ENCLOSURE 2

SITE ASSESSMENT

FOR

SHIELDALLOY METALLURGICAL CORPORATION
CLEVELAND, OHIO

Prepared for:

U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois

CONTRACT NO. 68-01-7367

TAT-05-G2-02211

TDD# 5-8907-01

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September 1990

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1.0 SITE DESCRIPTION

The Shieldalloy Metallurgical Corporation (SMC) is located in Cambridge, Guernsey County, Ohio (Figure 1). The site encompasses approximately 40 acres in a rural/light industrial area and is bordered to the north and west by wetlands supported by Chapman Run and Wills Creek (Figure 2). Shieldalloy Metallurgical (formerly Foote Mineral) is an operating facility which produces various steel alloys. Currently, SMC produces alloys which incorporate chromium and vanadium. For over 15 years the facility manufactured ferrocolumbium alloys; a procedure which utilized uranium and thorium. Radioactive waste from this process has accumulated in the form of two piles located on site. These waste piles comprise a total area of 12.5 acres. The radioactive waste piles extend into the wetlands at several locations and this has been the major source of environmental concern. In 1990, SMC utilized approximately 14,000 tons of bagdust (Extraction Procedure toxic for chromium) generated at the facility to cap one of the radioactive waste piles.

The facility lies within the Wills Creek valley. The bedrock geology of this area consists of alternating layers of coal, sandstone, shale, and limestone in varying proportions. The geology at the Cambridge plant is characterized by 20 to 70 feet of unconsolidated sediments overlying bedrock. These valley fill materials consist primarily of silts and clays, with some sand lenses at depth.

The surface water intake for the city of Cambridge's municipal water plant (approximate population 14,000) is located within 2 stream miles downstream of this facility on Wills Creek.

2.0 SITE BACKGROUND

SMC purchased the facility from Foote Mineral in 1987, and is currently working with the Nuclear Regulatory Commission (NRC) on a plan to decontaminate and decommission the radioactive wastes on-site. This plan would not remove the wastes from the wetlands or the site and would utilize the vanadium and chromium wastes in the capping procedure.

In the process of conducting a standard background check on the site, the TAT determined that several agencies, including the U.S. Environmental Protection Agency (U.S. EPA), the NRC, the Ohio Environmental Protection Agency (OEPA), and the U.S. Army Corps of Engineers (ACE), have been involved in the site over the years. A great deal of confusion has resulted in attempting to determine which agency has jurisdiction over which portion of the site. The extension of the waste piles into the wetlands was the source for much of this controversy. Wetlands are the concern of ACE, but as the piles were disposal rather than fill wastes, ACE believed it fell to the OEPA and U.S. EPA. The situation is further complicated by the NRC's involvement with the radioactive waste which supersedes all other claims.

FIGURE 1

GENERAL SITE LOCATION MAP

SHIELDALLOY METALLURGICAL CORPORATION

CAMBRIDGE, GUERNSEY COUNTY, OHIO

SOURCE: Adapted from U.S. Geological Survey 7.5 Minute Series (topographic) Cambridge and Byesville, Ohio Quadrangles

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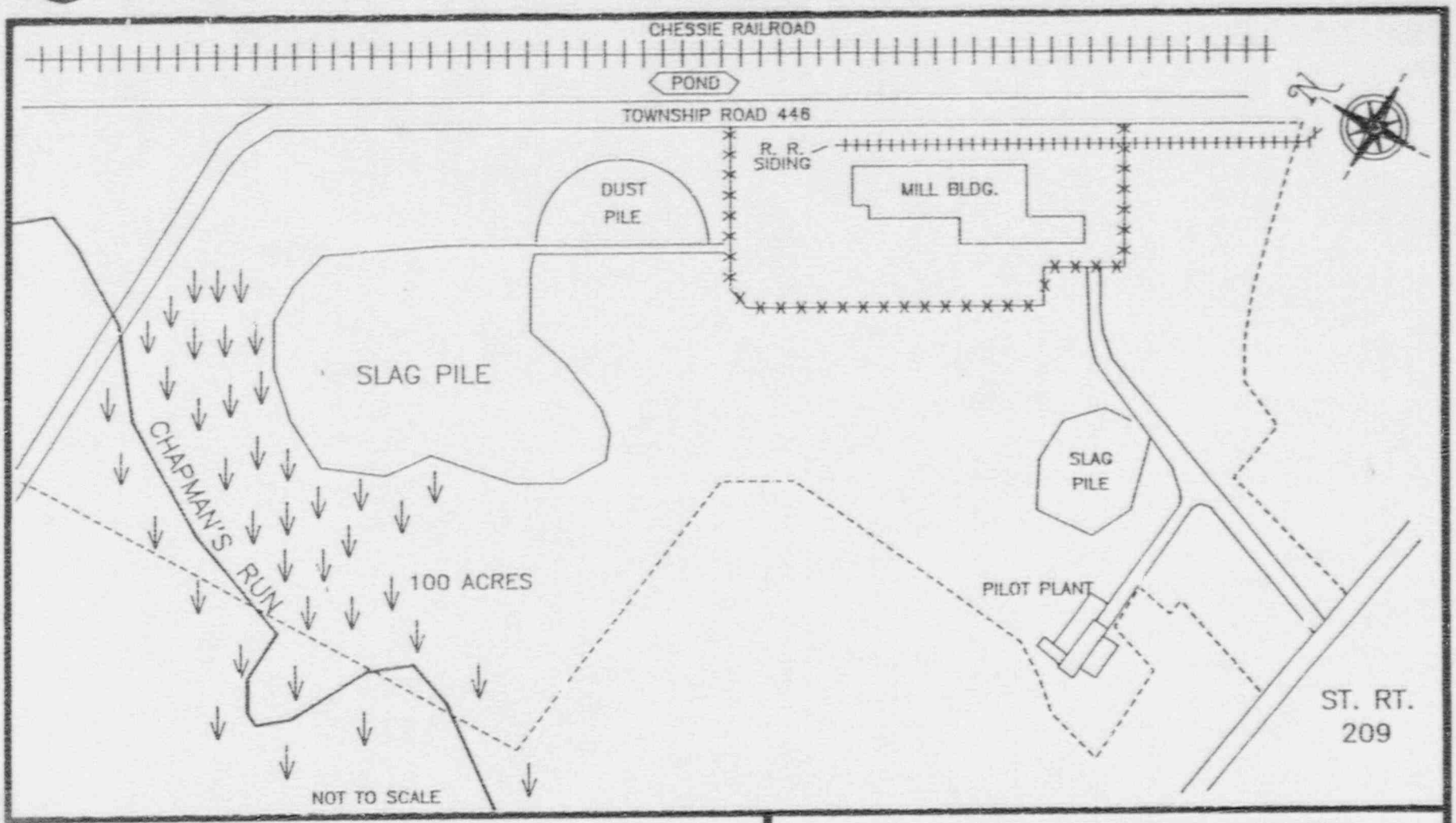

