

R-002-204.9

507

**PLANT 6 CONTAMINATED PERCHED WATER
MODIFIED REMOVAL ACTION WORK PLAN
AUGUST 1990**

08/10/90

WMCO/DOE-FMPC

79

REPORT

507

PLANT 6
CONTAMINATED PERCHED WATER
MODIFIED REMOVAL ACTION
WORK PLAN

AUGUST 1990

Prepared by:
Westinghouse Materials Company of Ohio
P.O. Box 398704
Cincinnati, Ohio 45239-8704

Prepared for:
U.S. Department of Energy
P.O. Box 398705
Cincinnati, Ohio 45239-8705

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	DESCRIPTION	1
	1.0 Summary of the Potential Threat	1
	2.0 Related Actions	2
	3.0 Roles of Participants	2
	4.0 Modified Removal Action	3
	5.0 Summary of HSL/VOC Analytical Results	3
	6.0 Integration with Operable Unit 3	3
III.	METHOD OF ACCOMPLISHMENT	3
	1.0 Project Planning	3
	2.0 Design Pumping Systems Discharge Piping Modifications	4
	3.0 HSL/VOC Investigation	4
	4.0 Management of Project	5
IV.	FIELD ACTIONS	5
	1.0 Perched Water Investigation	6
	2.0 Install Pumping Systems Discharge Piping Modifications	6
	3.0 Provide HSL/VOC Treatment (If Required)	6
	4.0 Pump Contaminated Water	7
V.	SAMPLING AND ANALYSIS PLAN	7
VI.	HEALTH & SAFETY PLAN	8
VII.	QUALITY ASSURANCE PLAN	9

VIII. ASSUMPTIONS 9

ATTACHMENT 1 Plant 6 Soil Boring Location Map 10

ATTACHMENT 2 Plant 6 Analytical Results from Boring #1149 (Sample # 45659) 11

ATTACHMENT 3 Plant 6 Contaminated Perched Water Modified Removal Action Work Plan Schedule 12

ATTACHMENT 4 Perched Groundwater Treatment Options 13

ATTACHMENT 5 Full Hazardous Substance List (HSL) Parameters 14

ATTACHMENT 6 Total Radionuclides Parameters 15

ATTACHMENT 7 Plant 6 Contaminated Perched Water Modified Removal Action Health and Safety Plan 16

I. INTRODUCTION

This document provides a modified work plan describing the required changes in the removal action taken to address the occurrence of relatively high concentrations of uranium found in perched water underlying Plant 6 at the Feed Materials Production Center (FMPC). The modification is required to address the presence of hazardous substance list/volatile organic compounds (HSL/VOCs) in the water being pumped. The existing pumping action was stopped when the HSL/VOCs were detected. The modified work plan was prepared to restart pumping to comply with the commitment for Removal Action No. 1 as stated in the Consent Agreement Under CERCLA Section 120 and 106(a) (hereafter called the "Consent Agreement") and is to be consistent with the requirements of 29 CFR 1910.120. The modified scope of work herein delineates the plan which will be used to locate the source of influent water, and pumping and treatment of the extracted water.

A Removal Site Evaluation (RSE) and an Action Memorandum has been generated and approved by the Department of Energy (DOE) as required by 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, latest revision.

II. DESCRIPTION

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 the extent of perched water in the upper 20 feet of the soil under the FMPC production area. This depth is intentionally confined to the space sufficiently above the aquifer that exists under the FMPC so that the surficial glacial till is not fully penetrated. In addition to systematic borings at 250 foot intervals across the entire production site, one phase of the RI/FS involves "biased" borings to explore suspect areas of contamination under the individual plants.

As part of the Production and Additional Suspect Areas Work Plan, several borings were installed in and around Plant 6 (see Attachment 1). Fourteen boring sites were identified in Plant 6 to evaluate suspect areas. Three of the 14 borings encountered perched water. The analyses of the water samples taken from the three piezometers indicated that the concentrations of uranium ranged from 1.74 to 138 mg/l. It was decided that a time-critical removal action be undertaken to pump water from these borings.

The pumping action began on November 6, 1989. The pumped water was transferred to existing FMPC Wastewater Treatment Facilities (WTFs) for uranium removal and nitrate treatment. The waste solids and liquids separated during treatment were handled in accordance with existing FMPC procedures which include processing filtered solids as a low level radioactive waste. The action was halted on April 23, 1990, due to the detection of HSL/VOCs in the water being pumped. The HSL/VOC analysis (see Attachment 2) of this pumped water indicates that discharge of this stream to the General Sump would not result in the discharge of pollutants from the Bionitrification Facility at levels above the "trigger levels" for a routine NPDES discharge from the FMPC.

2.0 Related Actions

Construction of a nitric acid fume scrubber facility led to the discovery of contaminated perched water beneath the floor of Plant 6 in August 1988. The wall of an abandoned clarifier pit, located adjacent to the nitric acid scrap pickling facility, was penetrated and 20,000 gallons of water flowed in the clarifier pit over a period of several days. Sampling of this water indicated a uranium concentration of 2,060 mg/l (2.06 g/l).

Perched water has continued to pass through this penetration and collect on the floor of the clarifier pit. Approximately once a week the quantity of accumulated water was measured, sampled, and pumped out of the clarifier pit and stored in a holding tank. The results indicated that a relatively constant flow was occurring. The water was transferred to existing FMPC WTFs for uranium removal and nitrate treatment before detection of HSL/VOC in the water.

3.0 Roles of Participants

- A. The DOE has been the lead agency for this removal action and will coordinate and execute continuation of this removal action.
- B. USEPA and OEPA shall review, comment and approve the modified work plan and follow progress through Technical Information Exchange (TIE) meetings and the Consent Agreement progress reports.
- C. 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 actions in a manner consistent with DOE and regulatory guidance.

4.0 Modified Removal Action

This Removal Action will address the presence of HSL/VOCs in Plant 6 perched water so that the existing piezometer and clarifier pit perched water pumping systems located in Plant 6 can be restarted. Any HSL/VOC treatment will occur prior to transferring the water to existing FMPC WTFs for treatment of uranium and nitrates. This action will be undertaken to continue the effort to control the potential for vertical migration of contamination into the Great Miami Aquifer by reducing the hydrostatic head of the perched water.

5.0 Summary of HSL/VOC Analytical Results

A groundwater sample from boring #1149 (Field ID #45695) within Plant 6 was collected for HSL/VOC analysis in February 1990 (see Attachment 2). The sample was received at International Technology Analytical Services laboratory in Oak Ridge, Tennessee on March 2, 1990. The sample data summary included in this result (Attachment 2, page 5 of 8) indicates that the concentrations of all the analysis parameters were "low". The following volatile organics exceeded the quantitative limit:

- | | |
|-----------------------|----------------------|
| 1,1-Dichloroethene | 1,2-Dichloroethylene |
| 1,1,1-Trichloroethane | Trichloroethene |

These volatile organics are constituents or probable degradation products of common industrial degreasing solutions.

6.0 Integration With Operable Unit 3

This removal action shall be managed by the WMCO/DOE Operable Unit 3 coordinators, to ensure compatibility with the final remedial action(s) selected for Operable Unit 3. Data and results from this removal action will be used to evaluate the final remedial options for Operable Unit 3. The groundwater pumping systems to be installed during this removal action shall be used to extract contaminated groundwater as specified in the Operable Unit 3 Task 12 Report.

III. **METHOD OF ACCOMPLISHMENT**

The following activities will be undertaken to provide planning, design, and management for the modified 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

3. Training has recently been completed to ensure that the personnel involved in the scope of work have been trained in accordance with the Occupational Safety and Health Administration (OSHA) standards found in 29 CFR 1910.120.

2.0 Design Pumping Systems Discharge Piping Modifications

The objective of this activity is to design a modification to the existing pumping systems discharge piping to isolate the extracted perched water contaminated with HSL/VOCs from the other wastewater flows in Plant 6. The existing pumping systems discharge piping will be redesigned to be combined into a new dedicated header system if it is determined that HSL/VOC treatment is required. The header system will be redesigned to discharge into an existing holding tank at the Plant 6 WTF from where it would be treated for HSL/VOCs if required (see Attachment 4).

3.0 HSL/VOC Investigation

Four treatment options for removing HSL/VOCs from Plant 6 pumping systems discharge water are under investigation (see Attachment 4). A Treatment Option Report detailing the selected treatment option shall be submitted to the U.S. EPA when sufficient data is available to select and justify a treatment option.

Option 1

This treatment option involves heating the water to approximately 180°F in the first unit of the existing Plant 6 WTF. This option would not require the construction of a new treatment unit at the FMPC. The water would be held at this temperature for a sufficient time to vaporize the organics. The retention time required to vaporize the organics and the amount of contaminants released to the atmosphere will be evaluated using simulation tests at the FMPC laboratory. The analytical results for the HSL/VOC perched groundwater samples will be used to determine the viability of this option.

Option 2

This option is the no treatment option which will be evaluated based on the total site discharge, including flow from the borings, meeting NPDES and RCRA requirements. Samples of the various borings will be evaluated for 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.

Option 3

This treatment option includes pumping perched groundwater to be circulated through activated carbon filters for removal of organic compounds. This option would require installation of a new treatment facility at the FMPC. The use of carbon filtration will include treatability tests in the laboratory and a design study to determine the system operation and anticipated loading on the carbon. Sampling for HSL/VOCs will be obtained to determine predicted system performance. In addition, the feed will be sampled for total suspended solids and oil and grease. This will determine the need for pretreatment to ensure the effectiveness of the carbon filtration. Depending on the total suspended solids present, bag filtration and cartridge filtration may be necessary. Clay-like materials may be required to absorb the oil and grease prior to the carbon filtration. Because the presence of biological activity could result in the coating of the activated carbon particles, a disinfection system may need to be installed prior to the carbon filtration.

