R-026-202.1

3183

REMOVAL SITE EVALUATION SCRAP METAL PILES

04-01-92

XX/XX
25
ENCLOSURE

[redacted]

3183

Removal Site Evaluation
Scrap Metal Piles

Environmental Remedial Action Project
Fernald Environmental Management Project
Fernald, Ohio

WEMCO Subcontract No. 2-21487
April 1992
Revision No. 0

Operable Unit 3, Project Order 17

PARSONS

Fairfield Executive Center
6120 South Gilmore Road
Fairfield, Ohio 45014

3183

Removal Site Evaluation
Scrap Metal Piles

Environmental Remedial Action Project
Fernald Environmental Management Project
Fernald, Ohio

WEMCO Subcontract No. 2-21487
April 1992
Revision No. 0

Operable Unit 3, Project Order 17

PARSONS

Fairfield Executive Center
6120 South Gilmore Road
Fairfield, Ohio 45014

Removal Site Evaluation
Scrap Metal Piles

3183

CONTENTS

SECTION

1.0	Introduction	1-1
2.0	Source Term	2-1
3.0	Evaluation of Potential Threat	3-1
4.0	Assessment of the Need for a Removal Action	4-1
5.0	Appropriateness of a Response	5-1
6.0	References	6-1

LIST OF FIGURES

3183

1-1	Operable Unit 3 Quadrant Map
1-2	Scrap Metal Pile Location
1-3	Scrap Copper Pile Locations
2-1	Subsurface Soil Boring and Surface Soil Sampling Locations
2-2	Piezometer Locations/Groundwater Radiological Results
2-3	Air Monitoring Locations

LIST OF TABLES

3183

2-1 Subsurface and Surface Soil Radiological Data
2-2 Air Monitoring Results from August 1989 through July 1990

LIST OF ACRONYMS AND ABBREVIATIONS

3183

CFR	Code of Federal Regulations
DOE	United States Department of Energy
dpm	disintegrations per minute
FEMP	Fernald Environmental Management Project
μg/g	micrograms per gram
μg/l	micrograms per liter
mrem	millirems
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
OU	Operable Unit
pCi/g	picoCuries per gram
pCi/l	picoCuries per liter
RCMSP	Radioactively Contaminated Metal Segregation Project
RI/FS	Remedial Investigation/Feasibility Study
RSE	Removal Site Evaluation

SECTION 1

3183

INTRODUCTION

This Removal Site Evaluation (RSE) is presented to assist the United States Department of Energy (DOE) (lead agency) in determining the scope for a removal action to address the potential threat of a release from the stockpiled low-level radioactively contaminated scrap metal piles and copper piles located at the Fernald Environmental Management Project (FEMP). The removal action is specified as Removal Action Number 15 (RA-15) in the Amended Consent Agreement which was signed in September 1991. Refuse metal will be handled under Removal Action 9, "Removal of Waste Inventories," Part I. Newly generated scrap metal will be handled under Removal Action 17, "Improved Storage of Soil and Debris." Figure 1-1 presents the production area and how the production area has been divided into quadrants. The scrap metal and copper piles are both referenced in the figure.

The scrap metal piles are located on the Decontamination Building (B69) pad in the northeast corner of the northeast quadrant of the Production Area for Operable Unit 3 (OU-3) as shown in Figure 1-2. The scrap copper piles are located on the northwest section of the drum storage pad, also in OU-3, as shown in Figure 1-3.

The scrap metal, with the exception of the scrap copper, was generated at the FEMP as a result of past on- site demolition projects, abandoned equipment, and the upgrade of facilities and vehicles. The copper was generated as a result of the Cascade Improvements/Cascade Upgrades project conducted at the DOE Gaseous Diffusion plant located in Paducah, Kentucky. The copper was sent to the FEMP for shredding and casting. However, the FEMP casting operations were abandoned because locations for disposition of resultant castings could not be identified. As a result, the scrap copper is currently being stored on the FEMP Plant 1 storage pad.

In May 1987, the scrap metal on the B69 pad was segregated as part of the Radioactively Contaminated Metal Segregation Project (RCMSP). The segregation was based on material thickness and recovery potential. The RCMSP segregated the scrap metal into recoverable and refuse metal categories, and further into recoverable ferrous and non-ferrous high-count radioactivity and low-count radioactivity categories. The separation between high count and low count are 200,000 disintegrations per minute (dpm)/window area.

The recoverable scrap metals which include the low-level radioactive ferrous and non-ferrous metals on the B69 pad and scrap copper located on the Plant 1 storage pad have the following inventory:

1) 3,300 tons of high-count and low-count recoverable ferrous and non-ferrous metals
2) 1,370 tons of copper