FIGURE 2
DETAILED SITE MAP

SHIELDALLOY METALLURGICAL CORPORATION
CAMBRIDGE, GUERNSEY COUNTY, OHIO

LEGEND

MARSH AREA | PROPERTY BOUNDARY | FENCE | RAILROAD TRACKS

WESTON MANAGERS DESIGNERS/CONSULTANTS
MAJOR PROGRAMS DIVISION

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On July 20, 1989, TAT joined representatives from the Ohio Department of Health (ODH) and the NRC on a guided tour of SMC. As the facility was, and is, operating, the tour did not interfere with work or include potentially hazardous areas. All waste piles were inspected and levels of radioactivity were measured by the ODH with a Ludlum Model 19 Micro R Meter. Site background was 20 microRoentgen per hour (uR/hr) with one "hot spot" of 80 uR/hr located on the east waste pile. The radioactive material was in the form of slag with no fine particles or dust apparent. It was the NRC's opinion that the radioactive material was rendered inert and nonhazardous by its matrix.

During the site inspection, SMC representatives indicated that analytical data existed for the various waste streams on site and that some ground water and stream analytical data also existed. In discussions with the U.S. EPA On-Scene Coordinator (OSC), Partap Lall, it was determined that this data be evaluated prior to an extent of contamination study by TAT. At the OSC's request, TAT prepared a letter to SMC requesting that all analytical and any other site data they may have in their possession be sent to the U.S. EPA.

On February 14, 1990, the TAT and OSC Ross Powers met with SMC representatives to discuss the data in question. At this time it was determined that SMC did not possess relevant data and that the TAT would conduct an extent of contamination study at the SMC facility. SMC officials expressed an interest in duplicating the TAT extent of contamination study.

3.0 SITE ASSESSMENT

On March 1, 1990, the TAT reviewed all available data on the area around the SMC site contained in the OEPA files in Logan, Ohio. The following day, March 2, 1990, TAT members Sandra Basham and Larry Mencin visited the SMC site to map out potential sampling areas with SMC consultant, Frank Myerski of ENSR. During this inspection, TAT determined the number and location of sampling stations in the wetlands and along the streams associated with the SMC site. The OSC was briefed as to the approach the TAT would take in conducting the extent of contamination study.

On April 11, 1990, TAT members Basham, Paul Malsch, and Mencin, met with SMC consultant, Mr. Myerski, at the SMC facility to conduct an extent of contamination study. Due to heavy rainfall the previous evening, many of the proposed sampling points were inaccessible and it was decided to postpone the study until water levels receded. On April 18, 1990, TAT members Kieran Dooley, Malsch, and Mencin returned to SMC and conducted an extent of contamination study along with SMC consultant, Mr. Myerski and SMC Environmental Manager, James Valenti.

Water and sediment sample locations were chosen so as to meet one of three criteria:

- o location was prior to SMC influence (i.e. background);
- o location was a point of surface water discharge from SMC into Chapman Run.
- o location was representative of an environmental receptor downstream of SMC influence.

To meet these goals a sample plan was devised consisting of 11 sample stations from 8 different sample locations on or surrounding SMC property (Table 1, Figure 3). Sample station 10 consisted of a blank of distilled water while sample station 9 consisted of a sample of finished water from the City of Cambridge water treatment facility. Sample station 11 was a duplicate of sample station 3.

From each of the 8 sample locations, a 5-liter water sample, along with an 8 and 32 ounce sediment sample, were collected. Only a sediment sample was collected from station 4 due to inadequate quantity of water at this location. Water samples were collected in high density polyethylene containers while standing on the stream bank so as not to disturb the sediment. Sediment samples were collected in glass jars at points of deposition utilizing a scoopula.

The ambient temperature, pH, and specific conductivity of all water sample were measured at the time of collection (Table 2). Water and sediment samples were analyzed for gross alpha and beta radiation, and subjected to a gamma scan. Water and sediment samples were also analyzed for priority pollutant metals, aluminum, and vanadium. All samples were analyzed by Core Laboratories under TAT Analytical Services TDD#5-9004-L04.

4.0 ANALYTICAL RESULTS

4.1 Metal Analysis

4.1.1 Surface water results

Table 3 presents the results of the metal analysis for all water samples. Several of the metals exceed the maximum permissible concentration according to Ohio Water Quality Standards (Chapter 3745-1 of the Administrative Code) (Table 4). Specifically, concentrations of selenium at sample station 5, thallium at station 2, zinc at station 1, and silver at every station exceed the maximum permissible concentration (Tables 3 and 4).

Ohio Water Quality Standards for barium, vanadium, and aluminum do not exist. Concentrations of vanadium at sample stations 3, 5, 6, 8, 9, and 11 exceed the "permissible ambient goal" of 0.007 parts

TABLE 1

SHIELDALLOY METALLURGICAL CORPORATION
CAMBRIDGE, OHIO

SAMPLE MATRIX
April 18, 1990

Sample Station	SAMPLE LOCATION
1	Upstream of SMC - intermittent unnamed tributary
2	Upstream of SMC - perennial unnamed tributary
3	Downstream of SMC - unnamed stream draining southern section of wetlands
4	Downstream of SMC - confluence of unnamed intermittent tributary and Chapman Run
5	Downstream of SMC - confluence of major northern drainage from wetlands and Chapman Run
6	Chapman Run downstream from site influence
7	Chapman Run upstream from site influence
8	Confluence of Chapman Run and Wills Creek
9	Distilled water blank
10	City of Cambridge Water Treatment Plant
11	Duplicate of station 3

FIGURE 3

SAMPLE LOCATION MAP

SHIELDALLOY METALLURGICAL CORPORATION

CAMBRIDGE, OHIO

SOURCE: Adapted from U.S. Geological Survey 7.5 Minute Series (topographic) Cambridge and Byesville, Ohio Quadrangles

WESTON MANAGERS DESIGNERS/CONSULTANTS — MAJOR PROGRAMS DIVISION

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TABLE 8

SHIELDALLOY METALLURGICAL CORPORATION
CAMBRIDGE, OHIO

TAT SAMPLE RESULTS – SURFACE WATER PARAMETERS
April 18, 1990

Sample Station	Collection Time	Temperature (Celsius)	pH	Conductivity (uMHOS)
1	1000	7	7.1	1100
2	0935	8	7.6	247
3	1120	13	7.9	370
4	1140	15	8.6	700
5	1050	19	10.4	3150
6	1520	15	7.7	283
7	1450	12	7.3	222
8	1410	15	7.4	535
9	1320	14	8.0	550
10	1520	*	*	*
11	1120	13	7.9	370

