SE	L,X,D,Y	1.0×10^4	7800	0	2.0×10^7	-----	-----
54-140	A-5023	Floor & Drain Plug Room-SE	D,Y,L,X	1.2×10^5	9550	0	2.8×10^7	-----	-----
54-140	A-5024	Floor Upstairs North End	D,L,X	5.0×10^4	1400	0	1.0×10^7	-----	-----
54-140	A-5025	Water Drain Pipe - SE Dock	Y	LT	LT	0	27.0	-----	-----
54-140	A-5206	Dust from Wall - SE Dock	-----	4.2×10^5	LT	0	1.7×10^6	-----	-----
54-140	A-5027	Floor - NE Corner Room	D, X, L	8.0×10^3	2500	0	3.3×10^8	-----	-----

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; & D - DDTR

AREA 5 SAMPLING AND ANALYSIS

TABLE 4 : BUILDINGS & SUMPS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			1/ GC/MS	As	Hg	H	DDT	HN	THIO
54-240	A-5014	Soil from Pit @ East End of Dock	---------	5.0×10^3	LT	0	5.9×10^3	------	-----
54-240	A-5015	Dirt from Room @ SE Corner	---------	7.5×10^3	65,600	0	1.5×10^5	------	-----
54-240	A-5016	Floor: Room @ NW Corner (DDT Suspect)	---------	5.0×10^3	4,650	0	5.1×10^5	------	-----
54-240	A-5017	From 6 Concrete pits @ NW Corner	-------	1.8×10^4	18,200	0	6.9×10^6	------	-----
54-240	A-5018	Water from Pits @ North End	NIL	LT	LT	0	------	------	LT
54-240	A-5019	Dirt from Floor NW Corner Room, Upstairs	---------	7.7×10^4	3,450	0	2.2×10^7	------	-----
54-240	A-5020	Dirt from Floor SW Corner Room, Upstairs	---------	4.8×10^4	800	0	6.9×10^6	------	-----
54-240	A-5047	Water-Pit East End of Dock	2/	5.0×10^3	LT	0	LT	------	LT

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; & D - DDTR

2/ CN hydrolysis product (C_7H_6OCl)

AREA 5 SAMPLING AND ANALYSIS

TABLE 5 : BUILDINGS & SUMPS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			1/ GC/MS	As	Hg	H	DDT	HN	THIO
54-260	A-5028	Concrete Tank Northeast	--------	9.8×10^4	9350	LT	1.9×10^4	-----	-----
54-260	A-5029	Water from Sump Pit	NIL	LT	LT	----	-------	-----	LT
54-260	A-5030	Sediment from Left Sump Pit	D, X	1.6×10^5	3.2×10^4	LT	1.1×10^5	-----	LT
54-260	A-5031	Sediment from Right Sump Pit	D, X	3.3×10^4	8550	LT	3.7×10^5	-----	LT
54-260	A-5032	Soil from Outside in Front of Sumps	--------	7.3×10^5	8650	----	1.5×10^5	-----	-----
54-260	A-5045	Water from Left Sump	NIL	LT	LT	----	------	-----	LT

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; & D - DDTR

AREA 5 SAMPLING AND ANALYSIS

TABLE 6 : BUILDINGS & SUMPS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			1/ GC/MS	As	Hg	Cd	DDT	HN	THIO
54-280	A-5058	Sediment from Round East Side Sump	D, Y, X	5.0×10^3	1.39×10^4	---	1.7×10^4	-----	LT
54-280	A-5059	Water from Round East Side Sump	0	1.2×10^3	LT	0	LT	-----	LT
54-280	A-5060	Water from Square Sump East Side	0	1.9×10^3	LT	0	LT	-----	LT
54-280	A-5064	Dirt from Floor Gutter Inside	------	4.02×10^6	1.3×10^4	LT	1.4×10^4	-----	----