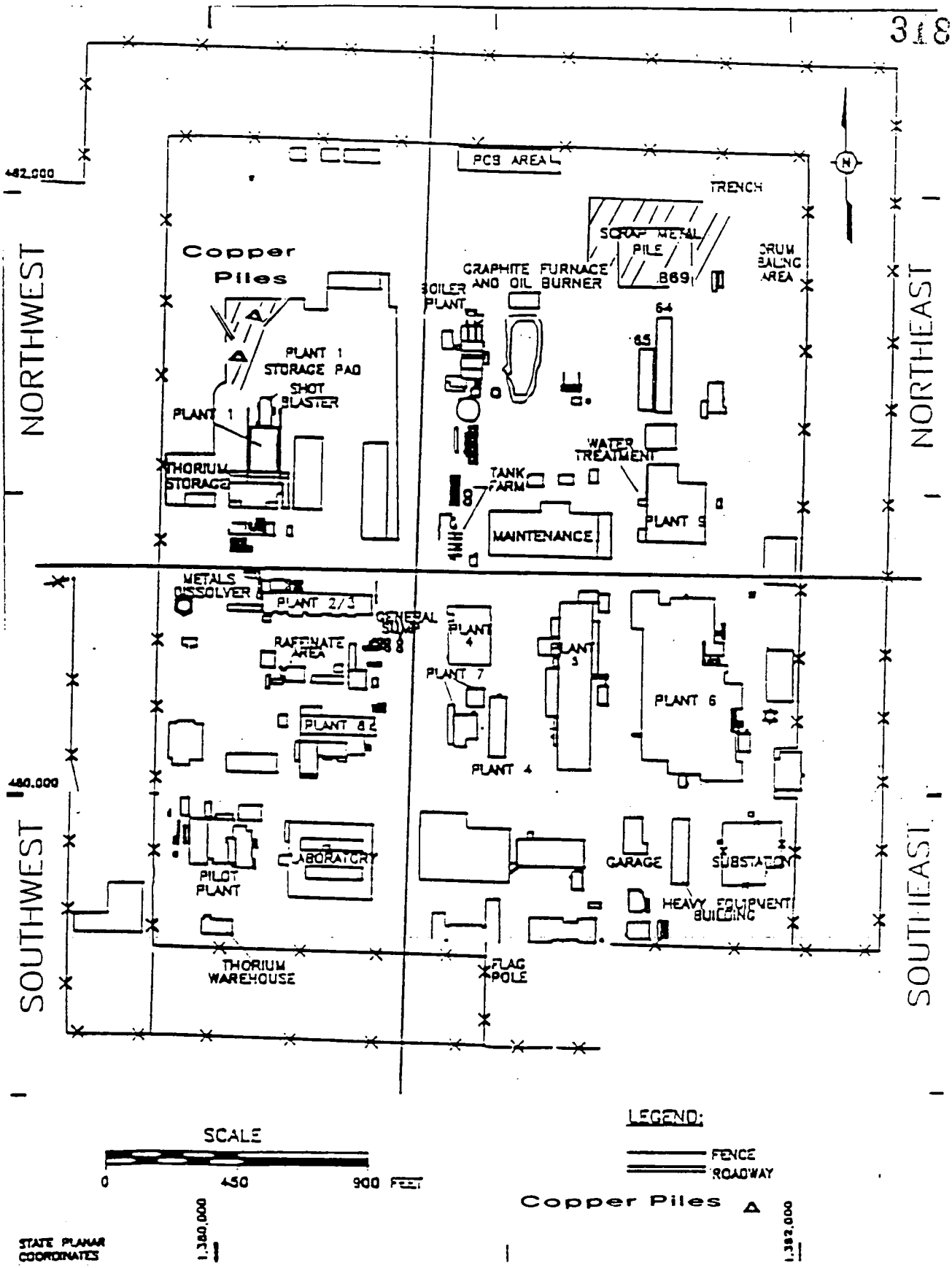


Figure 1-1 - Operable Unit 3 Quadrant Map

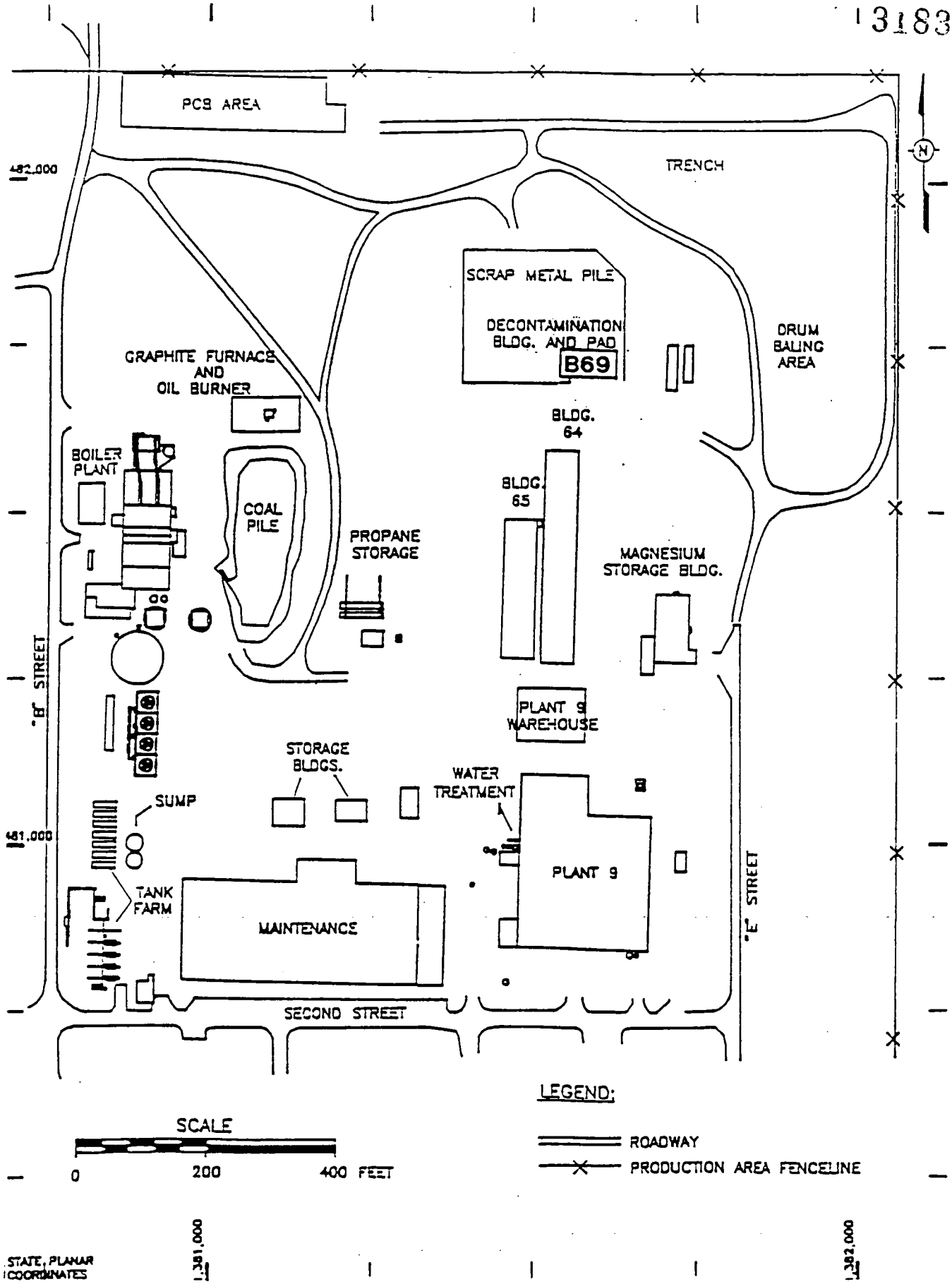


Figure 1-2 - Scrap Metal Pile Locations

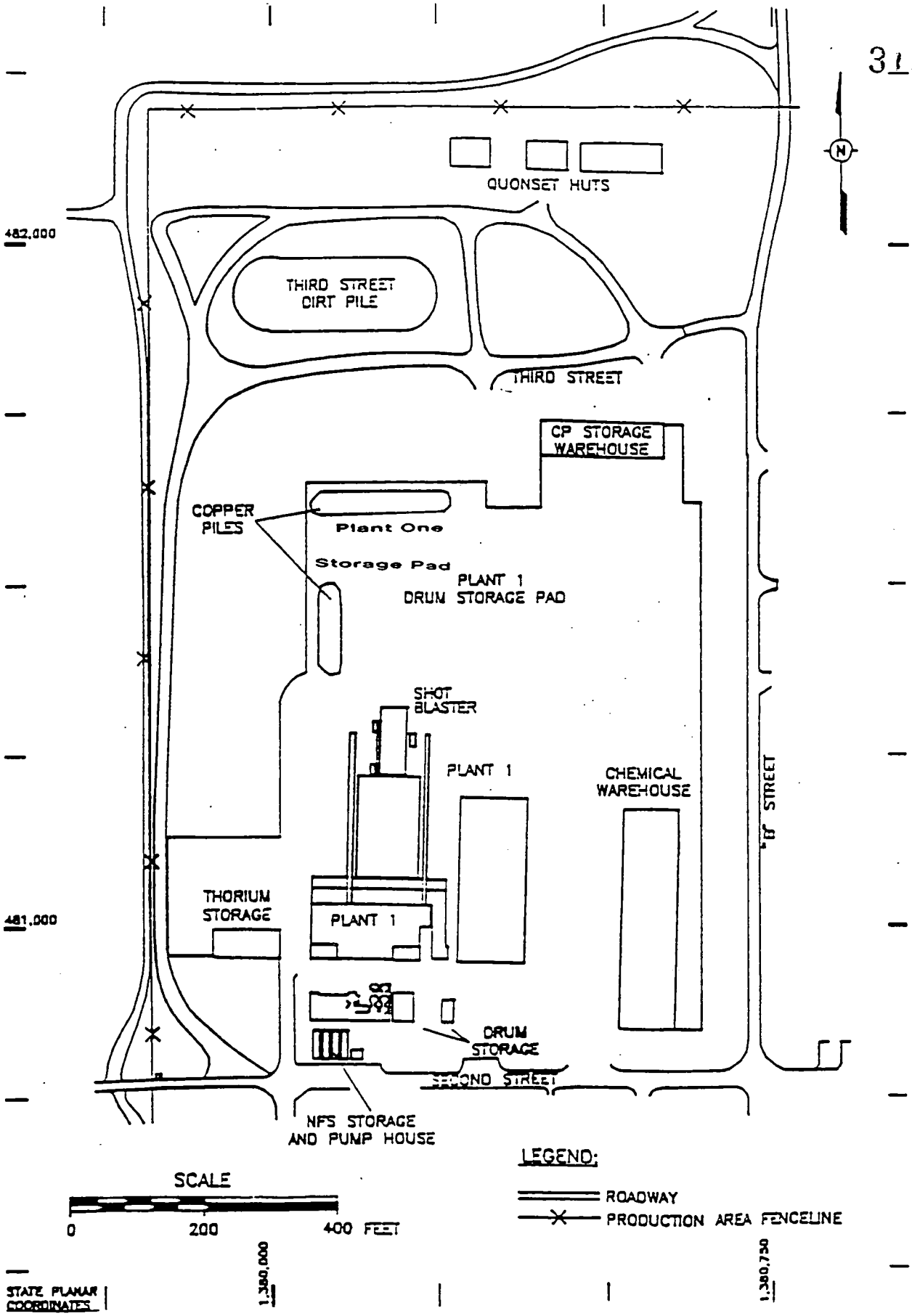


Figure 1-3 - Scrap Copper Pile Locations

SECTION 2

SOURCE TERM

Open storage of the contaminated scrap metals and abandoned equipment represent a potential source of contamination. The ongoing Remedial Investigation/Feasibility Study (RI/FS) includes analysis of present and potential exposure pathways for contaminants originating from the scrap metal piles.