* sample not collected

SHIELDALLOY METALLURGICAL CORPORATION
CAMBRIDGE, OHIO

TAT SAMPLE RESULTS – METAL ANALYSIS – WATER ab
April 18, 1990

METAL	SAMPLE STATION											Background Average
	1	2	3	4	5	6	7	8	9	10	11	
	(PPM)											
ANTIMONY	<0.1	<0.1	<0.1	*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
ARSENIC	0.006	<0.002	<0.002	*	0.023	<0.002	0.002	<0.002	0.002	<0.002	<0.002	0.0003
BARIUM	0.01	0.04	0.01	*	0.01	<0.01	<0.01	0.04	0.03	<0.01	<0.01	0.02
BERYLLIUM	<0.01	<0.01	<0.01	*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
CADMIUM	<0.01	<0.01	<0.01	*	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
CHROMIUM	<0.05	<0.05	<0.05	*	0.348	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
COPPER	<0.01	<0.01	<0.01	*	0.034	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
LEAD	0.111	0.06	<0.05	*	0.108	0.066	<0.05	<0.05	<0.05	<0.05	0.063	0.074
MERCURY	<0.0002	<0.0002	0.0002	*	0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	0.0002
NICKEL	0.117	<0.06	<0.06	*	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	0.079
SELENIUM	0.010	<0.001	0.001	*	0.038 c	<0.001	<0.001	0.001	0.001	<0.001	0.001	0.004
SILVER	0.206 c	0.112 c	0.622 c	*	0.2 c	0.176 c	8.9 c	0.108 c	0.349 c	0.413 c	0.259 c	3.07
THALLIUM	<0.01	0.105 c	0.06	*	<0.01	<0.01	0.07	<0.01	0.011	<0.01	0.027	0.06
ZINC	0.40 c	0.01	0.016	*	<0.01	<0.01	<0.01	<0.01	0.012	<0.01	<0.01	0.14
VANADIUM	<0.01	<0.01	0.422 d	*	41.6 d	0.069 d	<0.01	0.062 d	0.018 d	<0.01	0.457 d	0.01
ALUMINUM	23.5 e	0.2 e	0.15 e	*	1.37 e	0.3 e	0.18 e	0.34 e	0.71 e	0.11 e	0.3 e	7.96

* Sample not collected.

a – TAT analytical TDD # 05-9004-L4

b – Analysis conducted by Core Laboratories, Casper, WY.

c – Value exceeds Ohio Water Quality Standards.

d – Value exceeds permissible ambient goal (EPA–600/7–77–136).

e – Value exceeds ambient water limit (EPA–600/7–77–136).

Shading – value exceeds three times background levels.

TABLE 4

OHIO WATER QUALITY STANDARDS
Chapter 3745-1 of the Ohio Administrative Code

Parameter	Maximum Permissible Concentration (PPM)
Antimony	0.65
Arsenic	0.36
Beryllium	3.1 a
Cadmium	0.019 a
Chromium	4.4 a
Copper	0.054 a
Lead	0.54 a
Mercury	0.0011
Nickel	4.1 a
Selenium	0.02
Silver	0.011 a
Thallium	0.071
Zinc	0.3 a

a – value dependent upon water hardness;
hardness of 300 mg/l CaCo3 assumed

per million (ppm) according to U.S. EPA report, EPA-600/7-77-136, (Table 5). Concentrations of aluminum at all sample locations also exceed the "ambient water limit" of 0.075 ppm as suggested by this report. Concentrations of aluminum at all stations also exceed the secondary drinking water standard for aluminum of 0.05 ppm.

Sample stations 1, 2, and 7 are located prior to SMC influence and as such represent background metal concentrations for the area Assuming concentrations exceeding three times that of background (average of stations 1, 2, and 7) are indicative of elevated environmental levels, several sample stations possessed metals at elevated concentrations (Table 3). Specifically, concentrations of arsenic, chromium, copper, selenium, and vanadium in surface waters at sample station 5 were at least three times background. In addition, concentrations of vanadium in surface waters at sample stations 3, 5, 6, 8, and 11 were found to be at least six times that of background.

4.1.2 Sediment results

Table 6 presents results from the metal analysis of all sediment samples. Several of these metals exceed the upper range of typical metal concentrations found in soils (Table 7). Concentrations of silver in the sediment at stations 2, 4, 6, and 8 exceed the upper range for silver (8 ppm) while concentrations of vanadium at stations 3, 4, 5, and 11 exceed the upper range for vanadium (500 ppm) (Tables 6 and 7).

Employing the criteria that three times background is indicative of elevated environmental levels, several metals were found at elevated concentrations in the sediment. Arsenic at station 3 and chromium levels at stations 3, 4, 5, and 11 both exceeded background levels by at least three times (Table 6). Lead concentrations at station 5 and nickel concentrations at stations 3, 5, and 11 also exceeded background levels by at least three times. In addition, selenium levels at stations 3 and 11, and silver concentrations at stations 4, 6, and 8 exceeded the criteria as well. Finally, concentrations of zinc at stations 3, 5, 6, 8, and 11, and vanadium at stations 3, 4, 5, 6, and 11 were at least three times that of background levels (Table 6).

4.2 Radiation Analysis

4.2.1 Surface water results

Table 8 presents results of the radiation analysis of all surface water samples. Several of the sample stations (1, 6, 8, and 11) exceeded the Primary Drinking Water Standard (PDWS) for gross alpha radiation (15 picoCuries per liter [pCi/L]) (Table 8). Levels of beta radiation at sample stations 1, 2, 3, 5, 6, 8, 10, and 11 also exceeded the PDWS for gross beta radiation set at 50 pCi/L (Table 8). Although the PDWS does not address gross gamma radiation, it

TABLE 5

EPA RECOMMENDED LIMITS &
DRINKING WATER STANDARDS

Parameter	Goal/Limit		Drinking Water Standards	
Aluminum	0.073	a	0.05	d
Vanadium	0.007	a	-	
Barium	1.0	b	1.0	c

a - U.S. Environmental Protection Agency, Multimedia Environmental Goals for the Environmental Assessments, Report EPA-600/7-77-136, Research Triangle park, NC (November 1977).

b - National Research Council, Drinking Water and Health, Washington, DC, National Academy of Sciences (1977).

c - Primary Drinking Water Standard.

d - Secondary Drinking Water Standard.