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; & D - DDTR

AREA 5 SAMPLING AND ANALYSIS

TABLE 7 : BUILDINGS & SUMPS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			1/ GC/MS	As	Hg	H	DDT	HN	THIO
54-310	A-5039	Water from Drain Pipe	NIL.	LT	LT	LT	LT	---	---
54-310	A-5040	Soil NE Corner	---	1.0×10^6	3.5×10^2	LT	1.3×10^6	---	---
54-310	A-5041	Soil SE Corner	---	7.5×10^5	LT	LT	1.6×10^5	---	---
54-310	A-5042	Soil NW Corner	---	9.0×10^5	LT	LT	LT	---	---
54-310	A-5043	Soil SW Corner	---	4.8×10^5	LT	LT	1.6×10^6	---	---

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; & D - DDTR

AREA 5 SAMPLING AND ANALYSIS

TABLE 8 : BUILDINGS & SUMPS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			1/ GC/MS	As	Hg	H	DDT	HN	THIO
54-340	A-5001	Sediment from 6 Concrete Pits, South End	---	11.6×10^6	12,000	0	5.9×10^7	---	---
54-340	A-5002	Floor Drains Bench South End	Oil & DDT	1.2×10^4	LT	0	5.6×10^2	---	---
54-340	A-5003	Water 6 Drains in Concrete Slab, South End	0	LT	LT	0	LT	---	---
54-340	A-5004	Sediment fr. Pit on East Side	D	2.2×10^4	600	0	4.5×10^4	---	LT
54-340	A-5005	Sediment from Gutter Ditch in Room on North End	---	1.8×10^5	15,000	0	3.3×10^7	---	---
54-340	A-5006	Sediment from Gutter Ditch, North End of Dock	---	4.5×10^4	300	0	3.3×10^7	---	---
54-340	A-5044	Water from Sump Pit	NIL	LT	LT	---	---	---	LT
54-340	A-5045	Sediment from Sump Pit	D, X	7.6×10^5	31,800	LT	7.1×10^4	---	LT

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; & D - DDTR

AREA 5 SAMPLING AND ANALYSIS

TABLE 9 : BUILDINGS & SUMPS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			1/ GC/MS	As	Hg	H	DDT	HN	THIO
54-360	A-5033	From Concrete Tank NE Nearest Street	---	2.2×10^6	8.8×10^3	0	1.8×10^4	---	---
54-360	A-5034	From Concrete Tank, SE	---	1.5×10^5	9.7×10^3	0	8.0×10^3	---	---
54-360	A-5035	Water from Sump, Right Side	NIL	LT	LT	---	---	---	LT
54-360	A-5036	Sediment from Sump Right	D, X	1.3×10^5	LT	---	6.7×10^3	---	LT
54-360	A-5037	Sediment from Sump Left	D, X	8.5×10^5	2.8×10^3	---	1.4×10^5	---	LT
54-360	A-5038	Water from Sump Left	NIL	LT	LT	---	---	---	LT

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; & D - DDTR

AREA 5 SAMPLING AND ANALYSIS

TABLE 10 : BUILDINGS & SUMPS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			1/ GC/MS	As	Hg	H	DDT	HN	THIO
54-440	A-5007	Water from 6 Pits, North End of Bldg.	0	LT	LT	0	LT	---	---
54-440	A-5008	Water from Floor Drains, North End of Bldg.	OIL	LT	LT	0	LT	---	---
54-440	A-5009	Dust from Floor, NE Room	---	5.0×10^3	LT	0	7.6×10^7	---	---
54-440	A-5010	Water from Pit, NW side of Bldg. near Street	0	LT	LT	---	---	---	LT
54-440	A-5011	Water from Pit, South End of Building	0	LT	LT	---	---	---	LT
54-440	A-5012	Dirt from Gutter	---	5.0×10^3	LT	0	4.6×10^4	---	---
54-440	A-5013	Sludge fr. Pit on NW side	D, X	5.0×10^3	LT	0	5.4×10^4	---	LT