Option 4

This treatment option includes utilization of an air stripping column to remove the organics from the contaminated groundwater. This option would require installation of new treatment units at the FMPC. A treatability test will be performed in the FMPC laboratory. However, adequate data exists so that bench-scale testing is not deemed necessary. Trichloroethylene is the major VOC contaminant identified to date. It has a Henry's Law constant of 0.49 which makes it an excellent candidate for air stripping. All the other contaminants also have high Henry's Law constants and will be removed by air stripping. Using published data, an air stripping column will be designed. The design will also estimate the loading to the air to determine if a carbon filter is required with the air stripping column. Samples will be taken of the feed to determine the type of rinsing required to ensure effective air stripping. An acid rinse will be used for suspended solids and a hypochlorite rinse will be used for oil and grease or biological growth in the packed column.

4.0 Management of Project

FMPC site 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 and to provide for HSL/VOC removal (if required), prior to transferring the water to existing FMPC WTFs for treatment of uranium and nitrates.

1.0 Perched Water Investigation

The objective of this activity is to determine the source and magnitude of perched water contamination (radionuclides and VOCs) found under Plant 6. Possible sources include leakage from roof drain lines which discharge to the storm sewer and leaking piping under Plant 6. Piping near the perched water area in Plant 6 will be hydrostatically tested. Dye testing may be necessary in the Plant 6 area to help locate potential sources of the perched groundwater. Groundwater sampling of the perched water along with visual observations will also be used to investigate the perched water under Plant 6.

The only VOC concentrations presently known are from an analysis on a water sample taken from boring 1149 (See Attachment 1 included in the modified work plan). On July 23, 1990, water samples were taken from the Clarifier Pit and borings 1148, 1149, and 1161 for extended HSL analysis. The determination of which pumping unit(s) may require treatment will be determined when the above additional HSL analyses are received (expected approximately October 23, 1990).

The rate at which water was removed from the Clarifier Pit and the borings (1148, 1149, 1161) prior to shutdown on April 23, 1990, was approximately 40, 3.5, 30 and 1.5 gallons per day, respectively; or a total of approximately 75 gallons per day. These flow rates have remained relatively constant and will be considered in the selection of an appropriate treatment option.

Nine additional borings have been scheduled around boring 1149 where VOCs were found in a water sample. The borings are scheduled under the RI/FS to determine the extent of contamination. This investigation will help determine the source of the VOC contamination. Also, process records will be checked for leads to the source of the contamination.

2.0 Install Pumping Systems Discharge Piping Modifications

The objective of this activity is to install a new common header system for combining existing pumping systems discharge piping.

3.0 Provide HSL/VOC Treatment (If Required)

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

4.0 Pump Contaminated Water

The objective of this activity is to restart pumping of the contaminated water. This effort will be undertaken to control the potential for vertical migration of the contamination by reducing the hydrostatic head of the perched water. The uranium contaminated water will be pumped from the clarifier pit and borings into a holding tank at Plant 6 from where it will be processed through the HSL/VOC treatment system to remove the organics if necessary.

V. SAMPLING AND ANALYSIS PLAN

The perched groundwater under Plant 6 has been determined to have significant concentrations of uranium, warranting this removal action. However, the concentration levels of other contaminants (primarily VOCs, see Attachment 2) are not fully defined at this time. For this reason, additional samples have been taken, prior to the implementation of this removal action, to define contaminants, and to determine type and level of treatment required. A groundwater sample from boring 1149 (Field ID # 45695) within Plant 6 was collected in February 1990 (see Attachment 2). Additional groundwater sample data will be obtained from four existing soil borings (1161, 1148, 1149, 1145) and the clarifier pit in Plant 6 before proceeding with this removal action (see Attachment 1 for soil boring locations).

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

These samples will be analyzed at the certified independent laboratory for the following:

- Full Hazardous Substance List (HSL) Parameters (see Attachment 5)
- Total Radionuclides Parameters (see Attachment 6)

During the restart and operational phase of this removal action, samples will be collected and analyzed for total radionuclides at each boring where perched groundwater is being extracted. Full HSL sampling will be performed at the point of discharge of the perched groundwater from the perched groundwater system. The results of this full HSL sampling may be used to identify and eliminate contaminant analysis for future sampling. If HSL/VOC treatment is required, samples will be collected after the treatment system. Sampling shall be performed 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 cleanup criteria developed based on the Operable Unit 3 Baseline Risk Assessment. Samples shall also be collected quarterly for one year after termination of pumping activities to verify that the identified 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.

Additional routine samples will be obtained and analyzed utilizing FMPC protocols and procedures as identified in the Analytical Laboratories Quality Assurance Plan L.C.N.-QAP, October 1987. These routine samples will be utilized for process control and operational requirements.

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 7 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 Safety and Health Plan.

Additional safety documentation will be prepared as necessary 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. Periodic surveillances will be conducted by FMPC Quality Assurance/Quality Control personnel to verify compliance.

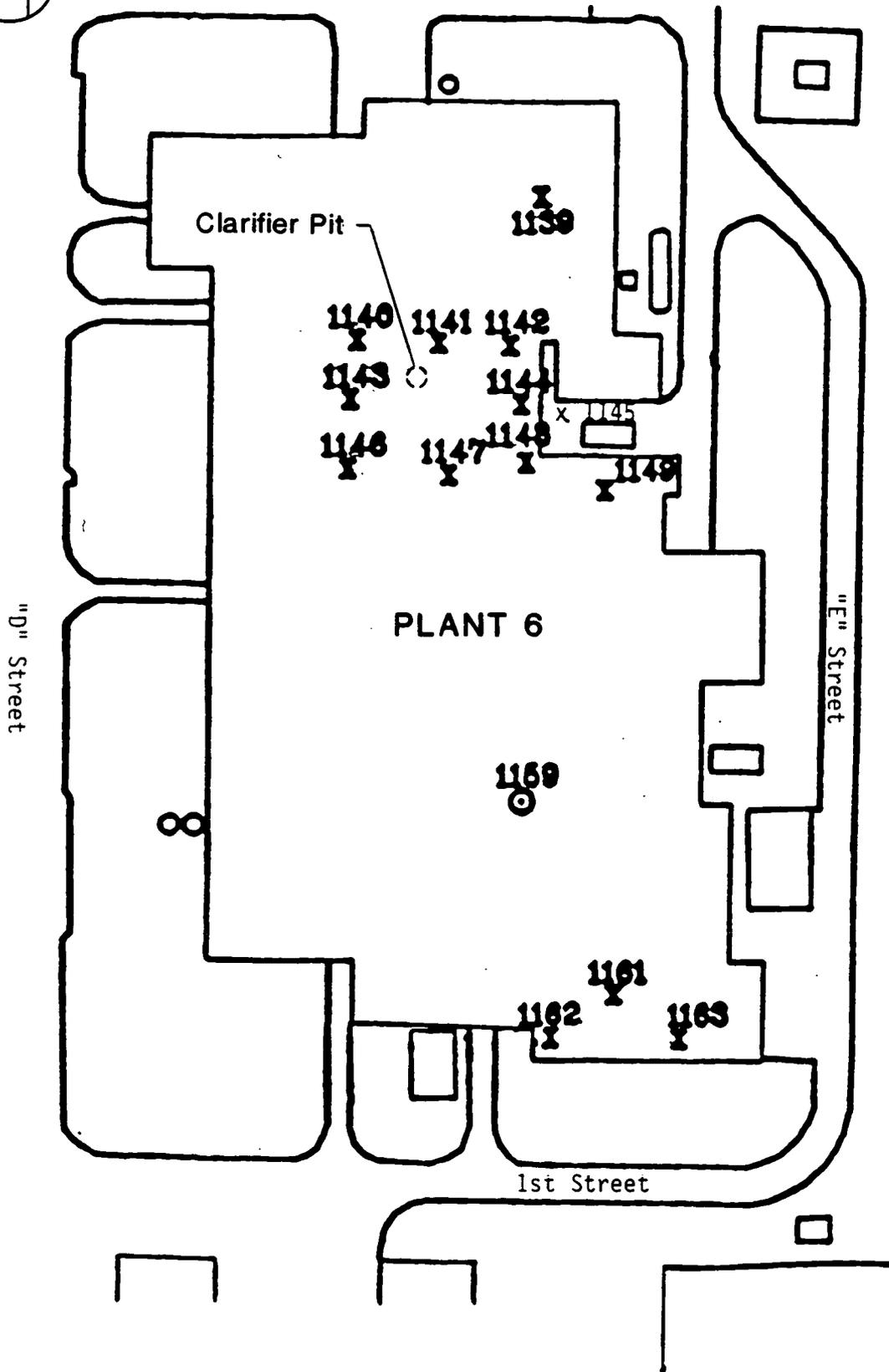
VIII. ASSUMPTIONS

1. No new regulatory assessments or permits are required.

ATTACHMENT 1

Plant 6

Soil Boring Location Map



ATTACHMENT 2**Plant 6****Analytical Results****from****Boring #1149 (Sample #45659)**



INTERNATIONAL
TECHNOLOGY
CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

C/O ASI Inc.
11030 Hamilton Cleves Road
Ross, OH 45061
Attn: Cindy Capannari

Date: April 23, 1990

Page 1 of 8

Job Number: ADV 35860

P.O Number: Accounts Payable

This is the Certificate of Analysis for the following:

Client Project ID: FMPC RI/FS
Date Received by Lab: 03/02/90
Number of Samples: One (1)
Sample Type: XXXXXXXXXX

1149

I. INTRODUCTION

On March 2, 1990, one (1) groundwater sample was received at ITAS Oak Ridge, Tennessee laboratory from Advanced Sciences Inc., Ross, Ohio. The list of analytical tests performed, as well as date of receipt and analysis, can be found in the attached report.

Blanks are identified with client sample ID's starting with either "QX..B" or "QX...B.". Data are reported with the qualifier "U" if the compound was analyzed for but not detected. Lists with concentration unit code and lab and client suffix code definitions are attached.