TABLE 6

SHIELDALLOY METALLURGICAL CORPORATION
CAMBRIDGE, OHIO

TAT SAMPLE RESULTS – METAL ANALYSIS – SEDIMENT ab
April 18, 1990

METAL	SAMPLE STATION (PPM) 1	2	3	4	5	6	7	8	9	10	11	Background Average
ANTIMONY	<5	<5	<5	<5	<5	<5	<5	<5	*	*	5.1	<5
ARSENIC	0.2	<0.1	0.4	<0.1	<0.1	0.1	0.1	<0.1	*	*	0.1	0.13
BARIUM	27.1	85.3	70.5	82.9	56.9	60.5	35.8	97.8	*	*	68.9	49.4
BERYLLIUM	<0.5	<0.5	<0.5	<0.5	<0.5	1.09	<0.5	0.58	*	*	<0.5	0.43
CADMIUM	<0.5	<0.5	<0.5	<0.5	<0.5	<0.51	<0.5	<0.5	*	*	<0.5	0.5
CHROMIUM	<3.0	3.9	135	23.8	59.2	3.2	<3.0	5.6	*	*	355	3.3
COPPER	3.85	7.1	9.9	10.3	14.2	16.9	7.3	12.1	*	*	13	6.1
LEAD	23.4	9.4	11.3	11.9	40.3	11.6	6.4	35.9	*	*	9.4	13.1
MERCURY	0.04	0.02	0.01	0.03	0.02	0.05	0.07	0.04	*	*	0.05	0.04
NICKEL	13.7	11.9	75	20.7	127	20.6	12.5	20.8	*	*	49.9	12.7
SELENIUM	0.15	0.21	0.61	0.21	0.22	0.2	0.14	0.18	*	*	0.94	0.17
SILVER	<1.0	14.1 c	3.8	24.5 c	6.3	162 c	0.96	19.2 c	*	*	<0.1	5.35
THALLIUM	<5	<5	<5	<5	<5	<5	<5	<5	*	*	<5	5.0
ZINC	13.7	52	93.5	65	153	90	36.1	82.5	*	*	126	27.3
VANADIUM	21.0	22.9	2100 c	745 c	931 c	161	19.3	19.9	*	*	2680 c	21.1
ALUMINUM	2860	5500	7520	9890	5890	10100	3920	7250	*	*	9060	4100

* Sample not collected

a – TAT analytical TDD# 05-9004-L04

b – Analysis conducted by Core Laboratories, Casper, WY.

c – Value exceeds upper range of typical metal concentrations found in soils.

Shading – Value exceeds three times background levels.

TABLE 7

TYPICAL CONCENTRATIONS OF METALS IN SOILS

METAL	RANGE (PPM)	TYPICAL MEDIAN (PPM)	SOURCE
Aluminum	10,000 – 300,000	71,000	1
Antimony	0.2 – 150	6	1, 2
Arsenic	0.1 – 194	11	3
Barium	100 – 3,000	500	1
Beryllium	0.01 – 40	0.3	1
Cadmium	0.01 – 7	0.5	4
Chromium	5 – 3,000	100	4
Copper	2 – 250	30	1
Lead	<1 – 888	29	3
Mercury	<0.01 – 4.6	0.098	3
Nickle	0.1 – 1,523	50	1, 3
Selenium	0.01 – 38	0.4	1, 4
Silver	<0.01 – 8	0.4	3
Thallium	0.01 – 0.8	0.2	1
Vanadium	3 – 500	100	1, 4
Zinc	1 – 2,000	90	1, 3

1. Bowen, H.J.M., Environmental Chemistry of the Elements, Academic Press, New York, pp. 60–61, 1979.
2. Connors, J.J., Shacklette, H.T., et al., "Background geochemistry of some rocks, soil, plants and vegetables in the conterminous United States." U.S. Geological Survey Professional Paper 574–F, 1975.
3. Ure, A.M., et al., "Elemental constituents of soils." Environmental Chemistry, 2:92–204, 1983.
4. Parr, J.F.; Marsh, P.B.; Kla, J.M. (eds.), Land treatment of hazardous wastes, Noyes Data Corporation Park Ridge, New Jersey, 1983.

TABLE 8

SHIELDALLOY METALLURGICAL CORPORATION
CAMBRIDGE, OHIO

TAT SAMPLE RESULTS – RADIATION ANALYSIS – WATER ab
April 18, 1990

RADIATION SOURCE	SAMPLE STATION											Background Average
	1	2	3	4	5	6	7	8	9	10	11	
	(pCi/L)											
Gross Alpha	5621 c ± 442	4.9 ± 2.7	14.2 ± 4.72	*	7.3 ± 27.0	668 c ± 21.2	0 ± 2.48	58.6 c ± 9.9	0.7 ± 4.8	10.3 ± 2.1	227 c ± 14.2	1875.3
Gross Beta	476.3 d ± 20.4	92.4 d ± 6.0	55.5 d ± 3.2	*	136.3 d ± 19.1	330 d ± 8.6	1 ± 1.6	96.8 d ± 6.0	9.8 ± 3.1	89.4 d ± 4.8	79.4 d ± 4.2	189.9
Gross Gamma	189	65 e	335	*	356	52	34	0	173	102 e	335	69.3
–radium 228	–	65	–	*	–	–	–	–	–	102	–	
–potassium 40	–	–	156	*	259	–	–	–	–	–	238	

* sample not collected

– not detected .

a – TAT analytical TDD# 05-9004-L04

b – Analysis performed by Core Laboratories, Casper, WY.

c – Value exceeds PDWS of 15 pCi/L.

d – Value exceeds PDWS of 50 pCi/L.

e – Value exceeds PDWS of 5 pCi/L.

Shading – Value exceeds three times background levels.

does provide a standard for radium 226/228 set at 5 pCi/L. Sample locations 2 and 10 possessed radium levels exceeding this standard (Table 8). When comparing radiation levels of surface water samples to background levels, gross gamma levels at stations 3, 5, and 11 exceeded background levels by three times or more (Table 8).

4.2.2 Sediment results

Table 9 presents the results of the radiation analysis of the sediment samples. Gross alpha levels at sample locations 4, 6, and 8 were elevated when compared to background levels (Table 9). Gross beta and gamma levels fell below this criteria at all sample locations.

5.0 THREATS TO HUMAN HEALTH AND THE ENVIRONMENT

5.1 Threats related to the National Contingency Plan

Conditions observed at SMC that may be considered in determining the appropriateness of a removal action as set forth in Section 300.415 (b) (2) of the National Contingency Plan include:

- Actual or potential exposure to hazardous substances or pollutants or contaminants by nearby populations, animals or food chain;
- Actual or potential contamination of drinking water supplies or sensitive ecosystems;
- Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released.