Elevated uranium concentrations in surface and subsurface soils, perched groundwater, and fugitive airborne releases have been detected near the scrap metal piles. Twenty-one surface and subsurface soil samples from nine sampling locations were collected in the immediate vicinity of the scrap metal pile (reference Figure 2-1). The subsurface borings were completed in 1990, and the surface soil samples were obtained in the spring of 1988. Boring depths ranged from 0.0 to 6.5 feet below ground surface. The total uranium levels from the boring(s) samples ranged from 27 micrograms per gram (μg/g) to 246 μg/g (approximately 170 picoCuries per gram [pCi/g]). Total uranium levels from surface soil samples in the immediate vicinity of the scrap metal piles ranged from 12 μg/g to 148 μg/g (approximately 8 to 102 pCi/g) (reference Table 2-1). Surface soil samples ranged from 0 to 6 inches below ground surface. The uranium-contaminated soil(s) (greater than 200 μg/g) in and around the scrap metal pile in the northeast quadrant is predominantly found in the upper surface (0 to 6 inches). No standards currently exist for radiological contamination levels in soil (other than thorium or radium). The Baseline Risk Assessment and RI/FS Remedy Selection Process will be the vehicle for determining final clean-up levels, including radiological levels in soils.

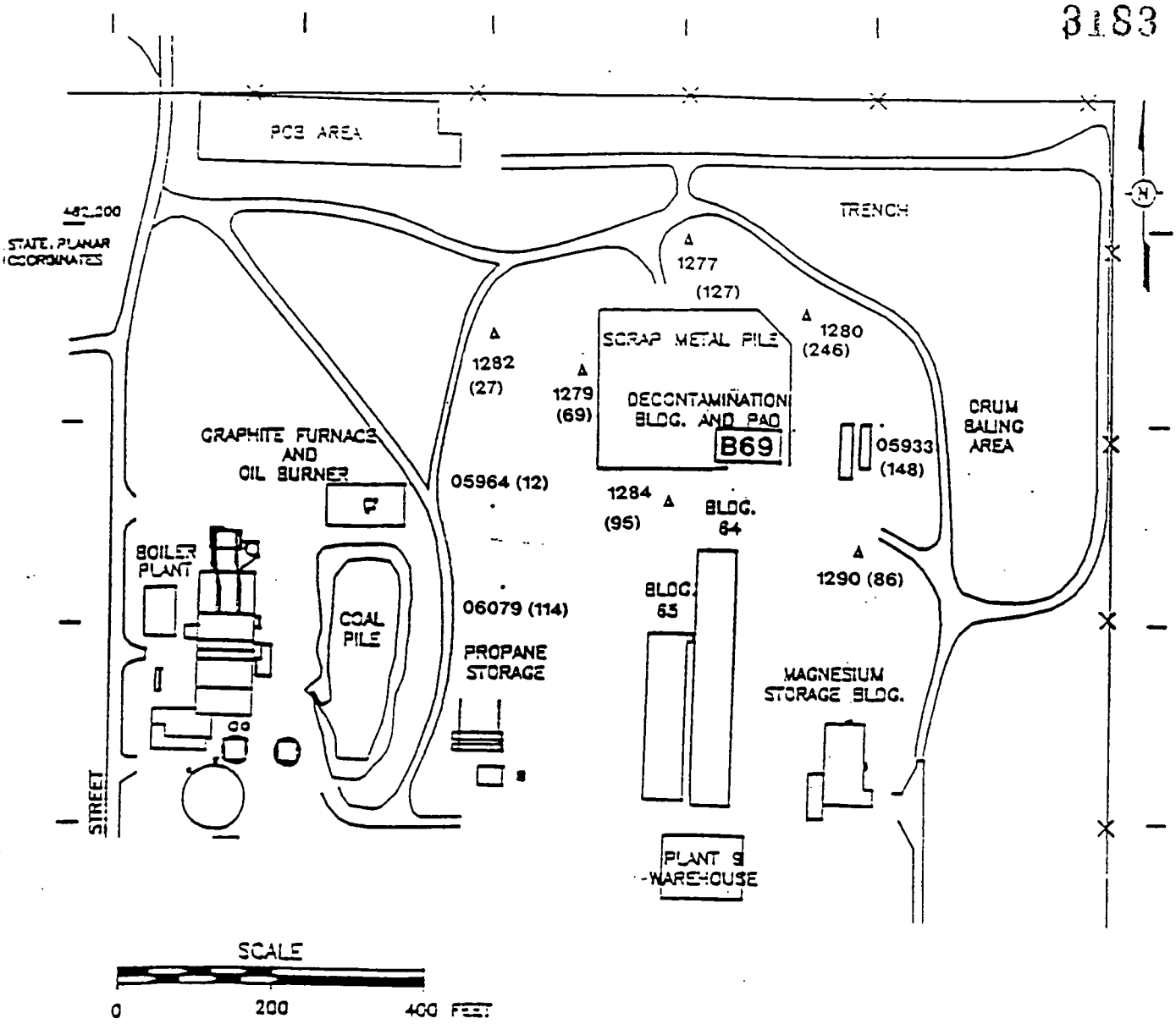
Perched groundwater has been monitored for uranium around the scrap metal pile. Piezometers were installed within three of the above referenced subsurface borings to a depth of 20 feet. The piezometers located on the north and west edges of the scrap metal pile indicate 493 and 463 micrograms per liter (μg/l) (approximately 340 and 319 picoCuries per liter [pCi/l]) total uranium, respectively. An additional piezometer located on the eastern side of the scrap pile exhibited 53 μg/l (approximately 37 pCi/l) total uranium. Stormwater and surface water runoff appear to be leaking surface contaminants through the vadose zone into the perched groundwater around the scrap metal pile and throughout the northeast quadrant. As a result, virtually all piezometers throughout the northeastern portion of the northeast quadrant contain uranium at concentrations that are at least an order of magnitude above the background of approximately 2μg/l. Title 40 Code of Federal Regulations (CFR) 141 establishes EPA regulations governing maximum contaminant levels (MCLs) for uranium. This allowable regulatory level for total uranium is 20 μg/l or 30 pCi/l. Figure 2-2 illustrates piezometer locations and groundwater radiological results around the scrap metal piles.