II. ANALYTICAL RESULTS/METHODOLOGY

The analytical results for this report are presented by analytical tests. Each set of data will include sample identification information, the analytical results, and the appropriate detection limits.

Reviewed and Approved:

Mary Hall for Snell Mills
Snell W. Mills III
Laboratory Manager.

SAM/vlg

American Council of Independent Laboratories
International Association of Environmental Testing Laboratories
American Association for Laboratory Accreditation

Advanced Sciences, Inc.
Date: April 23, 1990
Client Project ID: RI/FS Fernald

ANALYTICAL SERVICE
OAK RIDGE, TN
Page 5 of 3
Job Number: ADV 99360

SAMPLE DATA SUMMARY

<u>FIELD #</u>	<u>WAS #</u>	<u>MATRIX</u>	<u>CONC.</u>	<u>ANALYSIS</u>
45659	MM3695	WATER	LOW	VOC
	MM3701	WATER	LOW	PEST/PCB
	MM3683	WATER	LOW	METALS
	MM3671	WATER	LOW	MERCURY
	MM3704	WATER	LOW	CYANIDE
	MM3674	WATER	LOW	PHENOL/NITRATE
	MM3677	WATER	LOW	TOX
	MM3680	WATER	LOW	CL/FL/SO4
	MM3686	WATER	LOW	NH3/TKN/PO4
45659MS	MM3689	WATER	LOW	TOC
	MM3696	WATER	LOW	QC/MS/VOC
	MM3702	WATER	LOW	QC/MS/PEST/PCB
	MM3684	WATER	LOW	QC/MS/METALS
	MM3672	WATER	LOW	QC/MS/MERCURY
	MM3705	WATER	LOW	QC/MS/CYANIDE
	MM3675	WATER	LOW	QC/MS/PHENOL/NITRATE
	MM3678	WATER	LOW	QC/MS/TOX
	MM2960	WATER	LOW	QC/MS/CL/FL/SO4
	MM3681	WATER	LOW	QC/MS/NH3/TKN/PO4
45659DUP	MM3690	WATER	LOW	QC/MS/TOC
	MM3685	WATER	LOW	QC/DUP/METALS
	MM3673	WATER	LOW	QC/DUP/MERCURY
45659MSD	MM3706	WATER	LOW	QC/DUP/CYANIDE
	MM3697	WATER	LOW	QC/MSD/VOC
	MM3703	WATER	LOW	QC/MSD/PEST/PCB
	MM3676	WATER	LOW	QC/MSD/PHENOL/NITRATE
	MM3679	WATER	LOW	QC/MSD/TOX
	MM3682	WATER	LOW	QC/MSD/CL/FL/SO4
	MM3688	WATER	LOW	QC/MSD/NH3/TKN/PO4
	MM3691	WATER	LOW	QC/MSD/TOC

ABBREVIATIONS:

- VOC - VOLATILES
- PEST - PESTICIDES
- PCB - POLYCHLORINATED BIPHENYLS
- DUP - DUPLICATE
- MS - MATRIX SPIKE
- MSD - MATRIX SPIKE DUPLICATE
- TOX - TOTAL ORGANIC HALIDES
- CL - CHLORIDE
- FL - FLUORIDE
- SO4 - SULFATE
- NH3 - AMMONIA
- TKN - TOTAL KJELDAHL NITROGEN
- PO4 - TOTAL PHOSPHATE
- TOC - TOTAL ORGANIC CARBON

Advanced Sciences, Inc.
Date: 09-MAY-90

IT CORPORATION
KNOXVILLE, TN

Client Project ID: Fernald RI/FS

Job Number: ADV35860

EPA CLP TCL Volatile Organics by GCMS - Current EPA CLP Protocol - MV 702

Client Sample ID: 45659

Sample Date: N/A
IT Sample ID: MM3695
Prep Date:
Analysis Date: (Completed) 03/08/90
Blank Sample ID: QXM10B003081VBA
Concentration Units: UG/LITER

Parameter	Result	
Chloromethane	10	U
Bromomethane	10	U
Vinyl chloride	10	U
Chloroethane	10	U
Methylene chloride	28	B
Acetone	9	BJ
Carbon disulfide	5	U
1,1-Dichloroethene	460	E
1,1-Dichloroethane	74	
1,2-Dichloroethylene	430	E
Chloroform	26	
1,2-Dichloroethane	86	
2-Butanone	67	B
1,1,1-Trichloroethane	310	E
Carbon Tetrachloride	5	
Vinyl Acetate	10	U
Bromodichloromethane	5	U
1,2-Dichloropropane	5	U
cis-1,3-Dichloropropene	5	U
Trichloroethene	1400	E
Dibromochloromethane	5	U
1,1,2-Trichloroethane	5	U
Benzene	1	J
trans-1,3-Dichloropropene	5	U
Bromoform	5	U
4-Methyl-2-pentanone	10	U
2-Hexanone	10	U
Tetrachlorethene	14	
1,1,2,2-Tetrachloroethane	5	U
Toluene	5	U
Chlorobenzene	5	U
Ethylbenzene	5	U
Styrene	5	U
Total xylenes	5	U

Advanced Sciences, Inc.
Date: 09-MAY-90

IT CORPORATION
KNOXVILLE, TN

Client Project ID: Fernald RI/FS

Job Number: ADV35860

TCL Pesticides/PCB's in Water - Current EPA CLP Protocol - GC 720

Client Sample ID: 45659

Sample Date: N/A
 IT Sample ID: MM3701
 Prep Date: 03/07/90
 Analysis Date: (Completed) 03/12/90
 Blank Sample ID: QXG198003071
 Concentration Units: UG/LITER

Parameter	Result
alpha-BHC	.05 U
beta-BHC	.05 U
delta-BHC	.05 U
gamma-BHC (Lindane)	.05 U
Heptachlor	.05 U
Aldrin	.05 U
Heptachlor epoxide	.05 U
Endosulfan-I	.05 U
Dieldrin	.1 U
4,4'-DDE	.1 U
Endrin	.1 U
Endosulfan II	.1 U
4,4'-DDD	.1 U
Endosulfan sulfate	.1 U
4,4'-DDT	.1 U
Methoxychlor	.5 U
Endrin ketone	.1 U
alpha-Chlordane	.5 U
gamma-Chlordane	.5 U
Toxaphene	1 U
Aroclor-1016	.5 U
Aroclor-1221	.5 U
Aroclor-1232	.5 U
Aroclor-1242	.5 U
Aroclor-1248	.5 U
Aroclor-1254	1 U
Aroclor-1260	1 U

Advanced Sciences, Inc.
Date: 09-MAY-90

IT CORPORATION
KNOXVILLE, TN

Client Project ID: Fernald RI/FS

Job Number: ADV35860

TAL ICP Metals - EPA CLP Protocol (Mod. EPA 200.7) - AP 703

Client Sample ID: 45659

Sample Date: N/A
IT Sample ID: MM3683
Prep Date: 04/06/90
Analysis Date: (Completed) 04/11/90
Blank Sample ID: QXA158004062
Concentration Units: UG/LITER

Parameter	Result	
Molybdenum	44.8	
Aluminum	3410	E
Antimony	68	
Barium	589	
Beryllium	34.3	
Cadmium	40	
Calcium	976000	
Chromium	818	E
Cobalt	88.6	
Copper	91.6	
Iron	358	
Magnesium	251000	
Manganese	1580	E
Nickel	227	
Silver	264	
Sodium	207000	
Vanadium	299	
Zinc	268	E

Advanced Sciences, Inc.
Date: 09-MAY-90

IT CORPORATION
KNOXVILLE, TN

Client Project ID: Fernald RI/FS

Job Number: ADV35860

TAL Metals by Furnace AA - Current EPA CLP Protocol - AG 702

Client Sample ID: QXA138004062

Sample Date: N/A
IT Sample ID: 138004062
Prep Date: 04/06/90
Analysis Date: (Completed) 04/17/90
Blank Sample ID: QXA138004062
Concentration Units: UG/LITER

Parameter	Result	
Arsenic	2	U
Lead	2	U
Selenium	2	U
Thallium	2	U

Client Sample ID: 45659

Sample Date: N/A
IT Sample ID: MM3683
Prep Date: 04/06/90
Analysis Date: (Completed) 04/17/90
Blank Sample ID: QXA138004062
Concentration Units: UG/LITER

Parameter	Result	
Arsenic	2	U
Lead	4.2	3
Selenium	2	UWN
Thallium	2	U

Advanced Sciences, Inc.
Date: 09-MAY-90

IT CORPORATION
KNOXVILLE, TN

Client Project ID: Fernald RI/FS

Job Number: ADV35860

Mercury by Cold Vapor AA - Current EPA CLP Protocol - AV 002

Client Sample ID: QXA04B003291
Sample Date: N/A
IT Sample ID: 04B003291
Prep Date: 03/29/90
Analysis Date: (Completed) 03/29/90
Blank Sample ID: QXA04B003291
Concentration Units: UG/LITER

Parameter	Result
Mercury	.2 U

Client Sample ID: 45659
Sample Date: N/A
IT Sample ID: MM3671
Prep Date: 03/29/90
Analysis Date: (Completed) 03/29/90
Blank Sample ID: QXA04B003291
Concentration Units: UG/LITER

Parameter	Result
Mercury	.2 U

Client Sample ID: 45659S1
Sample Date: N/A
IT Sample ID: MM3672S1
Prep Date: 03/29/90
Analysis Date: (Completed) 03/29/90
Blank Sample ID: QXA04B003291
Concentration Units: % RECOVERY

Parameter	Result
Mercury	107.8

Advanced Sciences, Inc.
Date: 09-MAY-90

IT CORPORATION
KNOXVILLE, TN

Client Project ID: Fernald RI/FS

Job Number: ADV35860

Potassium by Flame AA - Current EPA CLP Protocol - AA 069

Client Sample ID: QXA15B004062
Sample Date: N/A
IT Sample ID: 15B004062
Prep Date: 04/06/90
Analysis Date: (Completed) 04/17/90
Blank Sample ID: QXA15B004062
Concentration Units: UG/LITER

