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PLANT 2/3 CONTAMINATED PERCHED WATER REMOVAL ACTION WORK PLAN JULY 1990

07/01/90

WMCO/DOE
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WORK PLAN

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PLANT 2/3

CONTAMINATED PERCHED WATER

REMOVAL ACTION

WORK PLAN

JULY 1990

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TABLE OF CONTENTS

I. **INTRODUCTION** 1

II. **BACKGROUND** 1

- 1.0 Summary of the Potential Threat 1
- 2.0 Related Actions 2
- 3.0 Roles of Participants 2
- 4.0 Removal Action 2
- 5.0 Integration With Operable Unit 3 3

III. **SUPPORT ACTIVITIES** 3

- 1.0 Project Planning 3
- 2.0 HSL/VOC Investigation 3
- 3.0 Collection System Design 4
- 4.0 Pumping System Design 4
- 5.0 Management of Project 4

IV. **FIELD ACTIONS** 4

- 1.0 Perched Water Source Detection 4
- 2.0 Installation of Collector System 5
- 3.0 Installation of the Pumping/Treatment System 5
- 4.0 Provide HSL/VOC Treatment (If required) 5
- 5.0 Operation of the Pumping/Treatment System 5

V. **SAMPLING AND ANALYSIS PLAN** 5

VI. **HEALTH & SAFETY PLAN** 7

VII. **QUALITY ASSURANCE PLAN** 7

VIII. **ASSUMPTIONS** 7

FIGURE 1 Plant 2/3 Borings 8

ATTACHMENT I - Plant 2/3 Contaminated Perched Water Removal Action Schedule 9

ATTACHMENT II - Full Hazardous Substance List (HSL) Parameters 10

ATTACHMENT III - Total Radionuclides Parameters 13

ATTACHMENT IV - Health and Safety Plan for the Plant 2/3 Contaminated Perched Water Removal Action . . 14

I. INTRODUCTION

This document provides a work plan describing the actions which will be taken to address the uranium contaminated groundwater found in borings inside and adjacent to Plant 2/3 at the Feed Materials Production Center (FMPC). This removal action is a component of an on-going removal action at the FMPC addressing perched water containing elevated concentrations of hazardous substances. This removal action is a component of Operable Unit #3. This work plan was prepared to satisfy the commitment to expand Removal Action No. 1 as stated in the Consent Agreement under CERCLA Section 120 and 106(a) (hereafter called the "Consent Agreement") and is consistent with the requirements of 29 CFR 1910.120.

A Removal Site Evaluation (RSE) and an Action Memorandum has been generated and approved by the Department of Energy (DOE) as required by the 40 Code of Federal Register (CFR) Part 300 the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Section 300.410. All activities performed under this work plan will be in accordance with the NCP and the OSWER Directive 9360.0-03B, SUPERFUND REMOVAL PROCEDURES, Rev. 3.

II. BACKGROUND

1.0 Summary of the Potential Threat

The Production and Additional Suspect Areas Work Plan of the Feed Materials Production Center (FMPC) Remedial Investigation and Feasibility Study (RI/FS) includes a comprehensive plan to sample and characterize the soil and perched water in the upper 20 feet of the soil under the FMPC production area. This area of investigation is intentionally confined to only 20 feet below grade of the production areas. This is to prevent cross-contamination from the contaminated perched water to the underlying Great Miami Groundwater Aquifer by puncturing the confining layer of material between them during boring activities. In addition to systematic borings at 250 foot intervals across the entire production site, one phase of the RI/FS involves "focused" borings to explore suspect areas of contamination under the individual plants.

Figure 1 shows the borings installed in the vicinity of Plant 2/3 and the average uranium concentration in perched water in parts per billion (ppb) at each boring. Contour interpretations are also shown for the 100, 1,000 and 10,000 ppb total uranium levels. Three localized regions of perched waters exhibiting concentrations which require extraction have been identified in the vicinity of Plant 2/3 at the FMPC (see Figure 1).

2.0 Related Actions

A time critical removal action was approved by the DOE, U. S. Environmental Protection Agency (USEPA) and Ohio Environmental Protection Agency (OEPA) for the pumping and treating of uranium contaminated perched water from under FMPC buildings. The first action involved pumping water from under Plant 6. This action commenced on August 1, 1988 on a temporary basis and a more permanent pumping system was placed in operation on November 6, 1989. The pumping in Plant 6 was temporarily stopped on April 23, 1990 due to the encountering of VOCs. The pumping will remain stopped until a determination is made on the appropriate level of treatment necessary. Plant 6 Perched Water is a continuation of the ongoing removal action to remove perched water.

3.0 Roles of Participants

A. The DOE is the lead agency for this removal action and will coordinate and execute this removal action. The state and local roles have been one of participation in the negotiations of the Consent Agreement and Technical Information Exchanges (TIE).

B. USEPA and OEPA shall review, comment on the work plan, follow progress through TIE meetings and the Consent Agreement progress reports.

C. Advanced Sciences, Inc. (ASI), as a subcontractor to DOE, is conducting the RI/FS program activities at the FMPC. ASI will perform slug test, install recovery wells and trench collector if the test data determine they are necessary.

D. Westinghouse Materials Company of Ohio (WMCO), the Maintenance and Operations Contractor at the FMPC, will coordinate, manage, implement, monitor and prepare all reports associated with the removal action.

4.0 Removal Action

Install recovery well(s) and/or trench collector(s) to remove perched water and pump the water to existing FMPC wastewater treatment facilities. This effort will be undertaken to control the potential for vertical migration into the Great Miami Aquifer by reducing the hydrostatic head of the perched water. The perched water under plant 2/3 has been determined to have significant concentrations of uranium, warranting this removal action. However, the concentration levels of other contaminants of concern are not known at this time. For this reason, preliminary sampling for HSLs/VOCs is scheduled prior to the implementation of this removal action to determine contaminants of concern and to determine type and level of treatment required.

5.0 Integration With Operable Unit 3

The pumping/treatment system for this removal action shall become part of the remedial action for Operable Unit #3 upon implementation of the subproject pertaining to remediation of Plant 2/3.

III. SUPPORT ACTIVITIES

The following activities will be undertaken to provide planning, design, and management for the removal action.

1.0 Project Planning

Included in this activity will be the preparation of detailed task listings and delineation of responsibilities to support the schedule given in Attachment 1. Also, a training schedule will be generated to ensure that the personnel involved in the scope of work will be trained in accordance with the Occupational Safety and Health Administration (OSHA) standards found in 29 CFR 1910.120.

2.0 HSL/VOC Investigation

If VOC contamination is verified by the sample results in the perched water, the water will be pumped to an above ground holding tank within Plant 2/3. The water will then be batch pumped to Plant 6 for treatment.

Three options for removing HSL/VOCs from Plant 6 pumping systems discharge water are under investigation. Option 1 involves heating the water to 180 degrees Fahrenheit in the first unit of the existing Plant 6 WTF. The water would be held at this temperature for a sufficient time to vaporize the organics. Preliminary simulation tests for this removal method have been performed at the WMCO laboratory. The water sample resulting from the tests are presently being analyzed for HSL/VOCs by an offsite laboratory. The water sample analysis will determine if Option 1 is viable. Option 3 requires the pumping systems discharge water to be circulated through activated carbon filters for removal of organic compounds. Option 4 involves utilization of an air stripping column to remove the organics from the contaminated water. Options 3 and 4 would require construction of new treatment units at the FMPC. Option 2 is an investigation into the feasibility of providing no treatment of the HSL/VOCs. A mass balance of the HSL/VOC level in FMPC wastewater discharge to the Great Miami River will be undertaken to determine the need for HSL/VOC treatment. If this option is acceptable, a report of this option will be prepared and issued to EPA for approval.

In the event that treatment is necessary and Option 1 is successful, the standard operating procedures (SOPs) for the Plant WTF will be modified to incorporate the necessary heating time operating changes. However, if the testing is not successful, a detailed design for either option 3 or 4 will be prepared based on the results of the ongoing treatment investigation.

3.0 Collection System Design

A series of slug tests will be conducted in approximately five piezometer in the area of each pumping center. The data from the slug tests will allow a determination of the efficiency of any recovery well design. The slug test data will allow a recommendation to be made as to whether a small well, large well, or trench collector should be employed in each of the three proposed pumping centers.

4.0 Pumping System Design

A design for a submersible pumping system with a liquid level control that is capable of removing water from the collection systems will be prepared. The pumping system will include provisions for the monitoring/metering of pump discharge, automatic start/stop control, manual override of automatic control, and a sampling port on the discharge line. The design of the pumping units will be based on the pumping units previously used in the Plant 6 Perched Water Removal Action. The boring with the highest pumping rate in Plant 6 pumped approximately 35-40 gallons per day prior to the temporary termination of the pumping. The volume of water to be removed is not expected to be significant in relation to the flow capability in the existing treatment facilities.

5.0 Management of Project

WMCO personnel will manage the project using FMPC-2201 Topical Manual, Project Management Procedures.