5.1.1 Actual or Potential Exposure To Hazardous Substances

Because of it proximity to commercial and residential areas, SMC poses a threat of radiation and metal exposure to the surrounding population. Unrestricted access to the area surrounding the facility increases the likelihood of human exposure to elevated radiation levels and metal concentrations. Fishing, trapping, and swimming have been reported in the waters surrounding the site.

5.1.2 Contamination of Drinking Water Supplies or Ecosystems

Wills Creek and Chapman Run border a large portion of the site and feed directly into the drinking water supply for the City of Cambridge. Elevated levels of certain metals and radiation were evident at sample station 8, the confluence of Chapman Run and Wills Creek, presenting the potential for contamination of city water. Likewise, samples collected from the wetlands west of the site contained elevated levels of certain metals and radiation.

TABLE 9

SHIELDALLOY METALLURGICAL CORPORATION
CAMBRIDGE, OHIO

TAT SAMPLE RESULTS – RADIATION ANALYSIS – SEDIMENT ab
April 18, 1990

RADIATION SOURCE	SAMPLE STATION											Background Average
	1	2	3	4	5	6	7	8	9	10	11	
	(pCi/G)											
Gross Alpha	1.7 ± 6.4	86.5 ± 72.6	8.6 ± 63.2	194 ± 84.1	34.5 ± 66.5	95.2 ± 73.6	0 ± 57.8	289 ± 93.0	*	*	51.3 ± 68.6	29.33
Gross Beta	8.3 ± 3.9	16.6 ± 4.4	11.7 ± 4.2	30.2 ± 5.0	21.3 ± 4.6	28.9 ± 5.0	5.9 ± 3.8	30.2 ± 5.0	*	*	11.6 ± 4.2	10.27
Gross Gamma	6.2	12	3.6	5.7	13.3	11.9	17.3	9.5	*	*	3.3	11.83

* – Sample not collected.

a – TAT analytical TDD# 05-9004-L04

b – Analysis conducted by Core laboratories, Casper, WY.

Shading – Value exceeds three times background levels.

5.1.3 Threat of Release Due to Weather Conditions

The west slag pile extends well into the wetlands and, even though capped, may pose a threat due to weather conditions. Several intermittent streams, originating from rain water running off the slag pile, pose a threat of migration of contaminants. These streams connect directly with Chapman Run presenting the possibility of contaminants migrating from the waste pile during periods of heavy rainfall.

5.2 Specific Threats

Heavy metal contamination and elevated radiation levels are a concern at the SMC site. Specifically, on-site concentrations of vanadium were above background levels in both water and sediment samples. Vanadium compounds, especially vanadium pentoxide, are eye, skin, and respiratory tract irritants. Vanadium exposure may result in nausea, anorexia, and anemia. Several other metals were detected at elevated concentrations, with station 5 possessing especially high concentrations of several of the priority pollutant metals (Tables 3 and 6).

Gamma and beta radiation present in the waters near the site present the major radiation threat associated with SMC. Every sample location, except 7 and 9, exceeded the PDWS for beta radiation. In addition, gamma levels in water samples collected from stations 3, 5, and 11 were at least three times that of background. Furthermore, radium 228 levels exceeded the PDWS at stations 2 and 10. Although the water treatment plant can apparently reduce radiation levels in the drinking water to acceptable levels, a threat exists to those who may use the water upstream from the plant for drinking water or recreation. Trapping, fishing, and swimming have been observed in the area.

6.0 ALTERNATIVE ACTIONS

To more accurately access the health threats posed by the SMC site its is suggested that the following actions be considered:

1. Upstream water and sediment samples should be collected and analyzed for radiation and priority pollutant metals to better define the intluence of strip mines in the area.

2. Water samples from the water treatment reservoir and treatment plant should be collected and analyzed for radiation and priority pollutant metals.

3. A survey of the surrounding area for private wells should be conducted, and sampled for radiation, vanadium, and priority pollutant metals.

4. Site access should be restricted to reduce the possibility of exposure to trespassers.

5. Sampling and analysis of biota from Wills Creek and Chapman Run should be conducted to determine the effect of the contaminants on the food chain.

6. A routine sampling of ground water and surface water runoff from the site should be established in order to ascertain seasonal variations in migration of contaminants from the site.

ATTACHMENT A

SITE PHOTOGRAPHS

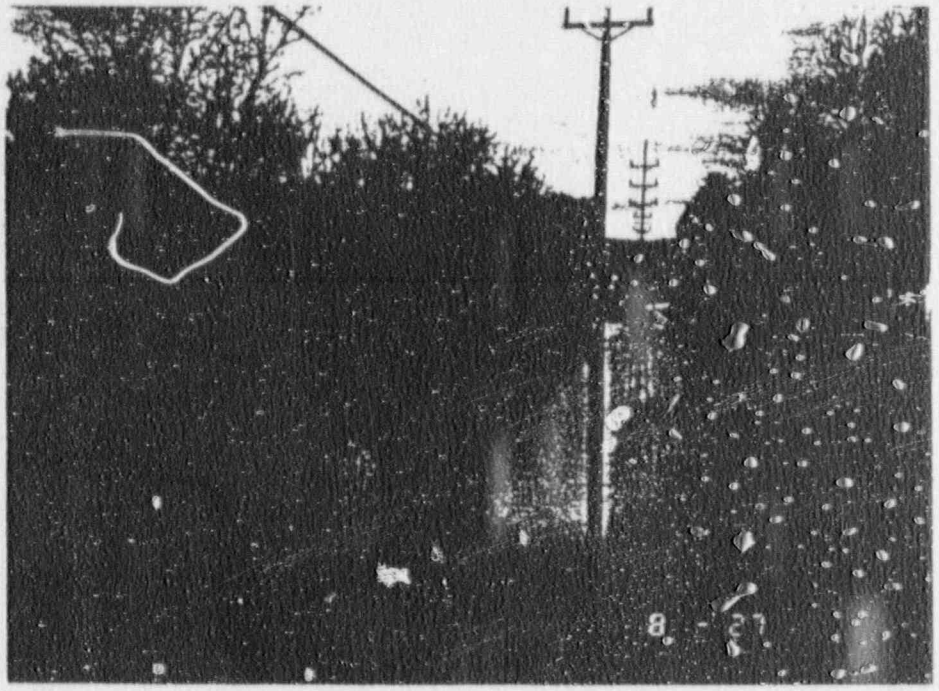

PHOTO:1 PCS# 2593
ROLL/PICTURE: 3/1
SITE NAME: SHIELDALLOY METALLURGICAL
DESCRIPTION: FLOODED WETLANDS NORTHWEST OF SMC PLANT. VIEW LOOKING NORTHWEST.
DATE/TIME: 4-11-90 / 0825
PHOTOGRAPHER: MENCIN
FILM: 35MM,200 ASA, NO ATTACHMENTS