Parameter	Result
Potassium	100 U

Client Sample ID: 45659
Sample Date: N/A
IT Sample ID: MM3683
Prep Date: 04/06/90
Analysis Date: (Completed) 04/17/90
Blank Sample ID: QXA15B004062
Concentration Units: UG/LITER

Parameter	Result
Potassium	4500 B

Client Sample ID: 45659D
Sample Date: N/A
IT Sample ID: MM3685D
Prep Date: 04/06/90
Analysis Date: (Completed) 04/17/90
Blank Sample ID: QXA15B004062
Concentration Units: UG/LITER

Parameter	Result
Potassium	4604 B

Advanced Sciences, Inc.
Date: 09-MAY-90

ET CORPORATION
KNOXVILLE, TN

Client Project ID: Fernald RI/FS

Job Number: ADV35860

Total Organic Carbon - EPA 415.1 - OM 001

Client Sample ID: QX0018003071
Sample Date: N/A
IT Sample ID: 018003071
Prep Date: 03/07/90
Analysis Date: (Completed) 03/07/90
Blank Sample ID: QX0018003071
Concentration Units: MG/LITER

Parameter	Result
Total Organic Carbon	1 U

Client Sample ID: 45659
Sample Date: N/A
IT Sample ID: MM3689
Prep Date: 03/07/90
Analysis Date: (Completed) 03/07/90
Blank Sample ID: QX0018003071
Concentration Units: MG/LITER

Parameter	Result
Total Organic Carbon	39.9

Client Sample ID: 45659MS
Sample Date: N/A
IT Sample ID: MM3690MS
Prep Date: 03/07/90
Analysis Date: (Completed) 03/07/90
Blank Sample ID: QX0018003071
Concentration Units: % RECOVERY

Parameter	Result
Total Organic Carbon	103

Advanced Sciences, Inc.
Date: 09-MAY-90

IT CORPORATION
KNOXVILLE, TN

Client Project ID: Fernald RI/FS

Job Number: ADV35860

Total Organic Halides - EPA 450.1/SW846-9020 - OM 004

Client Sample ID: QX0048003061
Sample Date: N/A
IT Sample ID: 048003061
Prep Date: 03/06/90
Analysis Date: (Completed) 03/06/90
Blank Sample ID: QX0048003061
Concentration Units: MG/LITER

Parameter	Result
Total Organic Halides	.01 U

Client Sample ID: 45659
Sample Date: N/A
IT Sample ID: MM3677
Prep Date: 03/06/90
Analysis Date: (Completed) 03/06/90
Blank Sample ID: QX0048003061
Concentration Units: MG/LITER

Parameter	Result
Total Organic Halides	.652

Client Sample ID: 45659MS
Sample Date: N/A
IT Sample ID: MM3678MS
Prep Date: 03/06/90
Analysis Date: (Completed) 03/06/90
Blank Sample ID: QX0048003061
Concentration Units: % RECOVERY

Parameter	Result
Total Organic Halides	325

Advanced Sciences, Inc.
Date: 09-MAY-90

IT CORPORATION
KNOXVILLE, TN

Client Project ID: Fernaid RI/FS

Job Number: ADV35860

- EPA 350.2 - WW 005

Client Sample ID: QXW058003191
Sample Date: N/A
IT Sample ID: 058003191
Prep Date: 03/19/90
Analysis Date: (Completed) 03/19/90
Blank Sample ID: QXW058003191
Concentration Units: MG/LITER

Parameter	Result
Ammonia	.1 U

Client Sample ID: 45659MS
Sample Date: N/A
IT Sample ID: MM3681MS
Prep Date: 03/19/90
Analysis Date: (Completed) 03/19/90
Blank Sample ID: QXW058003191
Concentration Units: % RECOVERY

Parameter	Result
Ammonia	108

Client Sample ID: 45659
Sample Date: N/A
IT Sample ID: MM3686
Prep Date: 03/19/90
Analysis Date: (Completed) 03/19/90
Blank Sample ID: QXW058003191
Concentration Units: MG/LITER

Parameter	Result
Ammonia	2.5 *

Advanced Sciences, Inc.
Date: 09-MAY-90

IT CORPORATION
KNOXVILLE, TN

Client Project ID: Fernald RI/FS

Job Number: ADV35860

Chloride by Ion Specific Electrode - EPA 325.3 - WW 017

Client Sample ID: QXW17B003121
Sample Date: N/A
IT Sample ID: 17B003121
Prep Date: 03/12/90
Analysis Date: (Completed) 03/12/90
Blank Sample ID: QXW17B003121
Concentration Units: MG/LITER

Parameter	Result
-----	-----
Chloride	.5 U

Client Sample ID: 45659MS
Sample Date: N/A
IT Sample ID: MM2960MS
Prep Date: 03/12/90
Analysis Date: (Completed) 03/12/90
Blank Sample ID: QXW17B003121
Concentration Units: % RECOVERY

Parameter	Result
-----	-----
Chloride	110

Client Sample ID: 45659
Sample Date: N/A
IT Sample ID: MM3680
Prep Date: 03/12/90
Analysis Date: (Completed) 03/12/90
Blank Sample ID: QXW17B003121
Concentration Units: MG/LITER

Parameter	Result
-----	-----
Chloride	50.8

Advanced Sciences, Inc.
Date: 09-MAY-90

IT CORPORATION
KNOXVILLE, TN

Client Project ID: Fernald RI/FS

Job Number: ADV35860

Fluoride by Ion Specific Electrode - EPA 340.2 - WW 042

Client Sample ID: QXW42B003091
Sample Date: N/A
IT Sample ID: 42B003091
Prep Date: 03/09/90
Analysis Date: (Completed) 03/09/90
Blank Sample ID: QXW42B003091
Concentration Units: MG/LITER

Parameter	Result
Fluoride	.05 U

Client Sample ID: 45659MS
Sample Date: N/A
IT Sample ID: MM2960MS
Prep Date: 03/09/90
Analysis Date: (Completed) 03/09/90
Blank Sample ID: QXW42B003091
Concentration Units: % RECOVERY

Parameter	Result
Fluoride	92.5

Client Sample ID: ~~45659~~ 4
Sample Date: N/A
IT Sample ID: MM3680
Prep Date: 03/09/90
Analysis Date: (Completed) 03/09/90
Blank Sample ID: QXW42B003091
Concentration Units: MG/LITER

Parameter	Result
Fluoride	.125

Advanced Sciences, Inc.
Date: 09-MAY-90

IT CORPORATION
KNOXVILLE, TN

Client Project ID: Fernald RI/FS

Job Number: ADV35860

Nitrate, as N - EPA 353.3 - WW 053

Client Sample ID: QXW538003121

Sample Date: N/A
IT Sample ID: 538003121
Prep Date: 03/12/90
Analysis Date: (Completed) 03/12/90
Blank Sample ID: QXW538003121
Concentration Units: MG/LITER

Parameter	Result
Nitrate	.1 U

Client Sample ID: 45659

Sample Date: N/A
IT Sample ID: MM3674
Prep Date: 03/12/90
Analysis Date: (Completed) 03/12/90
Blank Sample ID: QXW538003121
Concentration Units: MG/LITER

Parameter	Result
Nitrate	843 *

Client Sample ID: 45659MS

Sample Date: N/A
IT Sample ID: MM3681MS
Prep Date: 03/12/90
Analysis Date: (Completed) 03/12/90
Blank Sample ID: QXW538003121
Concentration Units: % RECOVERY

Parameter	Result
Nitrate	95.6

Advanced Sciences, Inc.
Date: 09-MAY-90

IT CORPORATION
KNOXVILLE, TN

Client Project ID: Fernald RI/FS

Job Number: ADV35860

Total Kjeldahl Nitrogen in Water - EPA 351.3 - WW 047

Client Sample ID: QXW478003191

Sample Date: N/A
IT Sample ID: 478003191
Prep Date: 03/19/90
Analysis Date: (Completed) 03/20/90
Blank Sample ID: QXW478003191
Concentration Units: MG/LITER

Parameter	Result
Total Kjeldahl Nitrogen	.1 U

Client Sample ID: 45659MS

Sample Date: N/A
IT Sample ID: MM3681MS
Prep Date: 03/19/90
Analysis Date: (Completed) 03/20/90
Blank Sample ID: QXW478003191
Concentration Units: % RECOVERY

Parameter	Result
Total Kjeldahl Nitrogen	156

Client Sample ID: ~~45659~~

Sample Date: N/A
IT Sample ID: MM3686
Prep Date: 03/19/90
Analysis Date: (Completed) 03/20/90
Blank Sample ID: QXW478003191
Concentration Units: MG/LITER

Parameter	Result
Total Kjeldahl Nitrogen	7.27 *

Advanced Sciences, Inc.
Date: 09-MAY-90

ET CORPORATION
KNOXVILLE, TN

Client Project ID: Fernald RI/FS

Job Number: ADV3586

- SM 420A - WW 062

Client Sample ID: QXW62B003071
Sample Date: N/A
IT Sample ID: 62B003071
Prep Date:
Analysis Date: (Completed) 03/07/90
Blank Sample ID: QXW62B003071
Concentration Units: MG/LITER

Parameter	Result
-----	-----
Total Organic Nitrogen	.1 U

Client Sample ID: 45659
Sample Date: N/A
IT Sample ID: MM3686
Prep Date:
Analysis Date: (Completed) 03/07/90
Blank Sample ID: QXW62B003071
Concentration Units: MG/LITER