IV. FIELD ACTIONS

Actions will be taken to investigate the source of perched water, install collector systems, and install pumping systems to remove and transfer the water to existing facilities for treatment before discharge to the Great Miami River.

1.0 Perched Water Source Detection

The objective of this activity is to determine the source of contaminated water for each of the three pumping centers. Possible sources include leakage or overflow from the thirteen sumps located throughout Plant 2/3, leakage from gravity lines which discharge to the sumps or historical losses through the acid brick floor in the plant. This will include actions such as hydrostatic testing, dye testing and

visual observations.

2.0 Installation of Collector System

The objective of this activity is to provide collector systems (small wells, large wells, or trench collectors) at each of the pumping centers. Based on the results obtained from the slug tests, and an evaluation of the geology of the soils found in the borings, the type of collector and/or number of wells required and where the systems should be located will be determined.

3.0 Installation of the Pumping System

The objective of this activity is to install pumping systems and associated piping in the collector systems. This activity will include operational checks of the systems as deemed necessary.

4.0 Provide HSL/VOC Treatment (If Required)

The objective of this activity is to install a treatment system (Option 3 or 4) to remove volatile organics from the extracted perched water. Treatment will take place in the event that the no treatment (Option 2) is unacceptable and if it is determined that operation of the existing Plant 6 treatment system (Option 1) can not be modified to achieve HSL/VOC removal.

5.0 Pump Contaminated Water

The objective of this activity is to pump the contaminated water. This effort will be undertaken to control the potential for migration of the contamination by reducing the hydrostatic head of the perched water. The uranium contaminated water will be pumped from the new recovery systems into a holding tank at Plant 2/3. If HSL/VOCs are present, new piping will be installed to transfer the water from the holding tank at Plant 2/3 to an identified system for treatment of the HSL/VOCs. If there are no HSL/VOCs present, existing facilities will pump the water directly to existing wastewater treatment systems for processing.

V. SAMPLING AND ANALYSIS PLAN

The perched groundwater under Plant 2/3 has been determined to have significant concentrations of uranium, warranting this removal action. However, the concentration levels of other contaminants of concern are not known at this time. For this reason, preliminary sampling is scheduled prior to the implementation of this removal action to determine contaminants of concern and to determine type and level of treatment required.

Split water samples in support of this removal action will be included in the Sampling and Analysis Plan. Split water samples will be taken by the FMPC Environmental

Monitoring Group. The collection of the split water samples and the analysis and reporting will be in accordance with procedures and protocol specified in the Quality Assurance Project Plan (QAPP) approved as part of the Remedial Investigation (RI) Work Plan. One set of split samples will be sent to a certified independent laboratory for analysis. The results from the certified lab will become part of the Administrative Record File.

The other set of split samples will be utilized as process control samples. The collection, handling, documentation, storage, and analysis of the process control water and soil samples will be in compliance with the approved FMPC Environmental Compliance/Monitoring Procedures and the Analytical Laboratories Quality Assurance Plan L.C.N.-QAP, October 1987. The process control samples will be sent to the FMPC Laboratory for analysis. The analysis results of the split samples from the certified independent laboratory will be used for verification of the analysis performed by the FMPC Laboratory. The results from the routine process control water sampling and monitoring by the FMPC personnel during operations will be included in the FMPC Annual Environmental Monitoring Report. This report is available for review as part of the Administrative Record File.

The preliminary water samples will be collected from each of the 13 existing wells in the Plant 2/3 area (see Figure 1 for well numbers and location). These samples will be analyzed at the certified independent laboratory for the following:

Full Hazardous Substance List (HSL) Parameters (See Attachment II)
Total Radionuclides Parameters (See Attachment III)

The preliminary water samples will also be analyzed at the FMPC laboratory for total radionuclides.

The results of this preliminary sampling will provide the list of contaminants for which treatment is required during the operational and maintenance phase of the perched groundwater removal system. Sampling for these identified contaminants of concern will be done on the following basis:

	Sampling Frequency
System start up and verification	Weekly
First 6 months of system operation	Monthly
After first 6 months of system operation	Quarterly

The samples shall be collected quarterly after the first 6 months of system operation until such time as the sampling results indicate that the contaminant levels are below the established criteria developed for Operable Unit 3. Samples shall also be collected quarterly for one year after termination of pumping activities to verify that the contaminants have been removed.

This monitoring and sampling program will be performed in conjunction with the sampling and analysis activities of Operable Unit 3 final remedial actions. The scope of this monitoring and sampling program will not interfere with any activity in this area.

As stated in the Consent Agreement, if the DOE determines that any activities or work being implemented under this Consent Agreement may create an imminent threat to human health or the environment from the release or threat of release of a hazardous substance, pollutant, contaminant, or hazardous constituent, it may stop any work or activities for such period of time as needed to respond and take whatever action is necessary to abate the danger.

Pumping will also be terminated if the sampling results reveal that after pumping operations begin the contaminant levels in the perched water become lower than the established criteria which are to be developed based on the Operable Unit 3 Baseline Risk Assessment.

VI. HEALTH & SAFETY PLAN

The work to be performed will be consistent with the Health and Safety Plan prepared for this removal action. A copy of this plan is provided as Attachment 2 of this Work Plan. The plan identifies, evaluates, and controls all safety and health hazards. In addition, it provides for emergency response for hazardous operations. The plan is consistent with 29 CFR 1910.120 and the FMPC Site Health and Safety Plan. Safety documentation will be prepared according to FMPC-2116 Topical Manual "Implementing FMPC Policies and Procedures for System Safety Analysis." FMPC-2116 has been prepared to implement DOE Order 5481.1B Safety Analysis and Review System and DOE/OR-901 Guidance for Preparation of Safety Analysis Reports.

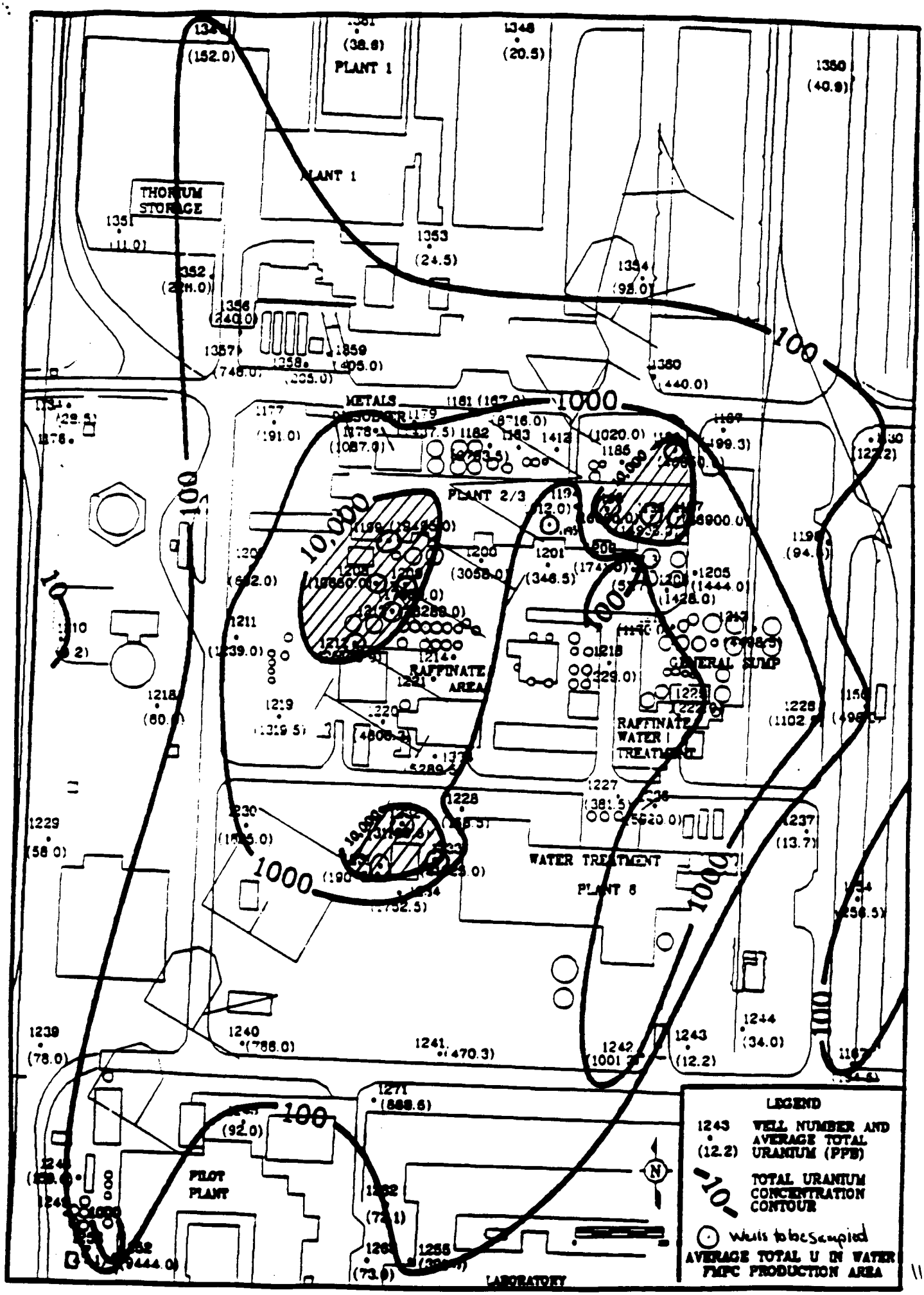
VII. QUALITY ASSURANCE PLAN

The overall quality assurance program at the FMPC is described in the site Quality Assurance Plan, FMPC 2139. The Quality Assurance Plan is based on the criteria specified in ASME NQA-1, Federal EPA Guideline QAMS-005/80 and DOE Orders 5700.6 and 5400.1. Specific quality assurance requirements will be incorporated into written and approved procedures and during personnel training. The Quality Assurance Department will conduct periodic surveillances to verify compliance.