This RSE has been prepared in accordance with Section 40 CFR 300.410 of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and the Amended Consent Agreement of September 1991. This RSE addresses the low-level radioactive scrap metal and copper piles and has been completed to support a decision as to the extent to which the present conditions warrant a removal action.

Removable contamination levels exhibited on the recoverable low-count scrap metal are generally less than 1,000 dpm/100 cm^2 beta/gamma, with some total (removable and fixed) contamination exceeding 100,000 dpm/window area. The separation between high- and low-count radioactivity is 200,000 dpm/window area. As stated in the Nuclear Regulatory Commission (NRC) Regulatory Guide 1.86, acceptable surface contamination levels for free release of materials for alpha, beta, and gamma emissions are 5,000 dpm/100 cm^2 removable. DOE Order 5400.5 also establishes the same free release level for surface radioactive contamination. It is our understanding that NRC plans to initiate a participative rule making to establish a residual radioactivity level for purposes of NRC licensee decommissioning. This rule would likely become an ARAR in the future for similar CERCLA actions and would apply to scrap metal free release. Average values correspond to the sum of fixed and removable contaminants on the surface of the scrap metal materials tested.

The presence of uranium in the perched groundwater in the vicinity of the scrap metal pile lends evidence that vertical migration could be occurring as a result of the scrap metal pile contamination.

Due to elevated uranium concentrations in fugitive airborne releases, nine defined air monitoring locations were established to determine radiological emissions at the boundary of the FEMP. One of the nine air monitoring locations (Air Monitoring Location 9) was located in the vicinity of the scrap metal pile (reference Figure 2-3). Air monitoring data from August 1989 through July 1990 showed that Air Monitoring Location 9 was four times higher than the other eight sampling locations, indicating that the scrap metal piles could be a potential contributor to identified airborne contamination. The Clean Air Act states that the air pathway cannot contribute more than 10 mrem effective dose in 1 year to a member of the public. Allowable limits for uranium isotopes (various isotopes) can be derived from DOE Orders 5480.11 and 5400.5 for radioactive airborne and surface water emissions. Table 2-2 presents the air monitoring data from August 1989 through July 1990.



LEGEND:

- ROADWAY
- PRODUCTION AREA FENCELINE
- ▲ BORING LOCATIONS (0.0 TO 6.5 FT)
- • SURFACE SOIL SAMPLING (0.0 TO 0.5 FT)
- (53) URANIUM CONCENTRATION (μg/g)

Figure 2-1 - Subsurface Soil Boring and Surface Soil Sampling Locations

Surface Soil Radiological Results RI/FS Data*			
Radiological Parameters	**N 481750 E 1381750 05933 0 - 6**	**N 481750 E 1381250 05964 0 - 6**	**N 481500 E 1381250 06079 0 - 6**
Cesium 137	< 0.6 ± 0.1	< 0.2	0.5 ± 0.1
Neptunium 237	< 0.6	< 0.6	< 0.6
Plutonium 238	< 0.6	< 0.6	< 0.6
Plutonium 239/240	< 0.6	< 0.6	< 0.6
Radium 226	2.9 ± 0.2	0.9 ± 0.1	1.8 ± 0.1
Radium 228	2.3 ± 0.2	0.7 ± 0.1	1.3 ± 0.1
Ruthenium 106	< 1.0	< 1.0	< 1.0
Strontium 90	< 0.5	< 0.5	< 0.5
Technetium 99	1.5 ± 0.5	< 0.9	2.6 ± 0.5
Thorium 228	2.8 ± 0.4	0.9 ± 0.2	1.4 ± 0.3
Thorium 230	9.3 ± 1.2	1.3 ± 0.3	3.4 ± 0.6
Thorium 232	2.5 ± 0.4	0.6 ± 0.2	1.4 ± 0.3
Total Thorium **	2.5	0.6	1.4
Uranium 234	52.1 ± 7.6	4.2 ± 0.6	40.6 ± 5.8
Uranium 235/236	4.0 ± 0.8	< 0.6	2.8 ± 0.6
Uranium 238	70.7 ± 10.0	4.8 ± 0.7	39.4 ± 5.7
Total Uranium **	148.0 ± 15.0	12.0 ± 2.0	114.0 ± 12.0
* Data validation in progress			
** Results reported in ug/g			

SubSurface Soil Radiological Data

Results in picoCuries per gram (pCi/g). Data presented by well ID, sample number, and depth in feet. NA indicates not analyzed; a number preceded by a "less than" symbol indicates that the compound was not present above the detection limit of the analytical instrument.