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; O D - DDTR

PINE BLUFF ARSENAL

TABLE 11 : AREA 5 SOIL CONTAMINATION SURVEY 1/ (SUMMARY)

BUILDING NUMBER	CONCENTRATION RANGE (PPB)		
	ARSENIC	MERCURY	DDT
54-140	NIL	0 - 460	6,300 - 13,000,000
54-240	0 - 36,000	0 - 9,000	10,000 - 7,000,000
54-260	0 - 150,000	0 - 6,700	6,700 - 530,000
54-280	0 - 3,800,000	0 - 8,950	850 - 60,000
54-310	0 - 720,000	180 - 5,600	2,700 - 650,000
54-340	0 - 31,000	0 - 8,600	970 - 920,000
54-360	0 - 620,000	0 - 20,100	1,100 - 64,000
54-440	NIL	0 - 200	270 - 6,300

1/ FOUR (4) CORES WERE TAKEN AROUND EACH OF THE CONTAMINATED BUILDINGS, 10' - 15' FROM THE BUILDING WITH EACH CORE ANALYZED AT THREE (3) LEVELS (SURFACE, 0'-5' AND 5'-10') FOR ARSENIC, MERCURY, DDT, MUSTARD, NITROGEN MUSTARD AND THIODIGLYCOL.

AREA 5 SAMPLING AND ANALYSIS

TABLE 12 : CORE DRILLING AROUND BUILDINGS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			GC/MS 1/	As	Hg	H	DDT	HN	THIO
54-140	A5066	South Side - Surface	---	LT	2.5×10^2	LT	7.8×10^5		
54-140	A5067	South Side - 0'-5'	---	LT	LT	LT	1.3×10^7		
54-140	A5068	South Side - 5'-10'	---	LT	LT	LT	1.8×10^5		
54-140	A5070	West Side - Surface	---	LT	LT	LT	2.3×10^5		
54-140	A5071	West Side - 0'-5'	---	LT	LT	LT	2.6×10^6		
54-140	A5073	West Side - 5'-10'	---	LT	4.6×10^2	LT	6.4×10^6		
54-140	A5074	North Side - Surface	---	LT	1.8×10^3	LT	4.0×10^6		
54-140	A5075	North Side - 0'-5'	---	LT	2.3×10^2	LT	6.0×10^5		
54-140	A5077	North Side - 5'-10'	---	LT	LT	---	7.2×10^6		
54-140	A5078	East Side - Surface	---	LT	LT	LT	2.4×10^5		
54-140	A5079	East Side - 0'-5'	---	LT	LT	LT	6.3×10^3		
54-140	A5081	East Side - 5'-10'	---	LT	4.0×10^2	LT	4.9×10^6		

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; G D - DDTR

AREA 5 SAMPLING AND ANALYSIS

TABLE 13 : CORE DRILLING AROUND BUILDINGS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			GC/MS 1/	As	Hg	H	DDT	HN	THIO
54-240	A5083	East Side Dock & Fence - Surface	---	3.6×10^4	2.0×10^2	LT	1.2×10^5		
54-240	A5084	South Side - Surface	---	LT	9.0×10^3	LT	2.2×10^4		
54-240	A5085	South Side - 0'-5' Level	---	1.2×10^4	1.8×10^2	LT	1.2×10^5		
54-240	A5086	South Side - 5'-10' Level	---	LT	2.0×10^3	LT	7.0×10^6		
54-240	A5087	West Side - Surface	---	LT	1.5×10^2	LT	6.4×10^5		
54-240	A5089	West Side - 0'-5' Level	---	LT	LT	LT	6.5×10^4		
54-240	A5090	West Side - 5'-10' Level	---	LT	LT	LT	9.0×10^4		
54-240	A5092	North Side - Surface	---	LT	LT	LT	4.4×10^5		
54-240	A5093	North Side - 0'-5' Level	---	LT	6.4×10^2	LT	2.9×10^4		
54-240	A5094	North Side - 5'-10' Level	---	LT	LT	LT	3.1×10^6		
54-240	A5095	Trench #1 South Side Outside Fence - Surface	---	LT	LT	---	1.5×10^4		
54-240	A5096	Trench #1 South Side Outside of Fence	---	LT	LT	---	1.0×10^4		