Parameter	Result
-----	-----
Total Organic Nitrogen	4.77

Advanced Sciences, Inc.
Date: 09-MAY-90

IT CORPORATION
KNOXVILLE, TN

Client Project ID: Fernald RI/FS

Job Number: ADV35860

Total Phenols - EPA 420.1 - WW 065

Client Sample ID: QXW65B003131
Sample Date: N/A
IT Sample ID: 65B003131
Prep Date: 03/13/90
Analysis Date: (Completed) 03/15/90
Blank Sample ID: QXW65B003131
Concentration Units: MG/LITER

Parameter	Result
-----	-----
Phenols	.01 U

Client Sample ID: 45659
Sample Date: N/A
IT Sample ID: MM3674
Prep Date: 03/13/90
Analysis Date: (Completed) 03/15/90
Blank Sample ID: QXW65B003131
Concentration Units: MG/LITER

Parameter	Result
-----	-----
Phenols	.07 *

Client Sample ID: 45659MS
Sample Date: N/A
IT Sample ID: MM3675MS
Prep Date: 03/13/90
Analysis Date: (Completed) 03/15/90
Blank Sample ID: QXW65B003131
Concentration Units: % RECOVERY

Parameter	Result
-----	-----
Phenols	120

Date: 09-MAY-90

IT CORPORATION
KNOXVILLE, TN

Client Project ID:

Job Number: ADV35860

- EPA 365.3 - WW 068

Client Sample ID: QXW688003191

Sample Date: N/A
 IT Sample ID: 688003191
 Prep Date: 03/19/90
 Analysis Date: (Completed) 03/22/90
 Blank Sample ID: QXW688003191
 Concentration Units: MG/LITER

Parameter	Result
Phosphorus (black, white, re	.02 U

Client Sample ID: 45659MS

Sample Date: N/A
 IT Sample ID: MM3681MS
 Prep Date: 03/19/90
 Analysis Date: (Completed) 03/22/90
 Blank Sample ID: QXW688003191
 Concentration Units: % RECOVERY

Parameter	Result
Phosphorus (black, white, re	96.6

Client Sample ID: 45659

Sample Date: N/A
 IT Sample ID: MM3686
 Prep Date: 03/19/90
 Analysis Date: (Completed) 03/22/90
 Blank Sample ID: QXW688003191
 Concentration Units: MG/LITER

Parameter	Result
Phosphorus (black, white, re	39.8 *

Advanced Sciences, Inc.
Date: 09-MAY-90

IT CORPORATION
KNOXVILLE, TN

Client Project ID: Fernald RI/FS

Job Number: ADV3586

Sulfate - EPA 375.4 - WW 081

Client Sample ID: QXW81B003111
Sample Date: N/A
IT Sample ID: 81B003111
Prep Date: 03/11/90
Analysis Date: (Completed) 03/11/90
Blank Sample ID: QXW81B003111
Concentration Units: MG/LITER

Parameter	Result
Sulfate	2 U

Client Sample ID: 45659MS
Sample Date: N/A
IT Sample ID: MM2960MS
Prep Date: 03/11/90
Analysis Date: (Completed) 03/11/90
Blank Sample ID: QXW81B003111
Concentration Units: % RECOVERY

Parameter	Result
Sulfate	87.9

Client Sample ID: 45659
Sample Date: N/A
IT Sample ID: MM3680
Prep Date: 03/11/90
Analysis Date: (Completed) 03/11/90
Blank Sample ID: QXW81B003111
Concentration Units: MG/LITER

Parameter	Result
Sulfate	98.2

Advanced Sciences, Inc.
Date: 09-MAY-90

IT CORPORATION
KNOXVILLE, TN

Client Project ID: Fernald RI/FS

Job Number: ADV3586

Total Cyanide - Current EPA CLP Protocol - WW 034

Client Sample ID: QXW348003131

Sample Date: N/A
IT Sample ID: 348003131
Prep Date: 03/13/90
Analysis Date: (Completed) 03/15/90
Blank Sample ID: QXW348003131
Concentration Units: UG/LITER

Parameter	Result
Cyanide	10 U

Client Sample ID: 45659

Sample Date: N/A
IT Sample ID: MM3704
Prep Date: 03/13/90
Analysis Date: (Completed) 03/15/90
Blank Sample ID: QXW348003131
Concentration Units: UG/LITER

Parameter	Result
Cyanide	248 N*

Client Sample ID: 45659S1

Sample Date: N/A
IT Sample ID: MM3705S1
Prep Date: 03/13/90
Analysis Date: (Completed) 03/15/90
Blank Sample ID: QXW348003131
Concentration Units: % RECOVERY

Parameter	Result
Cyanide	18.5 N

ATTACHMENT 3

Plant 6

Contaminated Perched Water

Modified Removal Action

Work Plan Schedule

Plant 6 Contaminated Groundwater Pumping

FMPC

Description	Time Zero
Work Plan - Prepare/Submit - USEPA Approval	
Perched Water Recharge Investigation	
HSL/VOC Investigation - Treatment Options - Obtain & Analyze Samples - Prepare Treatment Options Report - USEPA Approval Action	
Piping/Treatment System Design, Procurement, Installation, and Start-up (Treatment if required)	
Pump Perched Water - Option 1 (Plant 6 WTF) - Option 2 (No Treatment) - Option 3 & 4 (Other Treatment Techniques)	

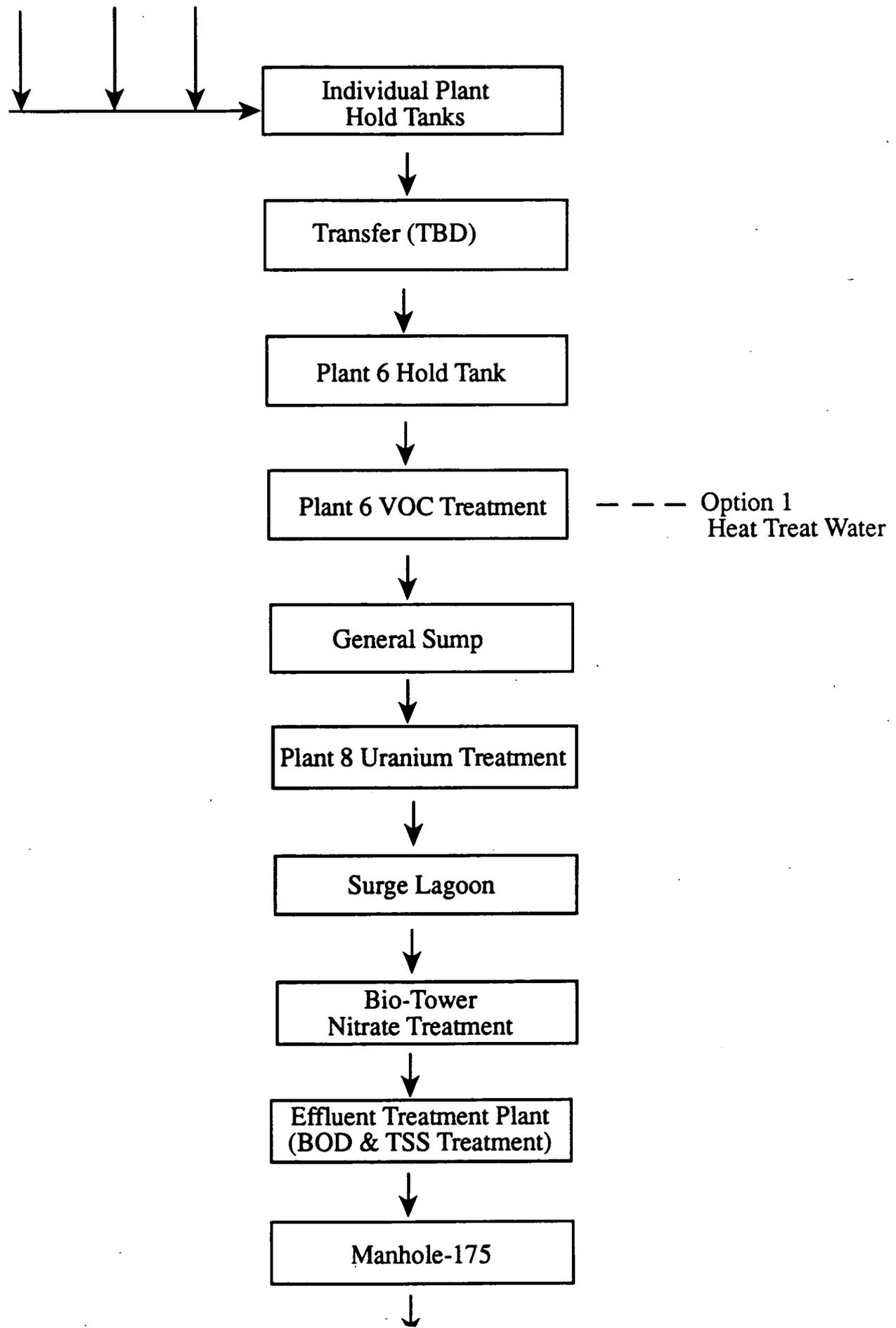
Note 1 = Pumping will continue until implementation of the Record of Decision (ROD) is complete for Operable Unit No. 3 or until concentration of hazardous substance in water becomes insignificant as compared to background.

Note 2 = Durations are working days.