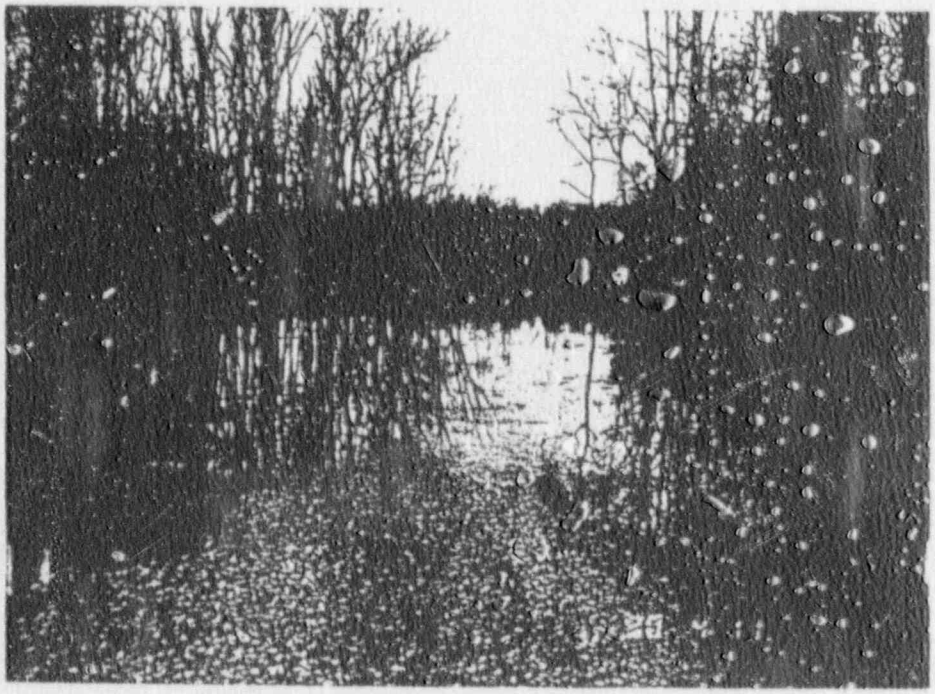

PHOTO:2 PCS# 2593
ROLL/PICTURE: 3/3
SITE NAME: SHIELDALLOY METALLURGICAL
DESCRIPTION: FLOODED WETLANDS NORTH OF WEST PILE. VIEW LOOKING WEST.
DATE/TIME: 4-11-90 / 0830
PHOTOGRAPHER: MENCIN
FILM: 35MM, 200 ASA, NO ATTACHMENTS

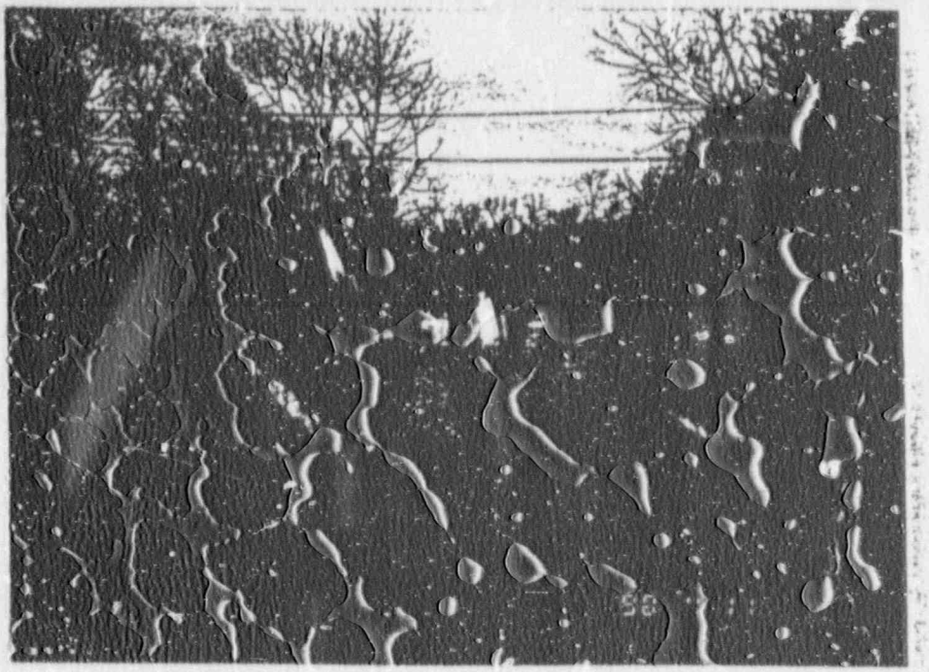

PHOTO:3 PCS# 2593
ROLL/PICTURE: 3/5
SITE NAME: SHIELDALLOY METALLURGICAL
DESCRIPTION: FLOODING ALONG CHAPMAN RUN JUST NORTH OF STATE ROUTE 209.
DATE/TIME: 4-11-90 / 0835
PHOTOGRAPHER: MENCIN
FILM: 35MM, 200 ASA, NO ATTACHMENTS

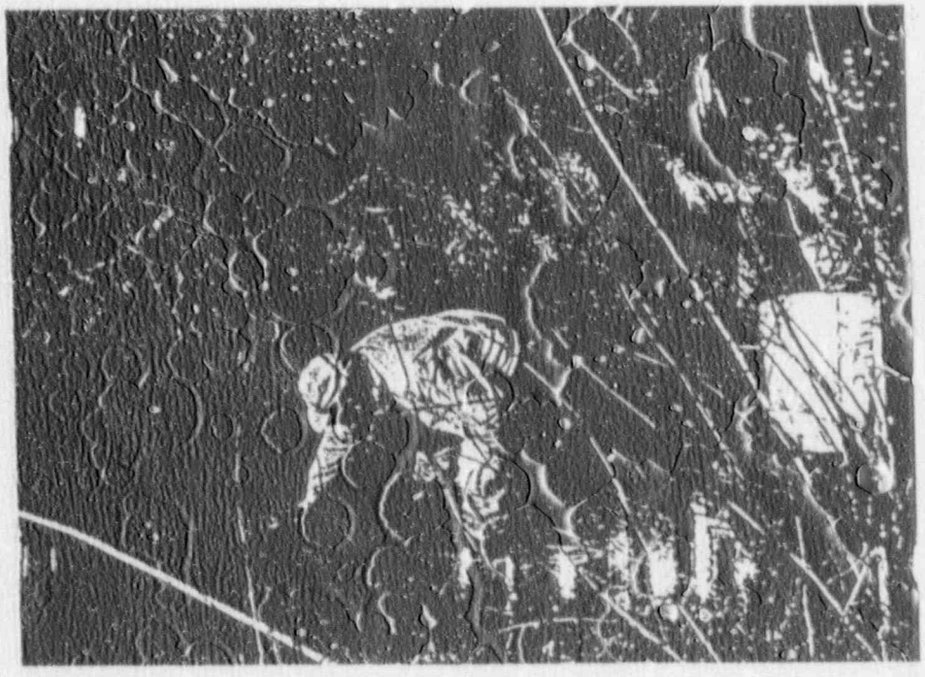

PHOTO:4 PCS# 2593
ROLL/PICTURE: 3/6
SITE NAME: SHIELDALLOY METALLURGICAL
DESCRIPTION: TAT COLLECTS WATER SAMPLES FROM AN UNNAMED TRIBUTARY OF CHAPMAN RUN; STATION 2.
DATE/TIME: 4-18-90 / 0930
PHOTOGRAPHER: MALSCH
FILM: 35MM, 200 ASA, NO ATTACHMENTS