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; G D - DDTR

AREA 5 SAMPLING AND ANALYSIS

TABLE 14 : CORE DRILLING AROUND BUILDINGS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			GC/MS 1/	As	Hg	H	DDT	HN	THIO
54-260	A5100	South Side - Surface	---	LT	6.7×10^3	LT	2.2×10^5		
54-260	A5101	South Side - 0'-5' Level	---	LT	6.4×10^2	LT	5.3×10^5		
54-260	A5102	South Side - 5'-10' Level	---	LT	2.0×10^2	LT	2.1×10^4		
54-260	A5104	West Side - Surface	---	1.5×10^5	3.7×10^3	LT	1.1×10^5		
54-260	A5106	West Side - 0'-5' Level	---	1.0×10^5	2.5×10^3	LT	7.8×10^3		
54-260	A5108	West Side - 5'-10' Level	---	9.6×10^3	2.0×10^2	LT	2.7×10^5		
54-260	A5109	North Side - Surface	---	LT	LT	LT	3.4×10^4		
54-260	A5110	North Side - 0'-5' Level	---	---	2.5×10^2	LT	2.6×10^4		
54-260	A5112	North Side - 5'-10' Level	---	LT	3.3×10^2	LT	5.5×10^4		
54-260	A5113	East Side - Surface Ramp	---	LT	4.0×10^2	LT	1.4×10^5		
54-260	A5114	East Side - 0'-5' Level	---	6.0×10^3	2.0×10^2	LT	6.7×10^3		
54-260	A5115	East Side - 5'-10' Level	---	LT	3.0×10^2	LT	4.4×10^4		

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; & D - DDTR

AREA 5 SAMPLING AND ANALYSIS

TABLE 15 : CORE DRILLING AROUND BUILDINGS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			GC/MS 1/	As	Hg	H	DDT	HN	THIO
54-280	A5129	North Side - 1' Below Surface	---	5.0×10^3	LT	LT	4.2×10^3		
54-280	A5130	North Side - 1'-5' Level	---	8.8×10^4	LT	LT	3.5×10^3		
54-280	A5131	North Side - 5'-10' Level	---	2.0×10^4	LT	LT	2.3×10^4		
54-280	A5133	East Side - 1' Below Surface	---	3.0×10^4	1.7×10^2	---	8.5×10^2		
54-280	A5134	East Side - 1'-5' Level	---	LT	LT	LT	4.8×10^3		
54-280	A5135	East Side - 5'-10' Level	---	2.0×10^4	LT	LT	3.7×10^3		
54-280	A5137	South Side - Surface	---	1.8×10^5	1850	LT	6.9×10^2		
54-280	A5138	South Side - 0'-5' Level	---	4.4×10^5	8950	---	2.5×10^3		
54-280	A5140	South Side - 5'-10' Level	---	1.0×10^5	4300	LT	1.9×10^3		
54-280	A5141	West Side - Surface	---	3.8×10^6	7800	LT	5.3×10^3		
54-280	A5143	West Side - 0'-5' Level	---	2.2×10^5	850	---	3.1×10^3		
54-280	A5144	West Side - 5'-10' Level	---	2.0×10^5	2750	---	6.0×10^4		