VIII. ASSUMPTIONS

1. No new regulatory assessments or permits required.

2. Samples are presently being analyzed for organic and other chemical constituents on the Hazardous Substance List (HSL).


PLANT 1
THORIUM STORAGE
METALS
PLANT 2/3
RAFFINATE AREA
GENERAL SUMP
RAFFINATE WATER TREATMENT
WATER TREATMENT PLANT 6
PILOT PLANT
LABORATORY
10,000
1000
100
10
LEGEND
1243 WELL NUMBER AND
(12.2) AVERAGE TOTAL URANIUM (PPB)
TOTAL URANIUM CONCENTRATION CONTOUR
Wells to be Sampled
AVERAGE TOTAL U IN WATER
FMPC PRODUCTION AREA

Plant 2/3 Contaminated Groundwater Pumping

FMPC

Description	
Work Plan	(70 working days)
NEPA	(50 working days)
Design Collector Systems	(45 working days)
Contaminated Groundwater Source Detection	(85 working days)
Install Collector Systems	(65 working days)
Install Pumping System	(44 working days)
Pump Contaminated Water	(508 working days*)

*Or longer if required

Attachment 1

ATTACHMENT II

FULL HAZARDOUS SUBSTANCE LIST (HSL) PARAMETERS

HSL INORGANICS

Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Magnesium
Manganese
Mercury
Nickel
Potassium
Selenium
Silver
Sodium
Thallium
Vanadium
Zinc
Cyanide

HSL VOLATILES

Chloromethane
Bromomethane
Vinyl Chloride
Chloroethane
Methylene Chloride
Acetone
Carbon Disulfide
1,1-Dichloroethene
1,1-Dichloroethane
trans-1,2-Dichloroethene
Chloroform
1,2-Dichloroethane
2-Butanone
1,1,1-Trichloroethane
Carbon Tetrachloride
Vinyl Acetate
Bromodichloromethane
1,1,2,2-Tetrachloroethane
1,2-Dichloropropane
trans-1,3-Dichloropropene
Trichloroethene
Dibromochloromethane
1,1,2-Trichloroethane
Benzene
cis-1,3-Dichloropropene
2-Chloroethyl Vinyl Ether
Bromoform
2-Hexanone
4-Methyl-2-pentanone
Tetrachloroethene
Toluene
Chlorobenzene
Ethyl Benzene
Styrene
Total Xylenes

ATTACHMENT II (Cont'd)

HSL SEMI-VOLATILES

Phenol
bis(2-Chloroethyl) ether
2-Chlorophenol
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Benzyl Alcohol
1,2-Dichlorobenzene
2-Methylphenol
bis(2-Chloroisopropyl) ether
4-Methylphenol
N-Nitroso-Dipropylamine
Hexachloroethane
Nitrobenzene
Isophorone
2-Nitrophenol
2,4-Dimethylphenol
Benzoic Acid
bis(2-Chloroethoxy) methane
2,4-Dichlorophenol
1,2,4-Trichlorobenzene
Naphthalene
4-Chloroaniline
Hexachlorobutadiene
4-Chloro-3-methylphenol (para-chloro-meta-cresol)
2-Methylnaphthalene
Hexachlorocyclopentadiene
2,4,6-Trichlorophenol
2,4,5-Trichlorophenol
2-Chloronaphthalene
2-Nitroaniline
Dimethyl Phthalatecenaphthylene
3-Nitroaniline
Acenaphthene
2,4-Dinitrophenol
4-Nitrophenol
Dibenzofuran
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Diethylphthalate
4-Chlorophenyl Phenyl ether
Fluorene
4-Nitroaniline
4,6-Dinitro-2-methylphenol
N-nitrosodiphenylamine
4-Bromophenyl Phenyl ether
Hexachlorobenzene
Pentachlorophenol
Phenanthrene
Anthracene
Di-n-butylphthalate
Fluoranthene
Pyrene
Butyl Benzyl Phthalate
3,3'-Dichlorobenzidine
Benzo(a)anthracene
bis(2-ethylhexyl)phthalate
Chrysene
Di-n-octyl Phthalate
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3-cd)pyrene
Dibenz(a,h)anthracene
Benzo(g,h,i)perylene

ATTACHMENT II (Cont'd)

HSL SEMI-VOLATILES

HSL PESTICIDES

alpha-BHC	Endosulfan I	4,4'-DDT	AROCLOR-1232
beta-BHC	Dieldrin	Endrin Ketone	AROCLOR-1242
delta-BHC	4,4'-DDE	Methoxychlor	AROCLOR-1248
gamma-BHC (Lindane)	Endrin	Chlordane	AROCLOR-1254
Heptachlor	Endosulfan II	Toxaphene	AROCLOR-1260
Aldrin	4,4'-DDD	AROCLOR-1016	
Heptachlor Epoxide	Endosulfan Sulfate	AROCLOR-1221	

ATTACHMENT III

TOTAL RADIONUCLIDES PARAMETERS

Cesium
Neptunium
Plutonium
Radium
Ruthenium
Strontium
Technetium
Thorium
Total Thorium
Uranium
Total Uranium

ATTACHMENT 2

HEALTH AND SAFETY PLAN FOR THE PLANT 2/3 CONTAMINATED PERCHED WATER REMOVAL ACTION

FEED MATERIALS PRODUCTION CENTER

JULY 1990

APPROVAL:

J. P. Hopper, Acting Manager Restoration
Westinghouse Materials Company of Ohio

CONCURRENCE:

J. J. Volpe, Vice President
Industrial Radiological Safety and Training
Westinghouse Materials Company of Ohio

453

TABLE OF CONTENTS

1.0 Tasks To Be Performed 1

2.0 Site History 1

3.0 Task Specific Hazard Assessment 2
3.1 Physical Hazards 2
3.2 Radiation Hazards 2
3.3 Chemical Hazards 2

4.0 Monitoring 5
4.1 Goals 5
4.2 Monitoring Equipment and Frequency of Monitoring . . . 5
4.3 Action Levels 6

5.0 Personal Protective Equipment 6
5.1 Perched Water Source Detection 7
5.2 Installation of Collector System 8
5.3 Installation of Pumping/Treatment System 9
5.4 Operation of the Pumping/Treatment System 11

6.0 Site Control 12
6.1 Access 12
6.2 Bioassay Samples 13
6.3 Medical Monitoring 13
6.4 Training Requirements 14
6.5 Safety Meetings 14

7.0 Exposure Symptoms 14

8.0 Site Entry Procedures 18

9.0 Decontamination 19

10.0 Wastes 19

11.0 Contingency Plans 19
11.1 Incidents or Injuries Involving Possible Intake of Radiological or Chemical Substances by Employees . . . 19
11.2 Pre-Emergency Planning 20
11.3 Lines of Authority 20
11.4 Evacuation 20
11.5 Emergency Equipment 20
11.6 Emergency Notification 21
11.7 Fire, Explosion, or Medical Emergency 21
11.8 Additional Information 21

18

12.0 Confined Space Entry 22

13.0 Approval and Compliance Statement 22

Figure 1 - Plant 2/3 Borings 23

Figure 2 - Exclusion Areas 24

Figure 3 - Rally Points 25

Figure 4 - Route to Medical Facility 26

1.0 TASKS TO BE PERFORMED

The work to be performed involves determining the source of the contaminated water for each of the three pumping centers near Plant 2/3, providing a collector system at each pumping center, providing a pumping system for the collector system, and the actual operation of the pumping system.