PHOTO:5 PCS# 2593
ROLL/PICTURE: 3/3
SITE NAME: SHIELDALLOY METALLURGICAL
DESCRIPTION: SMC REPRESENTATIVE SAMPLES AN UNNAMED TRIBUTARY OF CHAPMAN RUN. STATION 1.
DATE/TIME: 4-18-90 / 0959
PHOTOGRAPHER: ME CIN
FILM: 35 MM, 200 ASA, NO ATTACHMENTS

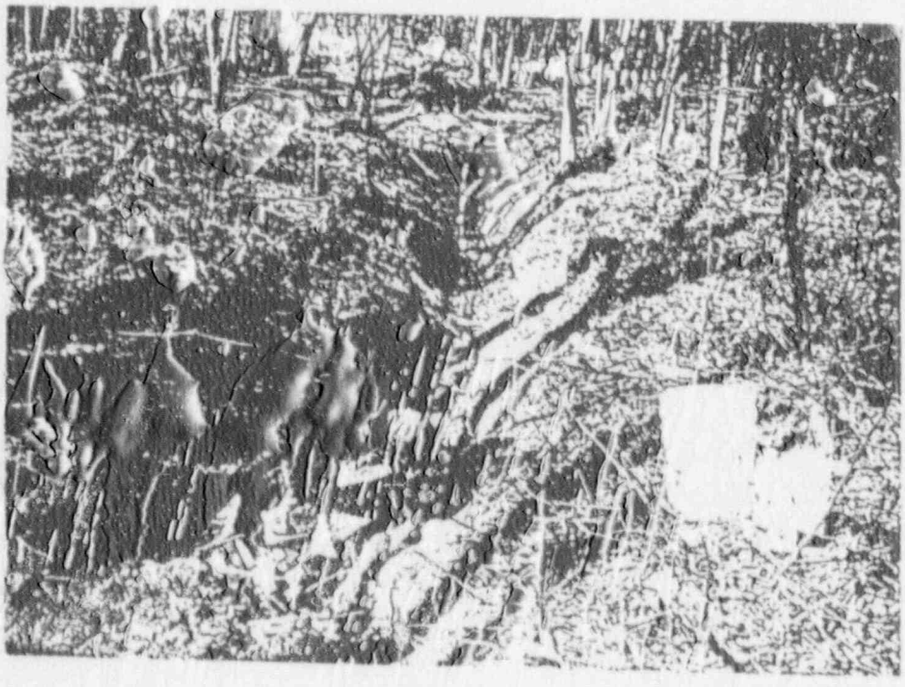

PHOTO:6 PCS# 2593
ROLL/PICTURE: 3/11
SITE NAME: SHIELDALLOY METALLURGICAL
DESCRIPTION: TAT COLLECTS WATER SAMPLE AT STATION 5 FROM AN UNNAMED TRIBUTARY OF CHAPMAN RUN.
DATE/TIME: 4-18-90 / 1053
PHOTOGRAPHER: MENCIN
FILM: 35MM, 200 ASA, NO ATTACHMENTS

PHOTO:7 PCS# 2593
ROLL/PICTURE: 2/12
SITE NAME: SHIELDALLOY METALLURGICAL
DESCRIPTION: TAT COLLECTS SEDIMENT SAMPLE AT STATION 5 FROM AN UNNAMED TRIBUTARY OF CHAPMAN RUN.
DATE/TIME: 4-18-90 / 1058
PHOTOGRAPHER: MERCIN
FILM: 35MM, 200 ASA, NO ATTACHMENTS

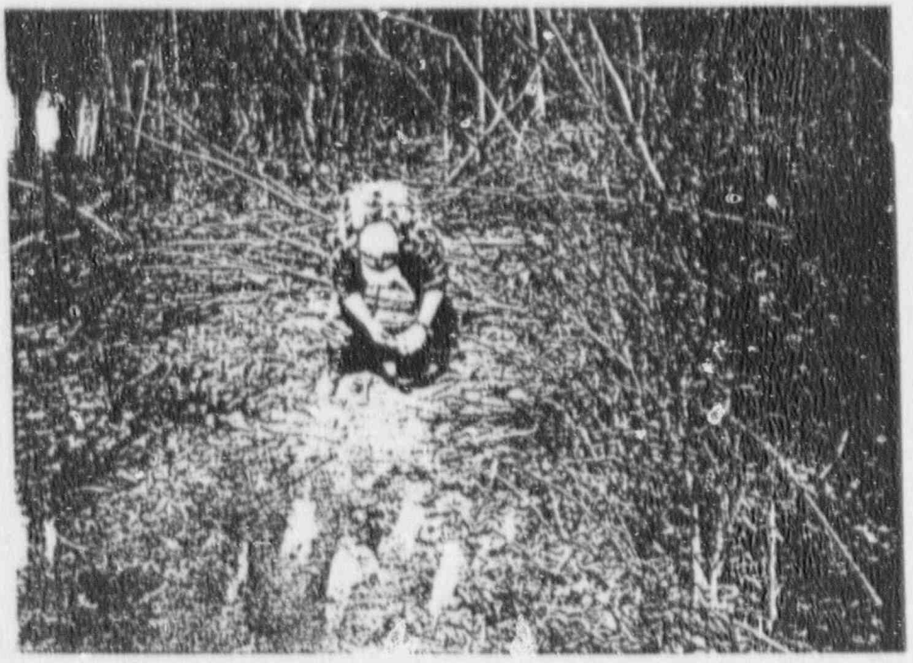

PHOTO:8 PCS# 2593
ROLL/PICTURE: 3/13
SITE NAME: SHIELDALLOY METALLURGICAL
DESCRIPTION: TAT COLLECTS SEDIMENT SAMPLE AT STATION 4.