Radiological Parameters	**1277 18663 0.0 - 0.5**	**1277 18667 2.0 - 2.5**	**1277 18672 4.5 - 5.0**
Cesium 137	< 0.2	NA	NA
Neptunium 237	< 0.6	NA	NA
Plutonium 238	< 0.6	NA	NA
Plutonium 239/240	< 0.6	NA	NA
Radium 226	1.4 ± 0.2	NA	NA
Radium 228	1.2 ± 0.3	NA	NA
Ruthenium 106	< 1.2	NA	NA
Strontium 90	< 0.5	NA	NA
Technetium 99	5.1 ± 0.8	NA	NA
Thorium 228	< 0.6	NA	NA
Thorium 230	1.4 ± 0.5	NA	NA
Thorium 232	< 0.6	NA	NA
Total Thorium **	< 23.0	< 23.0	< 23.0
Uranium 234	52.6 ± 11.0	NA	NA
Uranium 235/236	5.0 ± 1.6	NA	NA
Uranium 238	58.5 ± 12.0	NA	NA
Total Uranium **	127.0	11.0	51.0

* Data validation in progress

** Results reported in ug/g

Table 2-1 - Subsurface and Surface Soil Radiological Data (Sheet 3 of 7)

Radiological Parameters	1279 18707 0.0 - 0.5	1279 18713 3.0 - 3.5	1279 18719 6.0 - 6.5
Cesium 137	NA	NA	NA
Neptunium 237	NA	NA	NA
Plutonium 238	NA	NA	NA
Plutonium 239/240	NA	NA	NA
Radium 226	NA	NA	NA
Radium 228	NA	NA	NA
Ruthenium 106	NA	NA	NA
Strontium 90	NA	NA	NA
Technetium 99	NA	NA	NA
Thorium 228	NA	NA	NA
Thorium 230	NA	NA	NA
Thorium 232	NA	NA	NA
Total Thorium **	< 23.0	< 23.0	< 23.0
Uranium 234	NA	NA	NA
Uranium 235/236	NA	NA	NA
Uranium 238	NA	NA	NA
Total Uranium **	69.0	19.0	11.0
* Data validation in progress			
** Results reported in ug/g			

Radiological Parameters	1280 18729 0.0 - 0.5	1280 18733 2.0 - 2.5	1280 18739 5.0 - 5.5
Cesium 137	< 0.4	NA	NA
Neptunium 237	< 0.6	NA	NA
Plutonium 238	< 0.6	NA	NA
Plutonium 239/240	< 0.6	NA	NA
Radium 226	< 1.1	NA	NA
Radium 228	3.0 ± 0.8	NA	NA
Ruthenium 106	< 4.4	NA	NA
Strontium 90	< 0.5	NA	NA
Technetium 99	4.8 ± 0.8	NA	NA
Thorium 228	1.5 ± 0.5	NA	NA
Thorium 230	3.1 ± 0.9	NA	NA
Thorium 232	0.9 ± 0.4	NA	NA
Total Thorium **	35.0	< 23.0	< 23.0
Uranium 234	69.0 ± 17.0	NA	NA
Uranium 235/236	5.3 ± 2.0	NA	NA
Uranium 238	96.9 ± 24.0	NA	NA
Total Uranium **	246.0	11.0	11.0
* Data validation in progress			
** Results reported in ug/g			

Table 2-1 - Subsurface and Surface Soil Radiological Data (Sheet 5 of 7)

Radiological Parameters	1282 18773 0.0 - 0.5	1282 18777 2.0 - 2.5	1282 18782 4.5 - 5.0
Cesium 137	NA	NA	NA
Neptunium 237	NA	NA	NA
Plutonium 238	NA	NA	NA
Plutonium 239/240	NA	NA	NA
Radium 226	NA	NA	NA
Radium 228	NA	NA	NA
Ruthenium 106	NA	NA	NA
Strontium 90	NA	NA	NA
Technetium 99	NA	NA	NA
Thorium 228	NA	NA	NA
Thorium 230	NA	NA	NA
Thorium 232	NA	NA	NA
Total Thorium **	< 23.0	< 23.0	< 23.0
Uranium 234	NA	NA	NA
Uranium 235/236	NA	NA	NA
Uranium 238	NA	NA	NA
Total Uranium **	27.0	11.0	12.0
* Data validation in progress			
** Results reported in ug/g			

Table 2-1 - Subsurface and Surface Soil Radiological Data (Sheet 6 of 7)

Radiological Parameters	1284 18817 0.0 - 0.5	1284 18821 2.0 - 2.5	1284 18827 5.0 - 5.5
Cesium 137	NA	NA	NA
Neptunium 237	NA	NA	NA
Plutonium 238	NA	NA	NA
Plutonium 239/240	NA	NA	NA
Radium 226	NA	NA	NA
Radium 228	NA	NA	NA
Ruthenium 106	NA	NA	NA
Strontium 90	NA	NA	NA
Technetium 99	NA	NA	NA
Thorium 228	NA	NA	NA
Thorium 230	NA	NA	NA
Thorium 232	NA	NA	NA
Total Thorium **	33.0	< 23.0	< 23.0
Uranium 234	NA	NA	NA
Uranium 235/236	NA	NA	NA
Uranium 238	NA	NA	NA
Total Uranium **	95.0	11.0	11.0
* Data validation in progress			
** Results reported in ug/g			

Radiological Parameters	1290 18949 0.0 - 0.5	1290 18953 2.0 - 2.5	1290 18959 5.0 - 5.5
Cesium 137	NA	NA	NA
Neptunium 237	NA	NA	NA
Plutonium 238	NA	NA	NA
Plutonium 239/240	NA	NA	NA
Radium 226	NA	NA	NA
Radium 228	NA	NA	NA
Ruthenium 106	NA	NA	NA
Strontium 90	NA	NA	NA
Technetium 99	NA	NA	NA
Thorium 228	NA	NA	NA
Thorium 230	NA	NA	NA
Thorium 232	NA	NA	NA
Total Thorium **	36.0	< 23.0	< 23.0
Uranium 234	NA	NA	NA
Uranium 235/236	NA	NA	NA
Uranium 238	NA	NA	NA
Total Uranium **	86.0	13.0	11.0
* Data validation in progress			
** Results reported in ug/g			