The perched water source detection will:

no	Disturb Surface Soil	yes	Sample Surface Water
no	Disturb Subsurface Soil	no	Sample Lagoons
no	Use Heavy Equipment	no	Use Boat
yes	Enter Confined Space	yes	Involve Radioactivity
yes	Disturb Containerized Matter	no	Involve Trenches

The installation of the collector system will:

yes	Disturb Surface Soil	no	Sample Surface Water
yes	Disturb Subsurface Soil	no	Sample Lagoons
no	Use Heavy Equipment	no	Use Boat
no	Enter Confined Space	yes	Involve Radioactivity
no	Disturb Containerized Matter	yes	Involve Trenches

The installation of the pumping/treatment system will:

yes	Disturb Surface Soil	no	Sample Surface Water
yes	Disturb Subsurface Soil	no	Sample Lagoons
no	Use Heavy Equipment	no	Use Boat
no	Enter Confined Space	yes	Involve Radioactivity
no	Disturb Containerized Matter	yes	Involve Trenches

The operation of the pumping/treatment system will:

no	Disturb Surface Soil	yes	Sample Surface Water
no	Disturb Subsurface Soil	no	Sample Lagoons
no	Use Heavy Equipment	no	Use Boat
no	Enter Confined Space	yes	Involve Radioactivity
no	Disturb Containerized Matter	no	Involve Trenches

2.0 SITE HISTORY

The task will be performed at Plant 2/3 and northwest of the Raffinate Area which is located within the FMPC property lines area. At present, the Plant 2/3 is routinely occupied. The production facility is not actively refining uranium at this time. Soils and groundwater near Plant 2/3 and the Raffinate Area have the potential to be contaminated with uranium, its daughter products and organics.

Plant 2/3 is commonly referred to as the Refinery at FMPC. Naturally occurring uranium and recycled materials are processed by dissolving the uranium in nitric acid which produces uranyl nitrate. The uranyl nitrate is purified through an extraction process. The resulting solution is decomposed into UO_3 and the nitric acid is recovered.

The soil data from the Plant 2/3 area indicates an area where uranium is being introduced into the environment through surface deposition. The surface deposition does not appear to be contributing to the subsurface contamination as the uranium concentration decreases significantly below the depth of 1.5 feet. Virtually the entire Plant 2/3 is underlain with contaminated groundwater.

3.0 TASK SPECIFIC HAZARD ASSESSMENT

A preliminary review of the tank area (see Figure 1) in Plant 2/3 indicated the potential hazards identified below. Prior to the initiation of the activities, a formal walk-through survey of the conditions in the proposed work area in the Plant 2/3 complex will be conducted to ensure that conditions are such that a safe working environment can be provided for personnel within the defined exclusion area. All identified hazards will be addressed with the Industrial, Radiological, Safety and Training (IRS&T) representative(s) to determine the degree of hazard and if any additional requirements need to be included in the safety plan.

3.1 Physical Hazards

- o Noise
- o Overhead Hazards
- o Underground Utilities

3.2 Radiation Hazards

The potential radiation hazard are from uranium (depleted to 2% enriched in U-235) and short lived decay products.

3.3 Chemical Hazards

Table 1 includes the suspect contaminants along with the exposure limits, the primary hazard, the applicable action limit, and the background level in ambient air.

Table 1

CHEMICAL HAZARD TABLE

Contaminant	Primary Hazard	Limit	Action Level Level	Background in Ambient Air
Nitrogen Dioxide[1]	Inhalation	1 ppm (Note 3)	0.5 ppm	ND[8]
Asbestos [2]	Inhalation	0.2 f/cc (Note 4)	0.1 f/cc	ND[9]
Nitric Acid	Contact Skin/ Eyes	2 ppm (Note 4) 4 ppm (Note 3)		ND[8]
Sodium Hydroxide	Contact Skin/ Eyes	2 mg/M^3 (ceiling)		ND[8]
Uranium	Inhalation/ Ingestion	Note 5		2 X 10^{-12}uCi/cc[10]
Kerosene	Contact Skin/ Eyes	100 ppm (Notes 4 and 6)		ND[8]
Tributylphosphate	Contact Skin/ Eyes	2.5 mg/M^3 (Note 4)		ND[8]
Ammonia[7]	Inhalation Contact Skin/ Eyes	35 ppm (Note 3)	10 ppm	ND[8]
Calcium Hydroxide	Contact Skin/ Eyes	5 mg/M^3 (Note 4)		ND[8]
Sodium Carbonate	Contact Skin/ Eyes	---	---	ND[8]

[1] NO_2 may be produced if residual nitric acid is present in lines or sump.

[2] The Digestion area of the Refinery and the Hot Raffinate building are controlled areas for asbestos. Special posted requirements apply if entry to these areas is necessary. These requirements include personal protective equipment and training. Asbestos hazard is present if insulated lines or transite is damaged or disturbed (special permit required for asbestos work.)

[3] Based on a 15 minute short term exposure limit.

[4] Based on 8 hour time weighted average.

[5] The action level for uranium is 5 x 10^{-12} uCi/ml which is based on the DOE derived air concentration limit of 2 x 10^{-11} uCi/ml.

Table 1

CHEMICAL HAZARD TABLE
(Cont'd)

(6) Based on Stoddard solvent.

(7) Formerly used lines and equipment to be checked and secured prior to initiation of work in their vicinity.

(8) None detectable.

(9) None detectable using NIOSH 7400 Method (less than 0.01 fiber per cc)

(10) Highest recent monthly average at an air sample location inside plant 2/3. Lower limit of detection is 1×10^{-13} uCi/cc.

4.0 MONITORING

4.1 Goals

During the contaminant source detection task, air monitoring will be performed as determined to be necessary at the time of issuance of the work permit(s) to ensure that exposure levels do not exceed established exposure limits.

4.2 Monitoring Equipment and Frequency of Monitoring

4.2.1 Airborne Radioactivity

During the contaminant source detection and installation of the pumping and collector system tasks, air samples will be taken in the general area of the work inside Plant 2/3 daily while work is in progress. Local or breathing zone samples will be taken in the vicinity of possible leaks of fluid systems as they are air-pressurized for hydrostatic testing. Radioactive surface contamination shall be monitored whenever soil is disturbed by drilling or digging.

4.2.2 Radioactive Surface Contamination

During the contaminant source detection and installation of the pumping and collector systems tasks, weekly surveys for removable radioactive surface contamination will be performed in Plant 2/3 area. Contamination surveys will be performed on potentially contaminated fluid systems, as they are opened, to ensure that adequate protective clothing is being worn and to verify radiological postings.

Direct frisks and/or field swipe surveys will be performed on potential leak sites during pressure testing.

4.2.3 Radiation Surveys

Area radiation surveys will be taken monthly in Plant 2/3.

4.2.4 Chemical Hazard

Direct reading monitoring devices will be used to determine the concentration of NO_2 and/or other gases and vapors at the time of issuance of the work permit and thereafter as determined to be necessary by the Industrial Hygiene representative.

A HNu may be used periodically to test for organic vapors as determined to be necessary by the Industrial Hygiene representative.

If organic vapors are detected, they will be treated as unknowns. The Breathing Zone action levels are listed in Section 4.3.

4.2.5 Thermoluminescent Dosimetry (TLD)

TLDs will be worn by all workers.

4.3 Action Levels

Measurement	Level	Action
Removable contamination on open surfaces	20,000 dpm/100 cm^2 or 2,000 cpm with portable frisker (average)	Note 1
Airborne radioactivity (long lived)	5×10^{-12} uCi/ml	Note 1
HNu Meter (Breathing Zone)	Detection to 10 ppm (Note 2)	Note 1
	10-25 ppm	Supplied Air Respirator
	>25 ppm	Withdraw
Nitrogen Dioxide (Breathing Zone)	0.5 ppm	Withdraw
Ammonia	10 ppm	Note 3

Notes

1 Full-face air purifying respirators with combination HEPA filter and organic vapor, acid gas, fume cartridges.

2 1 ppm above background.

3 Full-face air purifying respirators with ammonia cartridges.

5.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

All employees in the task exclusion area will wear the following personal protective equipment while performing the required tasks. See Note 3 in Section 3.3 for additional requirements.

5.1 Contaminant Source Detection

ITEM	NEED	APPLICABILITY
Air purifying respirator	No (Yes)	Required if action levels are exceeded or as specified by IRS&T representative
Cartridges: HEPA Combination Radiological/OV/AG, or ammonia	No (Yes)	Required if action levels are exceeded or as specified by IRS&T representative
Hard Hat	No	
Hearing Protection	No	
Inner Gloves	No (Yes)	Used underneath leather palm gloves
Rubber/Latex Boots	Yes	As needed to prevent contact with liquids (e.g., sump & drains)
Leather-Palm Gloves	Yes	As needed for physical protection of hands
Rubber/Nitrile Gloves	Yes	As needed to prevent contact with liquids (e.g., sump & drains)
Plain Tyvek	No	
PE Tyvek	No	
Process Coveralls	Yes	
PVC Gloves	No	
SAR	No	
Safety Glasses	Yes	Minimum Requirement

5.1 Contaminant Source Detection (Cont'd)

ITEM	NEED	APPLICABILITY
Safety Goggles/Face Shield	Yes	As needed to prevent contact with splash or particulates (e.g., cleaning/grinding on chemically contaminated drain lines)
Safety Shoes	Yes	Minimum Requirement
Saranex Tyvek	No	
Shoe Covers	No	