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; & D - DDTR

AREA 5 SAMPLING AND ANALYSIS

TABLE 16 : CORE DRILLING AROUND BUILDINGS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			GC/MS 1/	As	Hg	H	DDT	HN	THIO
54-310	A5116	South Side - Surface	---	7.2×10^5	3.0×10^2	LT	6.5×10^5		
54-310	A5117	South Side - 0'-5' Level	---	2.2×10^5	1.8×10^2	LT	9.3×10^4		
54-310	A5118	South Side - 5'-10' Level	---	LT	1.9×10^2	LT	3.2×10^3		
54-310	A5119	West Side - Surface	---	LT	3.2×10^3	LT	2.7×10^3		
54-310	A5121	West Side - 0'-5' Level	---	LT	6.0×10^2	LT	9.9×10^3		
54-310	A5122	West Side - 5'-10' Level	---	LT	7.0×10^2	LT	3.3×10^4		
54-310	A5123	North Side - Surface	---	2.0×10^5	3.5×10^2	LT	1.7×10^5		
54-310	A5126	North Side - 0'-5' Level	---	---	5.6×10^3	LT	1.2×10^4		
54-310	A5127	North Side - 5'-10' Level	---	1.4×10^5	2.9×10^3	LT	2.3×10^4		

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; & D - DDTR

AREA 5 SAMPLING AND ANALYSIS

TABLE 17 : CORE DRILLING AROUND BUILDINGS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			GC/MS 1/	As	Hg	H	DDT	HN	THIO
54-340	A5161	East Side - Surface	---	1.2×10^4	5250	LT	3.9×10^4	LT	
54-340	A5162	East Side - 0'-5' Level	---	LT	800	LT	5.9×10^3	LT	
54-340	A5163	East Side - 5'10' Level	---	3.1×10^4	650	LT	8.4×10^3	LT	
54-340	A5165	South Side - Surface	---	2.7×10^4	8600	LT	4.9×10^4	LT	
54-340	A5166	South Side - 0'-5' Level	---	LT	1950	LT	1.3×10^4	LT	
54-340	A5167	South Side - 5'10' Level	---	LT	LT	LT	9.0×10^3	LT	
54-340	A5169	West Side - Surface	--	LT	4450	LT	9.2×10^5	LT	
54-340	A5170	West Side - 0'-5' Level	---	LT	400	LT	1.4×10^4	LT	
54-340	A5171	West Side - 5'10' Level	---	LT	LT	LT	9.7×10^2	LT	
54-340	A5173	North Side - Surface	---	6.0×10^3	1300	LT	1.4×10^3	LT	
54-340	A5174	North Side - 0'-5' Level	---	LT	300	LT	8.4×10^4	LT	
54-340	A5176	North Side - 5'10' Level	---	LT	LT	LT	8.5×10^3	LT	

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; & D - DDTR

AREA 5 SAMPLING AND ANALYSIS

TABLE 18 : CORE DRILLING AROUND BUILDINGS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			GC/MS 1/	As	Hg	H	DDT	HN	THIO
54-360	A5145	North Side - Surface	---	7.4×10^4	300	LT	1.1×10^3		
54-360	A5146	North Side - 0'-5' Level	---	1.3×10^5	3950	LT	9.0×10^3		
54-360	A5147	North Side - 5'-10' Level	---	1.2×10^4	300	LT	4.4×10^4		
54-360	A5149	West Side - Surface	---	2.5×10^4	200	LT	3.7×10^3		
54-360	A5150	West Side - 0'-5' Level	---	1.9×10^4	1050	LT	3.8×10^4		
54-360	A5151	West Side - 5'10' Level	---	2.0×10^4	250	LT	1.5×10^4		
54-360	A5153	South Side - Surface	---	5.2×10^5	20100	LT	1.8×10^3		
54-360	A5154	South Wise - 9'-5' Level	---	LT	1850	LT	2.3×10^4		
54-360	A5155	South Side - 5'10' Level	---	LT	200	LT	2.0×10^3		
54-360	A5158	East Side - Surface	---	6.2×10^5	LT	LT	3.5×10^3		
54-360	A5159	East Side - 0'-5' Level	---	LT	300	LT	1.1×10^3		
54-360	A5160	East Side - 5'-10' Level	---	6.0×10^3	1750	LT	6.4×10^4		