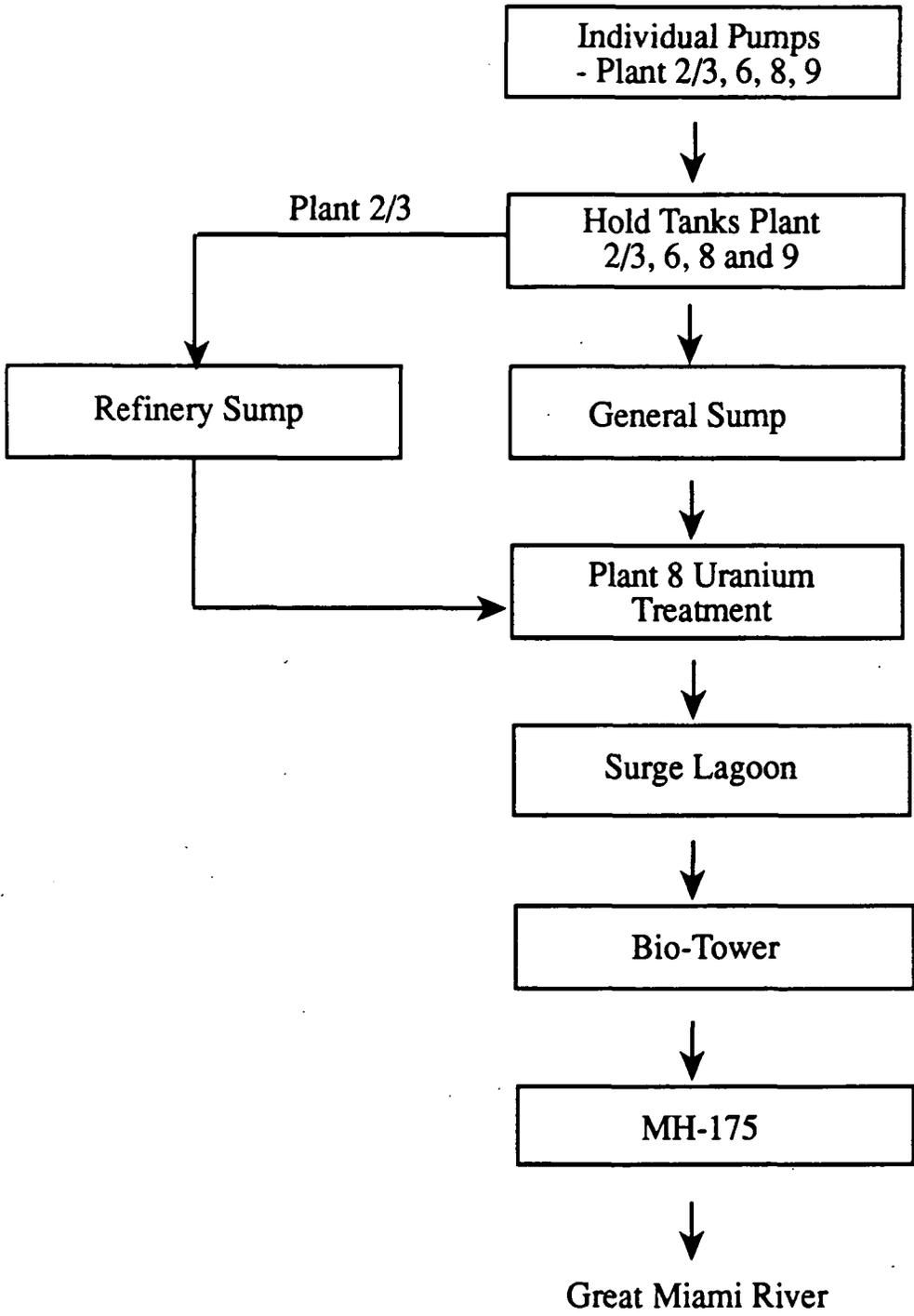
ATTACHMENT 4

Perched Groundwater Treatment Options

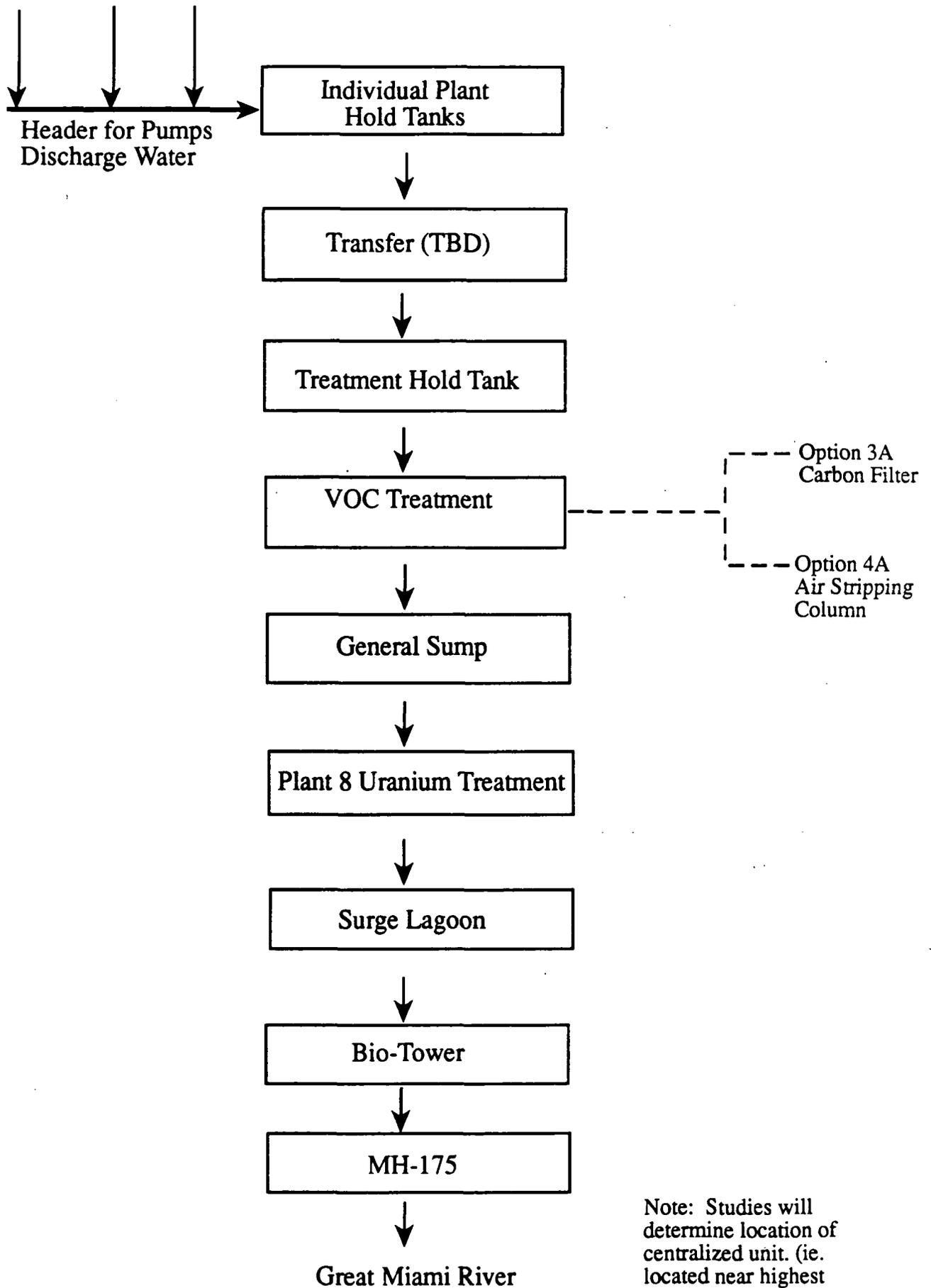
Centralized VOC Treatment (Option 1) Plant 6 Water Treatment



NO VOC in Perched Water and/or No VOC Treatment Required (Option 2)

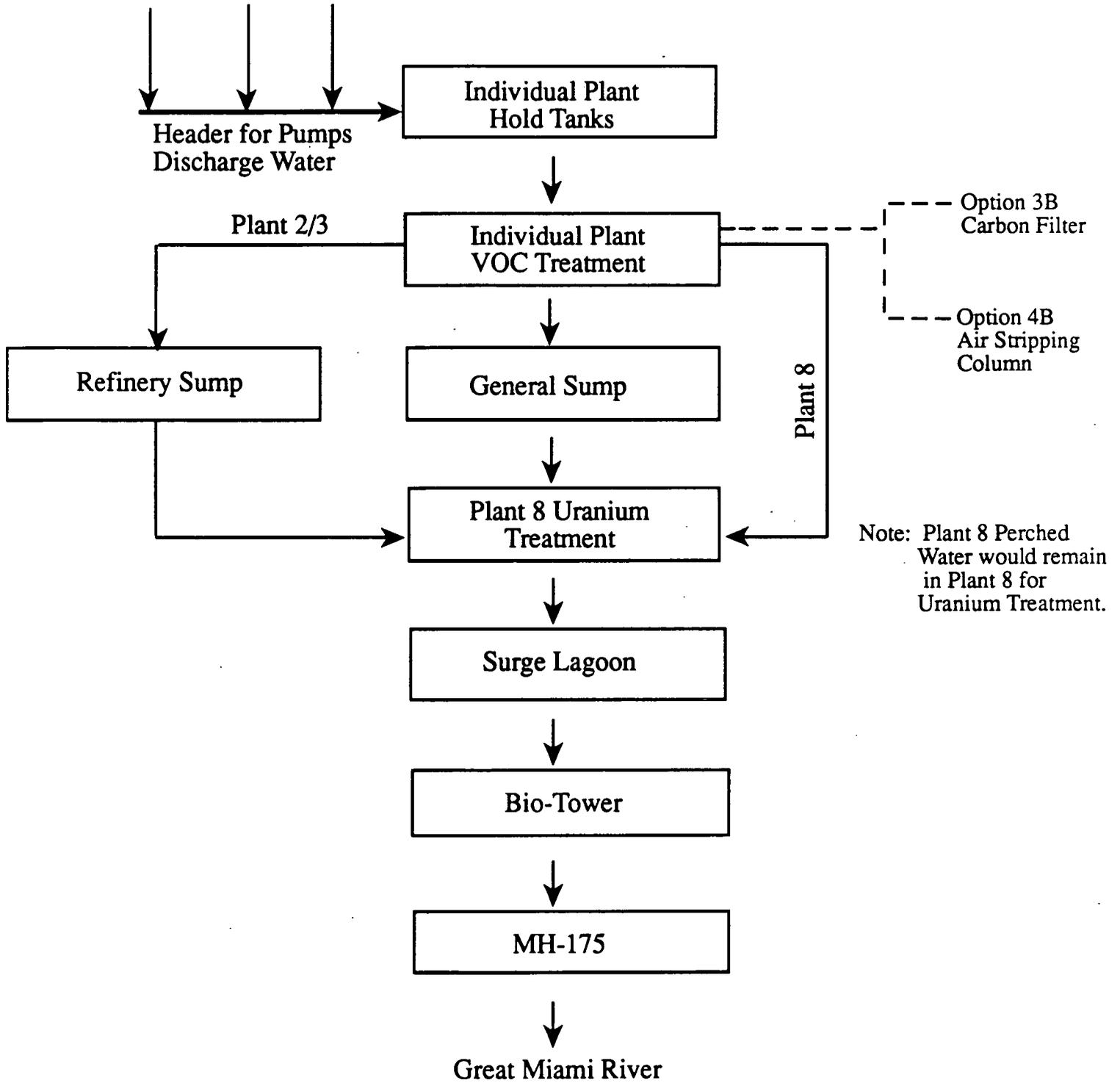


Centralized VOC Treatment (Options 3A & 4A) Locations at To Be Determined (TBD)