5.2 Installation of Collector System

ITEM	NEED	APPLICABILITY
Air purifying respirator	No (Yes)	Required if action levels are exceeded or as specified by the IRS&T representative.
Cartridges: HEPA Combination Radionuclide/organic vapor/ acid gas, or ammonia	No (Yes)	Required if action levels are exceeded or as specified by the IRS&T representative.
Hard Hat	Yes	As needed for overhead work
Hearing Protection	Yes	During concrete breaking/cutting
Inner Gloves	No (Yes)	Used underneath leather palm gloves
Rubber/Latex Boots	Yes	As needed to prevent contact with liquids (e.g., sumps, drains, pumping)

5.2 Installation of Collector System (Cont'd)

ITEM	NEED	APPLICABILITY
Leather-Palm Gloves	Yes	As needed for physical protection of hands
Rubber/Nitrile Gloves	Yes	As needed to prevent (e.g., sumps, drains, pumping)
Plain Tyvek	No	
PE Tyvek	No	
Process Coveralls	Yes	
PVC Gloves	No	
SAR	No	
Safety Glasses	Yes	Minimum Requirement
Safety Goggles/Face Shield	Yes	During pump testing and as needed
Safety Shoes	Yes	Minimum Requirement
Saranex Tyvek	No	
Shoe Covers	No	

5.3 Installation of Pumping/Treatment System

ITEM	NEED	APPLICABILITY
Air purifying respirator	No (Yes)	Required if action levels are exceeded or as specified by the IRS&T representative.
Cartridges: HEPA Combination Radionuclide/organic vapor/ acid gas	No (Yes)	Required if action levels are exceeded or as specified by the IRS&T representative.
Hard Hat	Yes	As needed for overhead work

5.3 Installation of Pumping/Treatment System(Cont'd)

ITEM	NEED	APPLICABILITY
Hearing Protection	Yes	During concrete breaking/cutting
Inner Gloves	No (Yes)	Used underneath leather palm gloves
Rubber/Latex Boots	Yes	As needed to prevent contact with liquids (e.g., sumps, drains, pumping)
Leather-Palm Gloves	Yes	As needed for physical protection of hands
Rubber/Nitrile Gloves	Yes	As needed to prevent contact with liquids (e.g., sumps, drains, pumping)
Plain Tyvek	No	
PE Tyvek	No	
Process Coveralls	Yes	
PVC Gloves	No	
SAR	No	
Safety Glasses	Yes	Minimum Requirement
Safety Goggles/Face Shield	Yes	During pump testing and as needed
Safety Shoes	Yes	Minimum Requirement
Saranex Tyvek	No	
Shoe Covers	No	

5.4 Operation of the Pumping/Treatment System

ITEM	NEED	APPLICABILITY
Air purifying respirator	No (Yes)	Required if action levels are exceeded or as specified by the IRS&T representative.
Cartridges: HEPA Combination Radionuclide/organic vapor/ acid gas	No (Yes)	Required if action levels are exceeded or as specified by the IRS&T representative.
Hard Hat	Yes	As needed for overhead work
Hearing Protection	No	
Inner Gloves	No (Yes)	Used underneath leather palm gloves
Rubber/Latex Boots	Yes	As needed to prevent contact with liquids (e.g., sumps, drains, pumping)
Leather-Palm Gloves	Yes	
Rubber/Nitrile Gloves	Yes	As needed to prevent contact with liquids (e.g., sumps, drains, pumping)
Plain Tyvek	No	
PE Tyvek	No	
Process Coveralls	Yes	
PVC Gloves	No	
SAR	No	
Safety Glasses	Yes	Minimum Requirement
Safety Goggles/Face Shield	Yes	During initial testing and as needed

5.4 Operation of the Pumping/Treatment System (Cont'd)

ITEM	NEED	APPLICABILITY
Safety Shoes	Yes	Minimum Requirement
Saranex Tyvek	No	
Shoe Covers	No	

6.0 SITE CONTROL

6.1. Access

The work associated with this removal action will be within the FMPC controlled area. In addition, the work area related to this removal action will be posted as "RWP Required for Entry". This will establish the Exclusion Zone per 29 CFR 1910.120. A layout map of Plant 2/3 is provided in Figure 2 delineating specific zones of activity, exclusion zones, and contamination control zones as determined by the FMPC radiological safety technicians.

The Exclusion Zone is the zone of high potential hazard due to physical or chemical dangers. Access to the Exclusion Zone will be restricted by the Supervisor-in-charge to trained and certified employees, as regulated by 29 CFR 1910.120, who are required to enter in order to perform their job functions. There will be different Exclusion Zones for the various tasks. The Exclusion Zone will be marked with barrier tape or other easily recognizable devices. The zone may be expanded if airborne hazards are detected. All areas requiring the use of respiratory protection are included in the exclusion zone. Entrance shall be limited to one area and controlled by the supervisor in charge.

If necessary, IRS&T representatives will establish a Contamination Reduction Zone, consisting of step-off pads, at the exit to the Exclusion Zone. This zone will be used for removal of disposable PPE and for cleaning of contaminated equipment.

6.1.1 Radiological Postings

Radiological areas will be posted in accordance with DOE Order 5480.11. The following is a brief summary of posting requirements based on uranium:

TABLE 2

POSTING REQUIREMENTS

Regulated Area	> 1000 dpm/100 cm^2 removable > 5000 dpm/100 cm^2 fixed and removable
Contaminated Area	> 10,000 dpm/100 cm^2 removable > 50,000 dpm/100cm^2 fixed and removable
Airborne Radioactivity Area	> 2 x 10^{-12} uCi/ml
Respirator Area	> 5 x 10^{-12} uCi/ml
Radiation Area	> 5 < mrem/hr.

In addition, special postings may be added for access to areas: "RWP Required for Entry" or "Contact HP for Entry."

6.2 Bioassay Samples

WMCO personnel involved in this project are required to participate in a routine periodic urine assay program. Any suspected exposure to hazardous substances shall be reported. Personnel are also required to wear a TLD at all times for radiological purposes.

6.3 Medical Monitoring

In accordance with 29 CFR 1910.120 OSHA requirements, all WMCO and WMCO subcontractor personnel are required to participate in a medical monitoring program which includes:

- o A baseline medical examination
- o Annual medical examination
- o Medical examinations may be required after exposures
- o WMCO respirator clearance for respirator users

Prior to the start of work, personnel involved in this project shall be identified by name and badge number. Each individual shall be subject to a medical surveillance approval by the Director, Medical Services. The approval statement shall certify that each individual is medically qualified to perform the work and is physically fit to wear PPE.

6.4 Training Requirements

All WMCO and WMCO subcontractor personnel assigned to the tasks will, as a minimum, meet the following training requirements:

- o Review of this health & safety plan for this work including site specified hazards and procedures. (This safety meeting(s) will be documented.)
- o WMCO radiation safety training
- o WMCO respiratory training and fit test or equivalent approved by WMCO Industrial Hygiene
- o 40-hour OSHA training
- o 8-hour annual refresher training
- o 8-hour supervisory training (for supervisors)
- o 24-hour supervised field experience

6.5 Safety Meetings

A safety meeting, which must be documented, shall be conducted prior to start of each day's work during the perched water source detection and the installation of the pumping system tasks. The meeting will cover the following applicable subjects:

[] work operations
[] personnel protective equipment
[] all monitoring data
[] hazard communications
[] monitoring tests and results
[] decontamination
[] task organization
[] physical stress
[] emergency procedures
[] communications
[] general safety
[] housekeeping

7.0 EXPOSURE SYMPTOMS

Exposure to low levels of radioactivity does not produce acute exposure symptoms. Such exposures may cause delayed effects such as cancer. Exposures are to be kept as low as reasonably achievable.

Exposure symptoms, along with the exposure routes and first aid actions, for the chemical hazards for the suspect contaminants included in Table 1 of Section 3.3 are described in the following paragraphs:

Ammonia:

Health Risks: Vapor highly irritating to eyes, nose, and throat

Anhydrous liquid causes freezing burn followed by caustic burn on the skin

700 ppm causes eye irritation

5,000 ppm causes immediate death from spasm, inflammation, edema

16-25% in air is flammable

Exposure Routes: Eyes, skin, respiratory tract

First Aid: Inhalation - Move victim to fresh air; give artificial respiration; observe for larygeaspasm and prepare for tracheotomy if necessary

Skin/Eyes - Flood with water for 15 minutes then treat as for thermal burn.

Nitrogen Dioxide:

Health Risks: Concentrated gas produces coughing, choking, headache, nausea, chest and abdominal pain; otherwise few symptoms occur immediately. After several hours, pulmonary edema gradually develops causing fatigue, coughing, frothy expectora, cyanosis, confusion and even death.

Concentrated gas is also irritating to eyes.

Exposure Routes: Eyes, respiratory tract

First Aid: Inhalation - Remove victim to fresh air encouraging to breathe deeply. Give oxygen if necessary.

Eyes/Skin - Flush with water for 15 minutes

Asbestos:

Health Risks: Exposures to high dust levels cause a pneumoconiosis called asbestosis. Exposures to low levels (especially in smokers) increases the risk of lung cancer. A rare cancer of the lung lining, mesothelioma, also is increased in incidence in asbestos workers. All these conditions take 10-20 years to develop.