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; & D - DDTR

AREA 5 SAMPLING AND ANALYSIS

TABLE 19 : CORE DRILLING AROUND BUILDINGS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			GC/MS 1/	As	Hg	H	DDT	HN	THIO
54-420	A5098	Trench #3 South Side Outside Fence - 0'-5' Level	---	LT	LT	---	1.1×10^5		
54-420	A5099	Trech #2 - Surface	---	LT	6.0×10^2	---	3.6×10^6		

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; G D - DDTR

AREA 5 SAMPLING AND ANALYSIS

TABLE 20 : CORE DRILLING AROUND BUILDINGS

BUILDING NUMBER	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			GC/MS 1/	As	Hg	H	DDT	HN	THIO
54-440	A5177	East Side - Surface Level	---	LT	200	LT	1.6×10^3	LT	
54-440	A5178	East Side - 0'-5' Level	---	LT	LT	LT	2.5×10^3	LT	
54-440	A5179	East Side - 5'-10' Level	---	LT	LT	LT	6.9×10^2	LT	
54-440	A5181	South Side - Surface Level	---	LT	LT	--	7.0×10^2		
54-440	A5182	South Side - 0'-5' Level	---	LT	LT	--	8.6×10^2	LT	
54-440	A5183	South Side - 5'-10' Level	---	LT	LT	--	1.1×10^3	LT	
54-440	A5185	West Side - Surface	---	LT	LT	LT	4.3×10^3	LT	
54-440	A5186	West Side - 0'-5' Level	---	LT	LT	LT	2.7×10^2	LT	
54-440	A5187	West Side - 5'-10' Level	---	LT	200	LT	4.9×10^3	LT	
54-440	A5189	North Side - Surface Level	---	LT	LT	LT	6.3×10^3	LT	
54-440	A5190	North Side - 0'-5' Level	---	LT	LT	LT	2.4×10^3	LT	
54-440	A5191	North Side - 5'-10' Level	---	LT	LT	LT	4.9×10^3	LT	

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; & D - DDTR

AREA 5 SAMPLING AND ANALYSIS

TABLE 21 : SEWER SAMPLES

SEWER LINE	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			1/ GC/MS	As	Hg	H	DDT	HN	THIO
C1-C3	A50232	Sewer	D, Y, X POSITIVE	2/	2/	2/	2/		
C1-C3	A50233	Sewer	D, Y, X POSITIVE	2/	2/	2/	2/		
C4-C5	A50230	Sewer	NEGATIVE	2/	2/	2/	2/		
C4-C5	A50238	Contaminated Sewer 04-009	---	1.0×10^4	150	LT	7.3×10^5		
C6-C7	A50252	Contaminated Sewer 06-021	---	2.3×10^4	LT	LT	7181		
C6-C7	A50257	Contaminated Sewer 06-021	---	1.3×10^4	600	LT	220		
C8-C12	A50270	Sewer 12-029	---	3.8×10^4	8.4×10^4	LT	2.9×10^5		
C8-C12	A50258	Sewer 09	---	1.4×10^5	1.5×10^5	LT	4.2×10^5		
C8-C12	A50259	Sewer 11	---	8.6×10^5	3.3×10^5	LT			
C8-C12	A50260	Sewer 10	---	1.7×10^5	8.0×10^6	LT	1.1×10^6		
C8-C12	A50237	Contaminated Sewer 08-008		1.0×10^4	LT	LT	2.6×10^5		
C8-C12	A50239	Contaminated Sewer 08-010		9.0×10^3	LT	LT	4.1×10^5		