Note: Studies will determine location of centralized unit. (ie. located near highest

Individual VOC Treatment (Options 3B & 4B) Locations at Plant 2/3, 6, 8, & 9



ATTACHMENT 5

Full Hazardous Substance List (HSL) Parameters

FULL HAZARDOUS SUBSTANCE LIST (HSL) PARAMETERS**HSL INORGANICS**

Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead

Manganese
Mercury
Nickel
Potassium
Selenium
Silver
Sodium
Thallium
Vanadium
Zinc
Cyanide
Magnesium

HSL VOLATILES

Chloromethane
Ethyl Benzene
1,1,2,2-Tetrachloroethane
Vinyl Chloride
Total Xylenes
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

Bromodichloromethane
Bromomethane
Styrene
1,2-Dichloropropane
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

HSL SEMI-VOLATILES

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

HSL PESTICIDES

alpha-BHC
4,4'-DDT
beta-BHC
Endrin Ketone
delta-BHC
Methoxychlor
gamma-BHC (Lindane)
Chlordane
Heptachlor
Toxaphene
4,4'-DDD
Dieldrin
Endosulfan Sulfate

Endosulfan I
4,4'-DDE
Aldrin
Endrin
Heptachlor Epoxide
Endosulfan II
AROCLOR-1016
AROCLOR-1221
AROCLOR-1232
AROCLOR-1242
AROCLOR-1248
AROCLOR-1254
AROCLOR-1260

ATTACHMENT 6

Total Radionuclides Parameters

TOTAL RADIONUCLIDES PARAMETERS

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

ATTACHMENT 7

PLANT 6

CONTAMINATED PERCHED WATER

MODIFIED REMOVAL ACTION

HEALTH AND SAFETY PLAN

FEED MATERIALS PRODUCTION CENTER

AUGUST 1990

APPROVAL:



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

CONCURRENCE:



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

TABLE OF CONTENTS

1.0 Tasks To Be Performed 1

2.0 Site History 2

3.0 Task Specific Hazard Assessment 2

 3.1 Physical Hazards 3

 3.2 Radiation Hazards 3

 3.3 Chemical Hazards 3

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 7

 5.1 Perched Water Investigation 7

 5.2 Design Pumping Systems Discharge Piping Modifications 8

 5.3 Provide HSL/VOC Treatment (If Required) 9

 5.4 Pump Contaminated Water 10

6.0 Site Control 11

 6.1 Access 11

 6.2 Bioassay Samples 12

 6.3 Medical Monitoring 13

 6.4 Training Requirements 13

 6.5 Safety Meetings 14

7.0 Exposure Symptoms 14

8.0 Site Entry Procedures 21

9.0 Decontamination 21

10.0 Wastes 22

11.0 Contingency Plans 22

 11.1 Incidents or Injuries Involving Possible Intake of
 Radiological or Chemical Substances by Employees 22

 11.2 Pre-Emergency Planning 22

11.3 Lines of Authority 22

11.4 Evacuation 23

11.5 Emergency Equipment 23

11.6 Emergency Notification 23

11.7 Fire, Explosion, or Medical Emergency 23

11.8 Additional Information 24

12.0 Confined Space Entry 24

13.0 Approval and Compliance Statement 25

 13.1 Provisions 25

 13.2 Amendments To Plan 25

Figure 1 - Exclusion Areas 26

Figure 2 - Rally Points 27

Figure 3 - Route to Medical Facility 28

1.0 TASKS TO BE PERFORMED

The work to be performed involves modifying the removal action which was undertaken to address the occurrence of relatively high concentrations of uranium found in the subsurface water underlying Plant 6 at the Feed Materials Production Center (FMPC). The modifications are required to address the presence of volatile organic compounds (VOCs) in the water that was being pumped. The modified work includes a support effort (project planning, investigating options to treat the pumped water for VOC removal, and the design of the system) and the actual work effort (perched water investigation, install pumping systems discharge piping modifications, provide HSL/VOC treatment (if required), pump contaminated water). The Health and Safety Plan is for the actual work effort, not for the support effort.

The work to be performed will be at Plant 6 and its water treatment system. The work will be performed by FMPC personnel. All work will be performed under the direction of the Plant 6 supervisor. Support will be provided by Water Treatment, Maintenance, Industrial Radiation Safety and Training (IRS&T), and Site Restoration personnel. The work will be consistent with the procedures identified in Section 13.

The perched water investigation:

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

The installation of pumping systems discharge piping modifications will:

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

Providing HSL/VOC treatment (if necessary) will:

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

The pumping of contaminated water will:

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

2.0 SITE HISTORY

The task will be performed at Plant 6 which is located within the FMPC property lines area. At present, Plant 6 is routinely occupied. Plant 6 was previously used to machine and process uranium metal (billets and target element cores) including nitric acid pickling of uranium materials.

The Plant 6 is currently being used for general housekeeping, storage of drums containing uranium, and maintenance, as well as for the existing removal action associated with the uranium contaminated surface and subsurface water near Plant 6. The removal action involves the perched water that collects on the floor of the clarifier pit. Approximately once a week, the quantity of accumulated water was measured, sampled, and pumped out of the clarifier pit. Small quantities of water were also pumped from three borings (1148, 1149, and 1161) inside Plant 6. The water was transferred to existing FMPC wastewater treatment facilities for uranium removal and nitrate treatment prior to the detection of HSL/VOC contamination. This modification to the removal action will address the HSL/VOC contamination.

Four treatment options for perched groundwater under Plant 6 are under investigation. The first option involves heating the water to 180°F in the first unit of the existing Plant 6 water treatment facility. 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 FMPC laboratory. The water samples resulting from the tests are presently being analyzed for VOCs by an offsite laboratory. The second option is the no treatment option which may be viable based upon the analytical results from the perched groundwater samples. The third option requires the pumping systems discharge water be circulated through charcoal filters for removal of organic compounds. The fourth option involves utilization of an air stripping column to remove the organics from the contaminated water. Methods 3 and 4 would require construction of new treatment facilities at the FMPC.

3.0 TASK SPECIFIC HAZARD ASSESSMENT

A walk-through survey of the work areas in Plant 6 indicated the potential hazards identified below. Prior to the initiation of the activities, a reassessment of the conditions will be conducted to ensure that conditions have not changed through

the issuance of work permits. All newly 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 changes to the safety plan are needed.

3.1 Physical Hazards

- Noise
- Overhead Hazards
- 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. Thorium content in affected areas is expected to be very low relative to uranium content. Therefore, the hazard potential from thorium is minimal.

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

<u>Contaminant</u>	<u>Primary Hazard</u>	<u>Limit</u>	<u>Action Level</u>	<u>Background Level in Ambient Air</u>
Nitrogen Dioxide ⁽¹⁾	Inhalation	1 ppm (Note 3)	0.5 ppm	ND ⁽⁶⁾
Asbestos ⁽²⁾	Inhalation	0.2 f/cc (Note 4)	0.1 f/cc	ND ⁽⁷⁾
Nitric Acid	Contact Skin/ Eyes	2 ppm (Note 4) 4 ppm (Note 3)		ND ⁽⁶⁾
Sodium Hydroxide	Contact Skin/ Eyes	2 mg/M ³ (ceiling)		ND ⁽⁶⁾
Uranium	Inhalation/ Ingestion	2x10 ⁻¹¹ (Note 5)	5x10 ⁻¹² (Note 5)	2x10 ⁻¹³ (Note 8)

Table 1
CHEMICAL HAZARD TABLE (Cont'd)

<u>Contaminant</u>	<u>Primary Hazard</u>	<u>Limit</u>	<u>Action Level</u>	<u>Background Level in Ambient Air</u>
Acetone	Inhalation	750 ppm	375 ppm	ND ⁽⁶⁾
1,1-Dichloroethylene*	Inhalation	5 ppm	2.5 ppm	ND ⁽⁶⁾
2-Butanone	Inhalation	200 ppm	100 ppm	ND ⁽⁶⁾
Trichloroethylene	Inhalation	50 ppm	25 ppm	ND ⁽⁶⁾
Freon-11	Inhalation	1000 ppm	500 ppm	ND ⁽⁶⁾
1,1,1-Trichloroethane*	Inhalation	350 ppm	175 ppm	ND ⁽⁶⁾
1,2-Dichloroethene	Inhalation	200 ppm	100 ppm	ND ⁽¹⁰⁾
Chloroform	Inhalation	2 ppm ⁽⁹⁾	1 ppm	ND ⁽¹⁰⁾
1,2-Dichloroethane	Inhalation	200 ppm	100 ppm	ND ⁽¹⁰⁾
Carbon Tetrachloride	Inhalation	2 ppm ⁽⁹⁾	1 ppm	ND ⁽¹⁰⁾

Notes

- (1) NO₂ may be produced if residual nitric acid is present in lines or sump.
- (2) No asbestos hazard present unless 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 5×10^{-12} uCi/ml which is based on the DOE derived air concentration limit of 2×10^{-11} uCi/ml
- (6) ND - None detectable

Table 1

CHEMICAL HAZARD TABLE (Cont'd)

- (7) None detectable using NIOSH 7400 Method (less than 0.01 fiber per cc)
- (8) Highest recent monthly average at an air sample location inside plant 6 (units in uCi/ml). Lower limit of detection is 1×10^{-13} uCi/cc.
- (9) Lower OSHA limit standard used in lieu of ACGIH standard.
- (10) Included per USEPA request.
 - These contaminants were present in the groundwater from soil boring #1149 in Plant 6.