Exposure Routes: Inhalation

First Aid: None

Nitric Acid:

Health Risks: Gas will burn eyes, nose, and throat. Breathing will cause respiratory irritation. Liquid contact with skin causes a yellow burn.

Exposure Routes: Eyes, skin, and respiratory tract

First Aid: Inhalation - Move victim to fresh air; give CPR if needed.

Eyes/Skin - Remove contaminated clothing. Flush skin or eyes with water for 15 minutes.

Sodium Hydroxide:

Health Risks: An extremely caustic chemical which causes irritation to eyes, nose, and throat if inhaled. When contacts skin or eyes, causes severe burns.

Exposure Routes: Eyes, skin, and respiratory tract

First Aid: Inhalation - Remove from further exposure; provide CPR if necessary; give oxygen if necessary.

Skin/Eyes - Remove contaminated clothing. Flush with water for 15 minutes.

Uranium:

Health Risks: High level exposures to soluble uranium compounds causes respiratory irritation and are toxic to the kidneys

Lower level chronic exposures increase the incidence of cancers of the lungs, lymph system, hemopoietic system

Exposure Routes: Broken skin and respiratory tract

First Aid: Inhalation - Remove person to fresh air. If trouble breathing because of exposure to soluble compounds, start bioassay procedures (urinalysis) to quantify dose.

Broken Skin- Remove contaminated clothing. Flush with water for 15 minutes. Check cleaned skin with frisker to ensure complete uranium removal.

Kerosene (Stoddard Solvent):

Health Risks: Combustible liquid
Liquid causes slight irritation to eyes and skin. Inhalation of high vapor levels causes nose irritation, coughing, distress, and pulmonary edema.

Exposure Routes: Skin, eyes, and respiratory tract

First Aid: Inhalation - Remove to fresh air; administer oxygen if necessary.

Skin/Eyes - Remove any contaminated clothing. Wipe off kerosene liquid and wash skin with soap and water.

Tributyl Phosphate:

Health Risks: Combustible liquid
Liquid contact results in severe irritation to skin and eyes

Inhalation of high levels > 15 mg/m^3 can cause CNS effects (headache, nausea, lethargy, weakness) and lung irritation followed by edema.

Exposure Routes: Skin, eyes, respiratory tract

First Aid: Inhalation - Remove victim to fresh air. Provide oxygen if necessary.

Skin/Eyes - Remove any contaminated clothing. Wash skin with soap and water until no trace of oily chemical remains.

Calcium Hydroxide:

Health Risks: Dust irritating to nose and throat when inhaled. Dust is alkali which will burn skin and eyes.

Exposure Routes: Skin, eyes, respiratory tract

First Aid: Inhalation - Remove victim to fresh air; treat symptoms

Skin/Eyes - Remove dusted clothing. Wash skin with soap and water. Flush eyes for 10 minutes with water.

Sodium Carbonate:

Health Risks: Dust is irritating to nose and throat when inhaled. Chronic inhalation may cause nasal septum perforation. Dust is a strong alkali which can cause delayed caustic burns to skin or eyes.

Exposure Routes: Skin, eyes, respiratory tract

First Aid: Inhalation - Remove victim to fresh air; treat symptoms.

Skin/Eyes - Remove any dusted clothing. Wash skin with soap and water. Flush eyes for 10 minutes with water.

8.0 SITE ENTRY PROCEDURES

During the perched water source detection and installation of pumping system tasks, the following procedures apply:

- o Identify exclusion zone, contamination reduction zone, and break area.
- o Perform daily safety meeting to familiarize team with site specific hazards.
- o Discuss alternate communications signals (if applicable).
- o Perform respirator check out and fit test prior to use.
- o Use buddy system. Teams of at least two individuals will be used for all activities within an exclusion zone.

Prior to the initiation of these work tasks, the following permits are required:

[] Radiation Work Permit
[] Penetration Permit
[] Chemical/Hazardous Material Permit
[] Work Permit

All personnel entering the Exclusion Zone shall be trained and certified to perform their assigned task as defined by 29 CFR 1910.120.

Entrance to the Exclusion Zone shall be controlled and at the approval of the supervisor in charge.

9.0 DECONTAMINATION

Equipment for decontamination of radiological or chemical hazards shall be kept available in the area surrounding the exclusion zone if such is determined necessary by supervisor or by either Radiation Safety or Industrial Hygiene prior to the initiation of the activity. As a minimum, the location of the nearest water for decontamination and eye washing shall be identified and its operability verified prior to start of work.

Decontamination will be performed consistent with the following FMPC Standard Operating Procedures, OSH(SP)-P-35-017 and topical manual FMPC-2084. In addition, specific RI/FS decontamination procedures for the Facilities Testing Program will be followed when appropriate.

10.0 WASTES

Wastes include, but are not limited to:

- o Disposable PPE
- o Excess materials such as soil or concrete

All potentially contaminated waste materials resulting from site activities will be collected and placed in drums or other containers. Disposable protective clothing will be placed in plastic bags and disposed of as compatible, potentially contaminated waste.

Drums or containers shall meet DOE 49 CFR Parts 171-178, EPA, 40 CFR Parts 264-265 and 300, and OSHA requirements. Hazard warning label shall be immediately applied to all drums as specified by WMCO management/supervisors and Solid Waste Compliance.

11.0 CONTINGENCY PLANS

11.1 Incidents or Injuries Involving Possible Intake of Radiological or Chemical Substances by Employees

See statement on submission of urine samples for radiation exposures in Standard Operating Procedure (SOP) No. 11-C-245.

Incidents or injuries involving potential intake of other hazardous substances shall be reported to supervisor and the WMCO Medical Section by the involved employee and an Incident Investigation Report completed by the involved employee.

11.2 Pre-Emergency Planning

During the training and pre-work safety meetings, all employees involved in this task shall be trained and reminded of the provisions of the plant emergency procedure, alarm signals and communications, evacuation routes and emergency reporting.

11.3 Lines of Authority

The supervisor in charge has the primary responsibility for the prevention of emergency conditions. In the event that an emergency does occur, the individual involved or observing the condition shall immediately notify a supervisor, the communication center or the Assistant Emergency Duty Officer (AEDO). The AEDO is responsible for ensuring that corrective actions have been implemented, the appropriate personnel notified, and reports completed as required.

11.4 Evacuation

In the event of an emergency which necessitates an evacuation of the Exclusion Area, the 2-2, 2-2 shall be sounded over the plant alarm system; a voice message will follow over the Emergency Message System instructing employees to go to their designated Rally Point (see Figure 2). Personnel shall immediately proceed to the Rally Point and participate in the accountability process. Personnel will follow instructions given by the Rally Point Coordinator. When an all-clear condition has been achieved, personnel will be released from the Rally Point.

11.5 Emergency Equipment

The following safety equipment, locations to be identified at safety meetings, is available for employee usage:

[] fire extinguisher
[] eye wash
[] safety shower
[] telephone
[] spill drums
[] absorbent
[] other - List
[] manual fire alarm
[] two-way radio
[] emergency SCBA units
[] respirators
[] clean-up materials
[] local evacuation alarm

11.6 Emergency Notification

All emergencies shall be reported immediately. Emergencies can be reported by telephone dialing 6511; by contacting the communications center via two-way radio; or by pulling a manual fire alarm.

11.7 Fire, Explosion, or Medical Emergency

In the event of a fire, explosion or medical emergency, the communication center shall be notified immediately by manual fire alarm, two-way radio, or by calling 6511. The communication center operator will activate the emergency response team and dispatch them to your location. Personnel in the immediate area should evacuate to a safe position and await instructions.

A map delineating the route to the nearest medical facility, which is in back of building 53, is shown on Figure 4. Complete medical assistance will be provided by trained professional FMPC medical personnel.

11.8 Additional Information

11.8.1 Hospitals

The WMCO Medical Facility (Building 53) is the primary choice for on-site injuries. The WMCO ambulance will transport the injured to the nearest hospital if necessary. WMCO maintains an emergency response capability which includes an ambulance and Emergency Medical Technicians.

11.8.2 Emergency Telephone Numbers

Ambulance:	6511 or 6512
Hospital:	6511 or 6512
Fire:	6511 or 6512

Name	Work	Radio
EMERGENCY RESPONSE	**6511**	
Industrial Hygiene	6207	357
Radiation Safety	6889	355
Fire and Safety	6235	303
Leo Singleton	8908	709
Assistant Emergency Duty Officer (AEDO)	6431 or 6295	202

12.0 CONFINED SPACE ENTRY

During the perched water source contamination detection task, entry may have to be made into tanks or below ground sumps, which are designated as Confined Spaces. Entry will be controlled by issuance of a confined space entry permit. This permit will ensure that all energized equipment inside the space is locked out and all valves of piping to the space are locked shut or blocked out by blanking plates at the nearest flanges. The Industrial Safety and Radiological Technician granting the permit will check the confined space atmosphere for 0_2, CO, and H_2S gases. Depending on the space, the entering person may be issued a portable multi-gas detector with alarm. Vertical confined space entries shall be made using harness and block and tackle, to facilitate quick rescue in emergencies. Further details on confined space permit issuance may be found in ESH-P-41-0046 and FMPC-516.