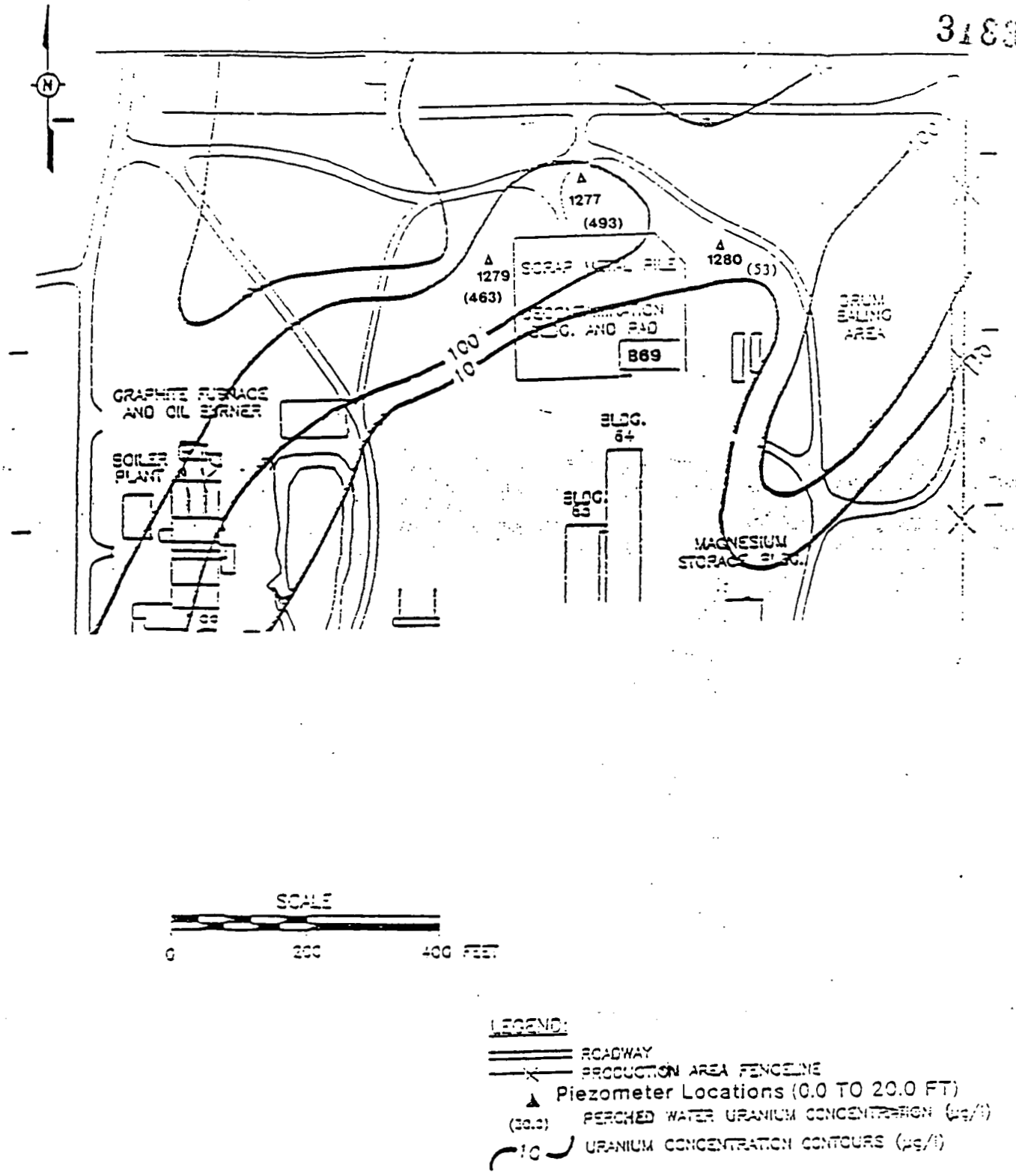


Figure 2-2 - Piezometer Locations/Groundwater Radiological Results

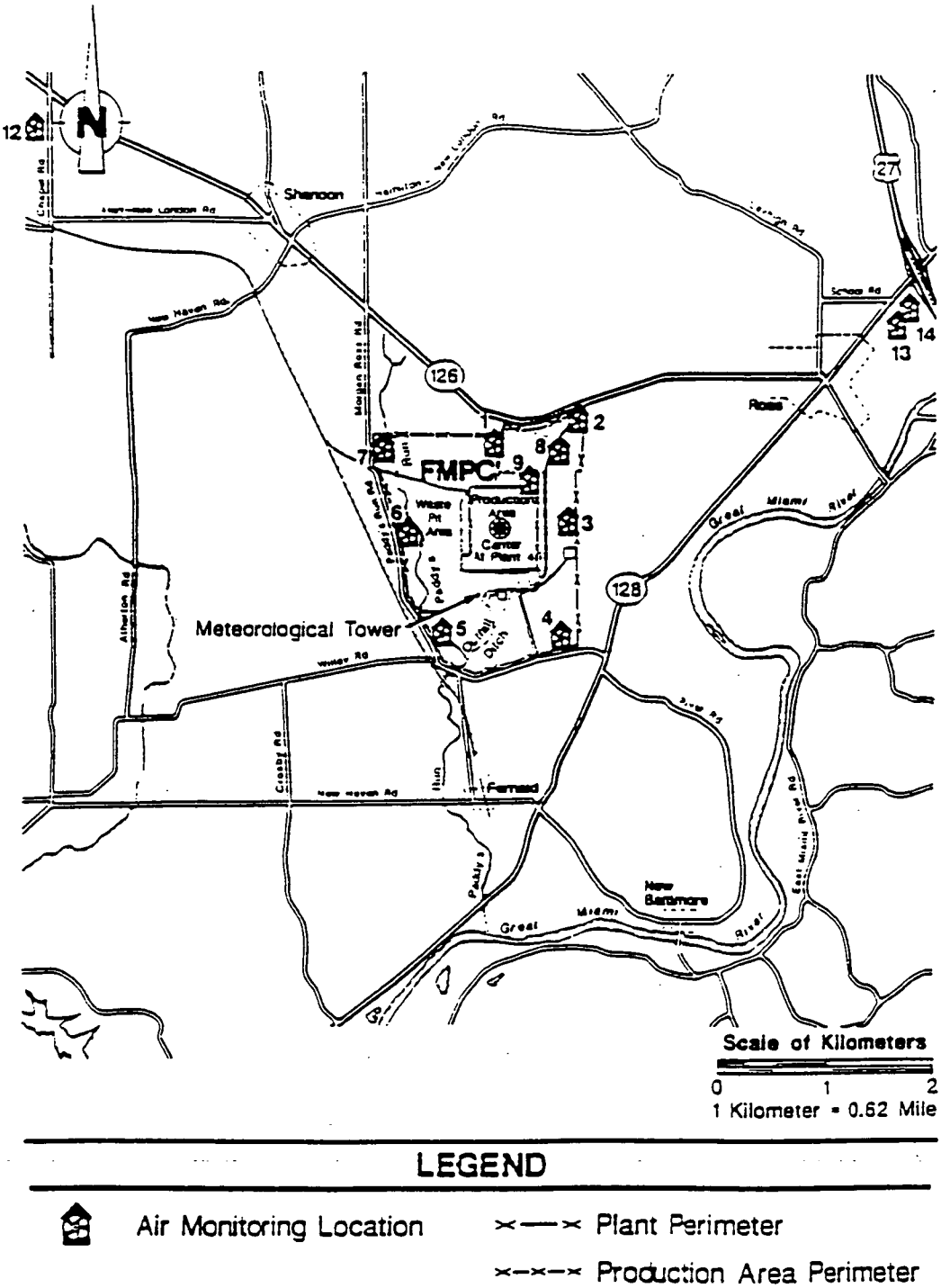


Figure 2-3 - Air Monitoring Locations

Table 2-2 - Air Monitoring Results from August 1989 through July 1990

$X10^{-6}$ pCi/M^3 Total U	
Air Monitoring Locations - Figure 2	**8/89 - 7/90**
Northeast	
1	180
2	210
3	350
8	380
9	1,420
South and West	
4	110
5	120
6	190
7	100

SECTION 3

EVALUATION OF POTENTIAL THREAT MAGNITUDE

There is a potential threat of migration posed by the exposed scrap metal piles. Surface water runoff could potentially carry contaminants from the point of origin into drainage structures, on-site facilities, and roadways. Particulate dispersion via surface soil erosion and wind conditions could create airborne particulates which have a potential for widespread migration to non-contaminated areas on site and off site. Infiltration of surface soil contaminants could reach the underlying area groundwater. The threat of direct contact with and inhalation of scrap metal pile contaminants exists to on-site personnel.

SECTION 4

ASSESSMENT OF THE NEED FOR A REMOVAL ACTION

Consistent with Section 40 CFR 300.410 of the NCP, the DOE shall determine the appropriateness of a Removal Action. A removal action to address potential releases from the scrap metal piles is considered appropriate in consideration of the concentration levels of contaminants found on the scrap metal. The following factors listed in 40 CFR 300.415 (b)(2) specifically apply to the need for this removal action:

1) 40 CFR 300.415 (b)(2)(i)

Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants. This removal action was deemed appropriate due to the potential airborne contaminants being carried off site from the scrap metal piles and scrap copper piles.

2) 40 CFR 300.415 (b)(2)(ii)

Actual or potential contamination of drinking water supplies or sensitive ecosystems.

This removal action was deemed appropriate based on radiological concentrations found on the surfaces of the scrap metal and scrap copper with the potential for these contaminants to migrate to groundwater.

3) 40 CFR 300.415 (b)(2)(v)