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; & D - DDTR

2/ No sediment sample - sewer line was full of water

AREA 5 SAMPLING AND ANALYSIS

TABLE 22 : SEWER SAMPLES

SEWER LINE	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			1/ GC/MS	As	Hg	H	DDT	HN	THIO
I1-I5	A50234	Industrial Sewer 04-005	---	$1.3x10^4$	$1.4x10^3$	LT	$3.4x10^6$		
I1-I5	A50240	Industrial Sewer 03-011	---	$2.4x10^6$	$1.8x10^4$	LT	$2.3x10^4$		
I1-I5	A50242	Industrial Sewer 03-012	---	$1.6x10^6$	$1.1x10^4$	LT	$1.4x10^6$		
I1-I5	A50231	Industrial Sewer 03-002	POSITIVE	2/	2/	2/	2/		
I1-I5	A50236	Industrial Sewer 05-007	---	$7.8x10^4$	$2.5x10^2$	LT	$8.8x10^5$		
I6-I16	A50246	Industrial Sewer 11-016		$1.9x10^4$	1700	LT	$1.1x10^6$		
I6-I16	A50247	Industrial Sewer 11-017		$9.0x10^5$	1700	LT	$4.5x10^5$		
I6-I16	A50248	Industrial Sewer 09-018		$9.4x10^5$	LT	LT	$2.9x10^5$		
I6-I16	A50249	Industrial Sewer 09-019		$3.5x10^4$	LT	LT	$4.0x10^5$		
I6-I16	A50250	Industrial Sewer 08-020		LT	LT	LT	$3.4x10^5$		
I6-I16	A50254	Industrial Sewer 08-023		$3.1x10^4$	150	LT	$4.1x10^4$		

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; & D - DDTR

2/ No sediment sample - the sewer line was full of water.

AREA 5 SAMPLING AND ANALYSIS

TABLE 23 : SEWER SAMPLES

SEWER LINE	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			1/ GC/MS	As	Hg	H	DDT	HN	THIO
I6-I16	A50255	Industrial Sewer 07-024		$1.3x10^4$	750	LT	2460		
I6-I16	A50256	Industrial Sewer 07-025		$1.7x10^4$	450	LT	620		
I6-I16	A50257	Industrial Sewer 08-026		$1.3x10^4$	600	LT	LT		
I21-I29	A50261	Sewer 21-030		$1.6x10^6$	$1.4x10^4$	LT	$1.2x10^6$		
I21-I29	A50263	Sewer 22-031		$2.1x10^6$	$1.4x10^4$	LT	$5.5x10^6$		
I21-I29	A50264	Sewer 24-032		LT	$1.0x10^4$	LT	LT		
I21-I29	A50265	Sewer 26-033		$7.6x10^5$	$1.1x10^6$	LT	$3.0x10^6$		
I21-I29	A50266	Sewer 26-034		$9.3x10^5$	$2.6x10^6$	LT	$2.9x10^6$		
I21-I29	A50267	Sewer 26-035		$1.6x10^5$	$3.0x10^4$	LT	$1.4x10^5$		
I21-I29	A50268	Sewer 26-036		$4.2x10^5$	$2.0x10^4$	LT	$1.8x10^4$		
I21-I29	A50269	Sewer 26-037		$4.4x10^5$	$2.1x10$	LT	$8.8x10^5$		

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; G D - DDTR

AREA 5 SAMPLING AND ANALYSIS

TABLE 24 : SEWER SAMPLES

SEWER LINE	SAMPLE NUMBER	SAMPLE DESCRIPTION	CONCENTRATION (ppb)						
			1/ GC/MS	As	Hg	H	DDT	HN	THIO
Ditch	A50243	Ditch 013		1.6×10^6	LT	LT	8714		
Ditch	A50244	Ditch 014		2.3×10^4	250	LT	1.5×10^4		
Ditch	A50245	Ditch 015		1.9×10^4	300	LT	1.5×10^4		

1/ GC-MS scan codes for positive samples are: L - Lewisite; Y - CN-like compound; X - Unknown; & D - DDTR