The confined space tasks to be performed shall include an inspection of cracks in the confined space vessel and inserting inflatable bladders in drains in order to be able to pressure check them for leaks.

13.0 APPROVAL AND COMPLIANCE STATEMENT

This site specific Health and Safety Plan was produced for the use of WMCO employees and subcontractors. It is intended for the FMPC and specifically for the following activities related to the Plant 2/3 removal action:

Contaminant Source Detection
Installation of Collector System
Installation of Pumping System
Operation of the Pumping System

The personnel performing these tasks must read and understand the attached site specific health and safety plan and agree to follow its provisions[1]. Written documentation with signatures of those personnel performing these tasks must be maintained.

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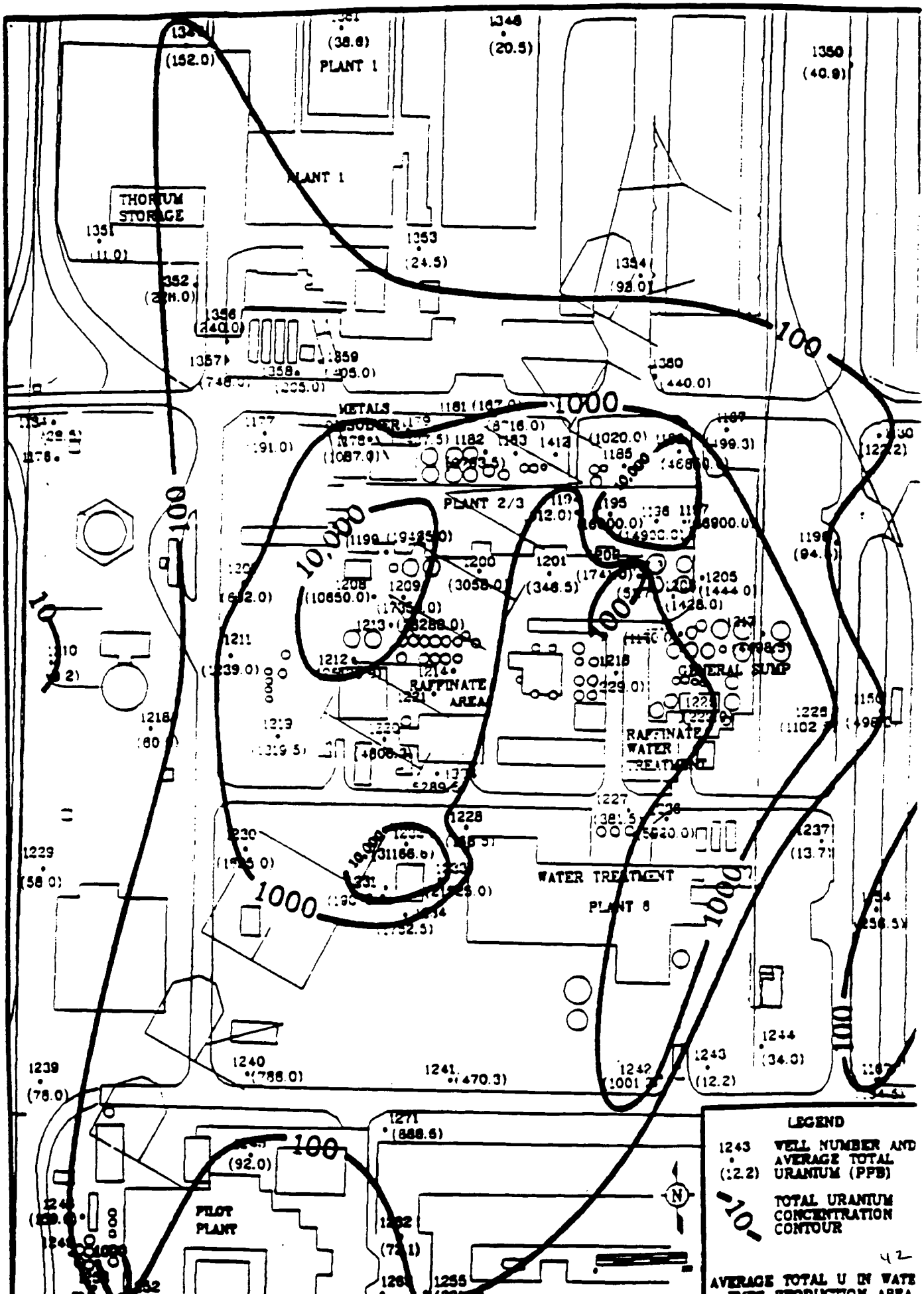
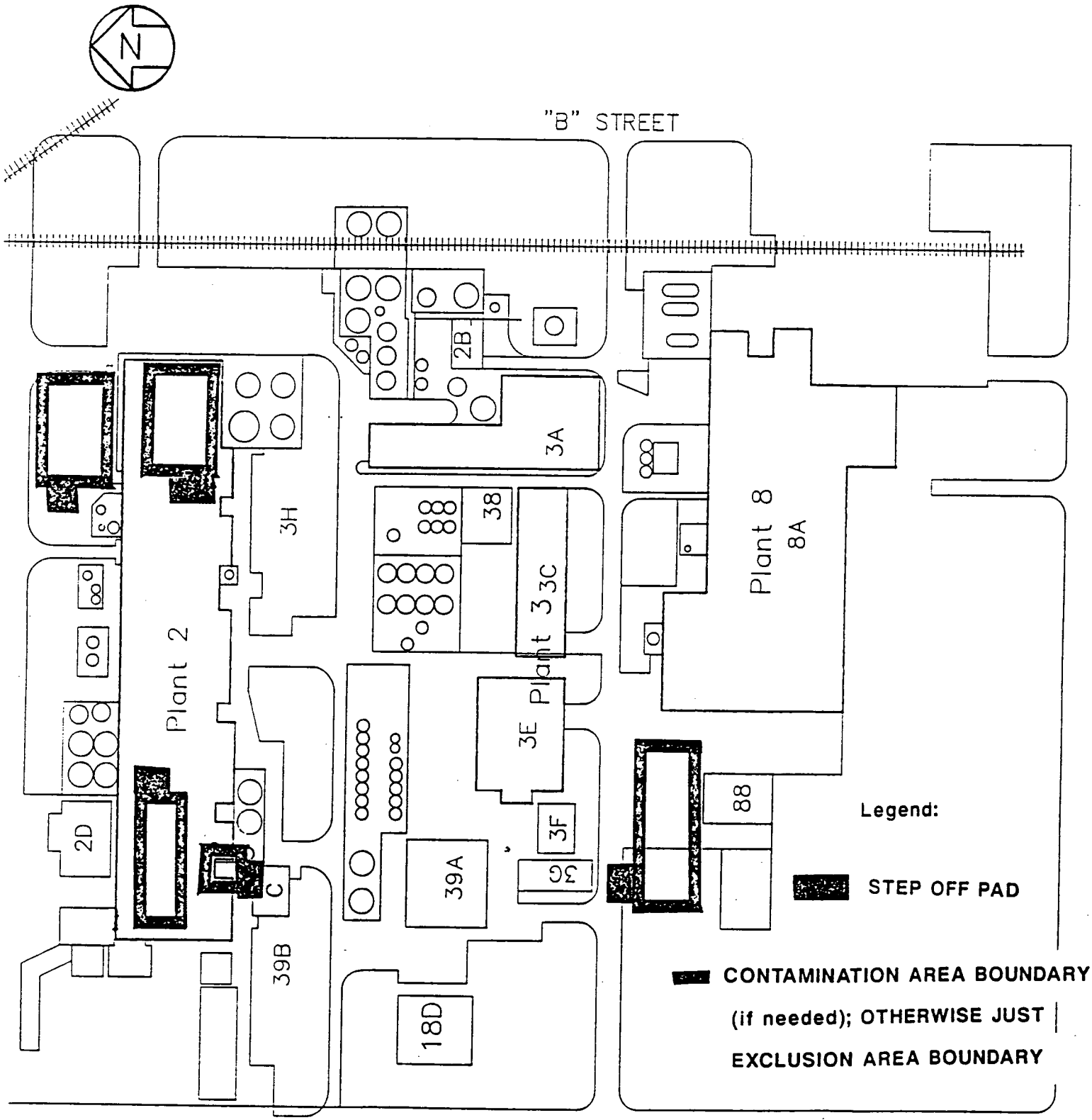
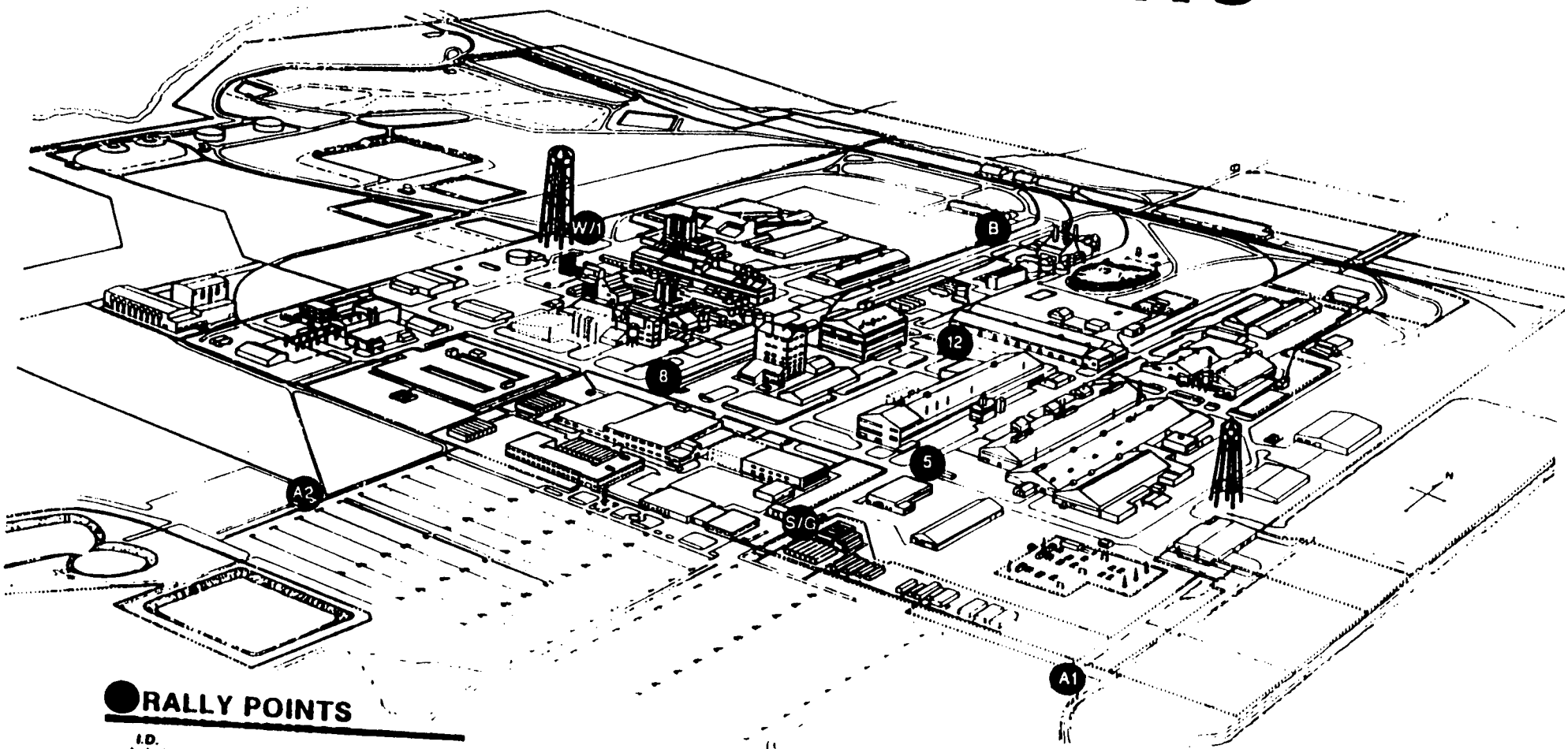
[1]Compliance with the provisions of the Health and Safety Plan may be audited through announced or unannounced site visits. Be sure that the provisions of this safety plan are implemented and document the reasons for field actions/changes when they are necessary. Site visits may be performed by the DOE or WMCO personnel.