Weather conditions that may cause hazardous substances, pollutants, or contaminants to migrate or be released.

This removal action was deemed appropriate based on radiological concentrations found on the surfaces of the scrap metal and scrap copper, and the possibility of significant weather events causing the contaminants to migrate out of the area.

SECTION 5

APPROPRIATENESS OF A RESPONSE

If it is determined that a response is appropriate due to the potential for contaminant migration to the public or environment, a removal action may be required to address the situation. If a planning period of fewer than 6 months exists prior to the initiation of a removal action, the DOE issues an Action Memorandum. Removal actions required to be initiated within 6 months of the determination of need is termed a "time critical" removal action. The level of regulatory documentation required by the NCP for non-time critical removal actions (see 40 CFR 400.415) are not required for time critical removal actions. Based upon the evaluation of the above factors, it has been determined that a time-critical removal action is required for the scrap metal piles. The Action Memorandum to be prepared will describe the selected response and provide supporting documentation for the decision. This memorandum is to be used to document the threat to public health and the environment. It will also serve as a decision document to be included in the Administrative Record. A removal action work plan will be prepared to describe how this removal action will be conducted.

SECTION 6

REFERENCES

(AEC 1973) United States Atomic Energy Commission, 1973. *Nuclear Regulatory Guide 1.86*, United States Printing Office.

(OFR 1990) National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 1990. *Title 40 CFR 300.410*, Office of the Federal Register National Archives and Records Administration.

(PARSONS 1990) United States Department of Energy, 1990. *Task 6 Report of the Remedial Investigation for Operable Unit 1 (Draft)*. Fernald: FMPC-0306-2.

(PARSONS 1992) United States Department of Energy, January 1992. *Scrap Metal Piles Work Plan Removal Action 15.*