DATE/TIME: 4-18-90 / 1132
PHOTOGRAPHER: DOOLEY
FILM: 35MM, 200 ASA, NO ATTACHMENTS

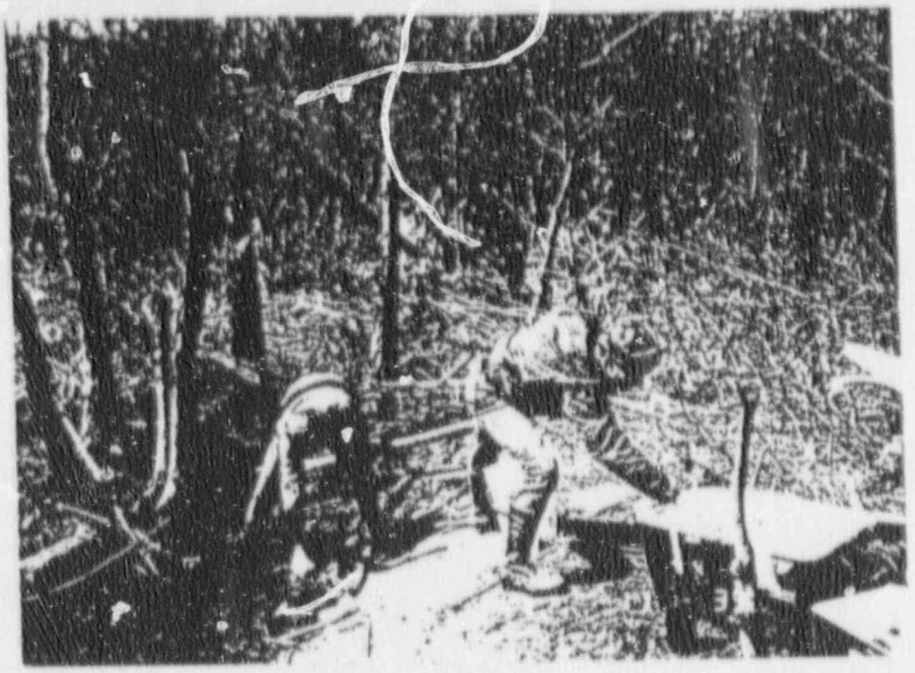

PHOTO:9 PCS# 2593
ROLL/PICTURE: 3/14
SITE NAME: SHIELDALLOY METALLURGICAL
DESCRIPTION: TAT & SMC REPRESENTATIVE COLLECT WATER SAMPLES AT STATION 3.
DATE/TIME: 4-18-90 / 1146
PHOTOGRAPHER: MENCIN
FILM: 35MM, 200 ASA, NO ATTACHMENTS

PHOTO:10 PCS# 2593
ROLL/PICTURE: 3/16
SITE NAME: SHIELDALLOY METALLURGICAL
DESCRIPTION: DUST CLOUD GENERATED FROM HEAVY EQUIPMENT OPERATION ON SMC PROPERTY.
DATE/TIME: 4-18-90 / 1236
PHOTOGRAPHER: HALSCH
FILM: 35MM, 200 ASA, NO ATTACHMENTS

PHOTO:11
ROLL/PICTURE:
SITE NAME:
DESCRIPTION:

DATE/TIME:
PHOTOGRAPHER:
FILM:

PCS# 2593
3/20
SHIELDALLOY METALLURGICAL
TAT COLLECTS WATER SAMPLE AT STATION 8;
CONFLUENCE OF CHAPMAN RUN & WILLS CREEK.
4-18-90 / 1402
DOOLEY
35MM, 200 ASA, NO ATTACHMENTS

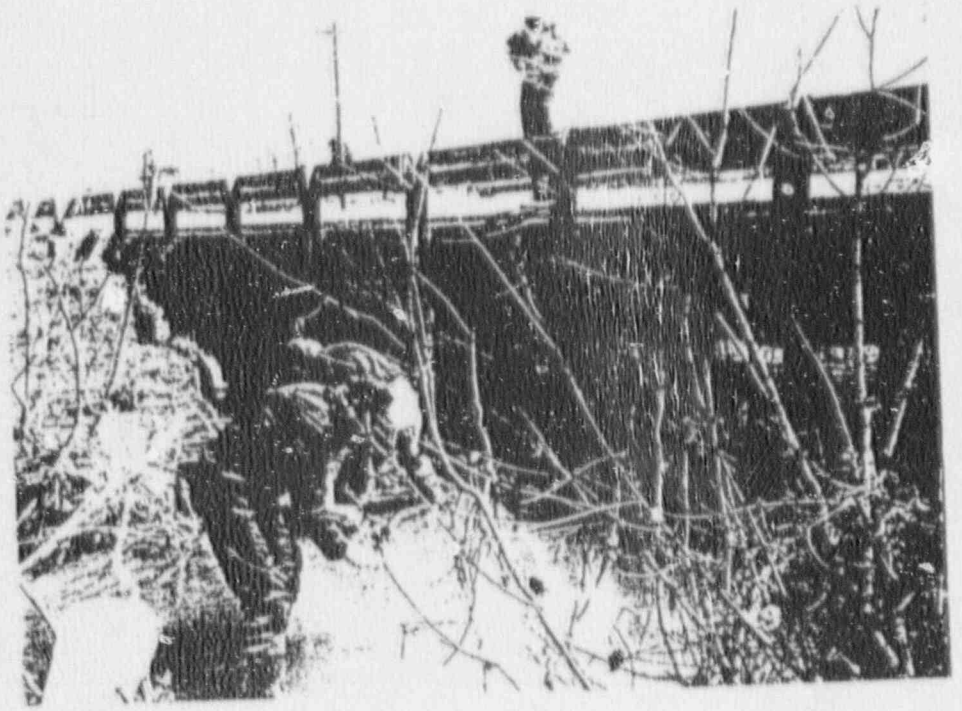

PHOTO:12
ROLL/PICTURE:
SITE NAME:
DESCRIPTION:

DATE/TIME:
PHOTOGRAPHER:
FILM:

PCS# 2593
3/22
SHIELDALLOY METALLURGICAL
TAT COLLECTS SAMPLE AT CHAPMAN RUN AS IT
CROSSES STATE ROUTE 209; STATION 7.
4-18-90 / 1449
MENCIN
35MM, 200 ASA, NO ATTACHMENTS

PHOTO:13 PCS# 2573
ROLL/PICTURE: 3/23
SITE NAME: SKIELDALLOY METALLURGICAL
DESCRIPTION: TAT & SMC REPRESENTATIVE COLLECT SAMPLES FROM CHAPMAN RUN NW OF SMC; STATION 6.
DATE/TIME: 4-18-90 / 1535
PHOTOGRAPHER: MALSCh
FILM: 35MM, 200 ASA, NO ATTACHMENTS