PLANT 1
THORIUM STORAGE
METALS
PLANT 2/3
RAFFINATE AREA
GENERAL SUMP
RAFFINATE WATER TREATMENT
WATER TREATMENT
PLANT 6
PILOT PLANT
100
1000
10,000
10
LEGEND
1243 WELL NUMBER AND
(12.2) AVERAGE TOTAL URANIUM (PPB)
TOTAL URANIUM CONCENTRATION CONTOUR
AVERAGE TOTAL U IN WATE


N
"B" STREET
2B
3A
3H
38
3C
Plant 3
Plant 2
Plant 8
8A
3E
3F
3G
39A
39B
2D
C
18D
88
Legend:
STEP OFF PAD
CONTAMINATION AREA BOUNDARY
(if needed); OTHERWISE JUST
EXCLUSION AREA BOUNDARY

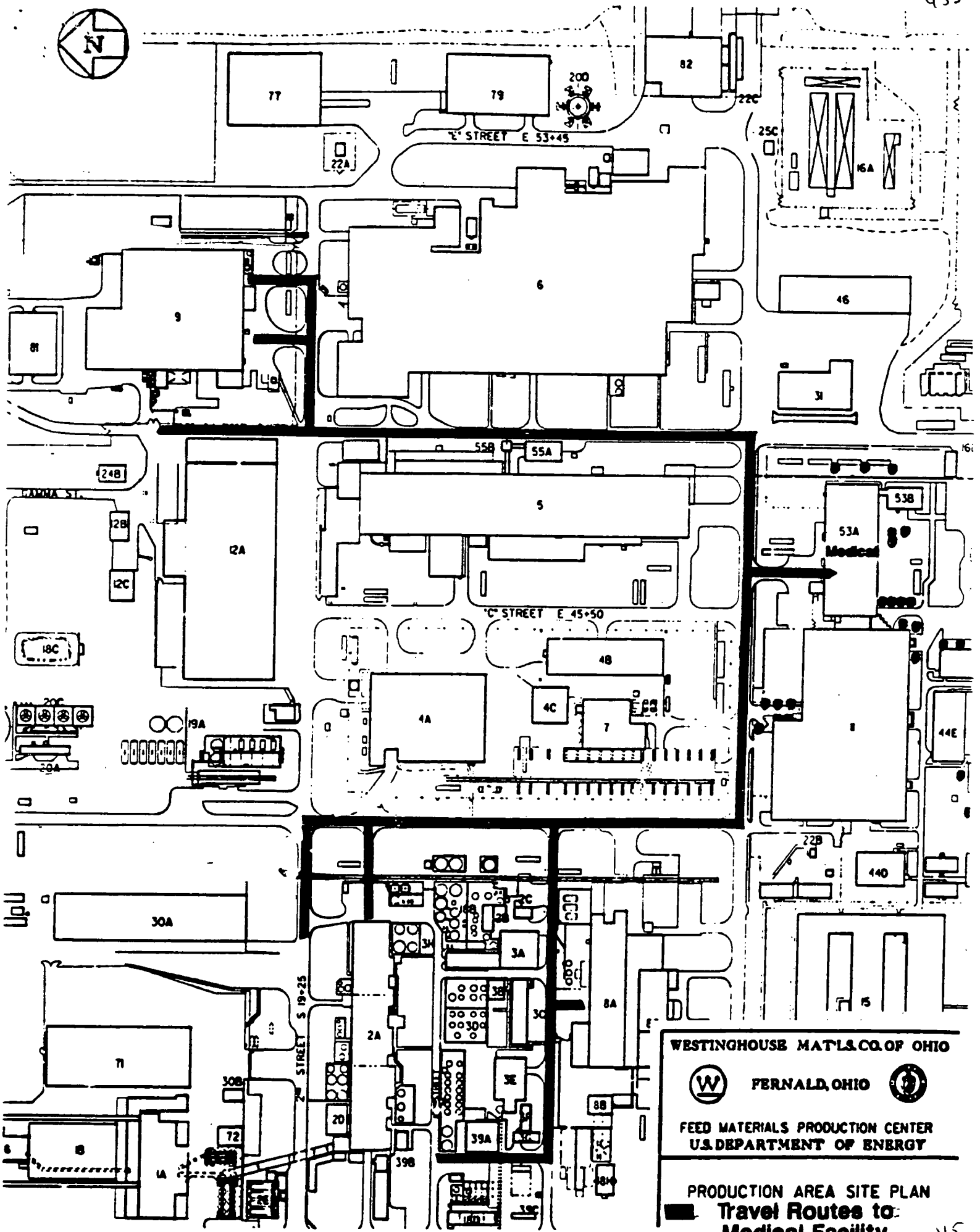
PLANT 2/3

FMPC RALLY POINTS



RALLY POINTS

I.D. Label	Plant or Area Description
A1	Administration
A2	Alternate Administration
B	Boiler Plant
S/G	Security & Garage
W/1	Waste Pit Area & Plant 1
5	Plant 5
8	Plant 8
12	Building 12


N
77
79
200
82
22C
25C
16A
'E' STREET E 53+45
22A
6
9
81
46
31
55B
55A
24B
GAMMA ST.
5
53B
53A
Medical
12B
12A
12C
'C' STREET E 45+50
18C
48
4C
4A
7
1
44E
20C
19A
20A
22B
440
30A
3A
8A
15
2ND STREET S 19+25
2A
71
30B
20
72
39A
39B
88
18
1A
WESTINGHOUSE MAT'LS. CO. OF OHIO
FERNALD, OHIO
FEED MATERIALS PRODUCTION CENTER
U.S. DEPARTMENT OF ENERGY
PRODUCTION AREA SITE PLAN
Travel Routes to
Medical Facility