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 treatment system tasks, air samples will be taken in the general area of the work inside Plant 6 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.

4.2.2 Radioactive Surface Contamination

During the contaminant source detection and installation of the treatment system tasks, weekly surveys for removable radioactive surface contamination will be performed in Plant 6. Contamination surveys will be performed on potentially contaminated fluid systems, as they are opened and following dust generating activities, 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 6.

4.2.4 Chemical Hazard

Direct reading monitoring devices will be used to determine the concentration of NO₂ 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 will be used periodically to test for organic vapors as determined to be necessary by the Industrial Hygiene representative. In addition, charcoal tube air samples will be taken to characterize time weighted average levels of organics. 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

<u>Measurement</u>	<u>Level</u>	<u>Action</u>
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) (thoron)	5 x 10 ⁻¹² uCi/ml 0.25 working level	Note 1, Note 3 Note 1, Note 3
HNU Meter (Breathing Zone)	Detection to 10 ppm (Note 2)	Note 1
	10-25 ppm	Supplied Air Respirator (SAR)
	>25 ppm	Withdraw
Nitrogen Dioxide (Breathing Zone)	0.5 ppm	Withdraw

<u>Measurement</u>	<u>Level</u>	<u>Action</u>
Nitric Acid (Note 4)	1 ppm (in air) 4 ppm (in air)	SAR Withdraw

Notes

- 1 Full-face air purifying respirators with combination HEPA filter and organic vapor, acid gas, fume cartridges.
- 2 Detection is defined as a 1 ppm above background.
- 3 The action level is 25% of the Derived Air Concentration (DAC) averaged over a calendar quarter. Daily averages of one DAC (four times amount listed) is the action limit for short-term exposure.
- 4 If contact with skin likely, skin protection shall be used.

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.

5.1 Perched Water Investigation

<u>ITEM</u>	<u>NEED</u>	<u>APPLICABILITY</u>
Air purifying respirator cartridges: HEPA Combination Radiological/organic vapor/acid gas	No (Yes)	Required if action levels are exceeded or as specified by IRS&T representative
Hard Hat	No	
Hearing Protection	No (Yes)	As needed for grinding or similar operations.
Rubber Boots	Yes	As needed to prevent contact with liquids (e.g., sump & drains)

5.1 Perched Water Investigation (Cont'd)

<u>ITEM</u>	<u>NEED</u>	<u>APPLICABILITY</u>
Leather-Palm Gloves	No (Yes)	As needed for handling drums, equipment, etc. for general protection
Neoprene/Nitrile Gloves	Yes	As needed to prevent contact with liquids (e.g., sump & drains)
Inner Gloves	Yes	PVC inner gloves to be worn under leather palm gloves
Plain Tyvek	No	
PE Tyvek	No	
Process Coveralls	Yes	Minimum Requirement
Safety Glasses	Yes	Minimum Requirement
Safety Goggles or Face Shield	Yes	During hydrostatic testing, as needed to prevent contact with splash or particulates (e.g., cleaning/grinding on chemically contaminated drain lines)
Safety Shoes	Yes	Minimum Requirement

5.2 Design Pumping Systems Discharge Piping Modifications

<u>ITEM</u>	<u>NEED</u>	<u>JUSTIFICATION</u>
Air purifying respirator cartridges: HEPA Combination Radionuclide/organic vapor/acid gas	No (Yes)	Required if action levels are exceeded or as specified by the IRS&T representative.

5.2 Design Pumping Systems Discharge Piping Modifications (Cont'd)

<u>ITEM</u>	<u>NEED</u>	<u>JUSTIFICATION</u>
Hard Hat	Yes	As needed for overhead work
Hearing Protection	Yes	During concrete breaking/cutting
Rubber Boots	Yes	As needed to prevent contact with liquids (e.g., sumps, drains, pumping)
Leather-Palm Gloves	No (Yes)	As needed for handling drums, equipment, etc. for general protection
Neoprene/Nitrile Gloves	Yes	As needed to prevent contact with liquids (e.g., sumps, drains, pumping)
Inner Gloves	Yes	PVC inner gloves to worn under leather palm gloves
Plain Tyvek	No	
PE Tyvek	No	
Process Coveralls	Yes	Minimum Requirement
Safety Glasses	Yes	Minimum Requirement
Safety Goggles or Face Shield	Yes	During pump testing and as needed
Safety Shoes	Yes	Minimum Requirement

5.3 Provide HSL/VOC Treatment (If Required)

<u>ITEM</u>	<u>NEED</u>	<u>JUSTIFICATION</u>
Air purifying respirator cartridges: HEPA Combination Radionuclide/organic vapor/acid gas	No (Yes)	Required if action levels are exceeded or as specified by the IRS&T representative.

5.3 Provide HSL/VOC Treatment (If Required) (Cont'd)

<u>ITEM</u>	<u>NEED</u>	<u>JUSTIFICATION</u>
Hard Hat	Yes	As needed for overhead work
Hearing Protection	Yes	During concrete breaking/cutting
Rubber Boots	Yes	As needed to prevent contact with liquids (e.g., sumps, drains, pumping)
Leather-Palm Gloves	No (Yes)	As needed for handling drums, equipment, etc. for general protection
Neoprene/Nitrile Gloves	Yes	As needed to prevent contact with liquids (e.g., sumps, drains, pumping)
Inner Gloves	Yes	PVC inner gloves to be worn under leather palm gloves
Plain Tyvek	No	
PE Tyvek	No	
Process Coveralls	Yes	Minimum Requirement
Safety Glasses	Yes	Minimum Requirement
Safety Goggles or Face Shield	Yes	During pump testing and as needed
Safety Shoes	Yes	Minimum Requirement

5.4 Pump Contaminated Water

<u>ITEM</u>	<u>NEED</u>	<u>JUSTIFICATION</u>
Air purifying respirator cartridges: HEPA Combination Radionuclide/organic vapor/acid gas	No (Yes)	Required if action levels are exceeded or as specified by the IRS&T representative.

5.4 Pump Contaminated Water (Cont'd)

<u>ITEM</u>	<u>NEED</u>	<u>JUSTIFICATION</u>
Hard Hat	Yes	As needed for overhead work
Rubber Boots	Yes	As needed to prevent contact with liquids (e.g., sumps, drains, pumping)
Leather-Palm Gloves	No (Yes)	As needed for handling drums, equipment, etc. for general protection
Neoprene/Nitrile Gloves	Yes	As needed to prevent contact with liquids (e.g., sumps, drains, pumping)
Inner Gloves	Yes	PVC inner gloves to be worn under leather palm gloves
Plain Tyvek	No	
PE Tyvek	No	
Process Coveralls	Yes	Minimum Requirement
Safety Glasses	Yes	Minimum Requirement
Safety Goggles or Face Shield	Yes	During initial testing and as needed
Safety Shoes	Yes	Minimum Requirement

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 6 is provided in Figure 1 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 Radiological Safety 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, Radiological Safety 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/100 cm 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

Site 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 and require additional sampling. Personnel are also required to wear a TLD at all times for radiological purposes.

If sample analyses indicate that thorium levels in air or on surfaces were sufficient to deliver more than eight DAC-hours to an individual, in vivo monitoring and/or other bioassay measurements will be performed on that individual as deemed appropriate by FMPC Dosimetry.

6.3 Medical Monitoring

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

- A baseline medical examination
- Annual medical examination
- Medical examinations may be required after exposures
- Annual 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 site personnel assigned to the tasks will, as a minimum, meet the following training requirements:

- Review of this health & safety plan for this work including site specified hazards and procedures. (The safety meeting(s) will be documented.)
- Site radiation safety training
- Site annual respiratory training and quantitative fit test or equivalent approved by site Industrial Hygiene
- Site nuclear criticality training
- 40-hour OSHA training
- 8-hour annual refresher training, as necessary
- 8-hour supervisory training (for supervisors)
- 24-hour supervised field experience
- FMPC site orientation video

The completion of this training shall be documented by the site training organization.

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, the installation of the pipe header, 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 symptoms for chemical hazards are described in the following paragraphs:

Acetone:

Health Risks: Highly flammable liquid.
Inhalation causes irritation of eyes and skin.
Inhalation systemic effects of nausea, vomiting, muscle weakness, narcosis.

Exposure Routes: Skin, eyes, respiratory tract

First Aid: Inhalation - Remove to fresh air. Give oxygen and CPR if necessary.

Skin/Eyes - Flush with water for 15 minutes after removing soaked clothing.

1,1-Dichloroethylene:

Health Risks: Highly flammable gas.
Vapor irritating to eyes, nose, and throat.
Inhalation causes dizziness, drunkenness, anesthesia.

Exposure Routes: Skin, eyes, and respiratory tract

First Aid: Inhalation - Remove to fresh air. Give CPR if necessary. Give oxygen if necessary.

Skin/Eyes - Remove any contaminated clothes; flush skin and eyes for 15 minutes; get medical attention for eyes.

2-Butanone:

Health Risks: Extremely flammable liquid. Acute exposure irritates eyes, skin, and respiratory tract. Eye contact causes corneal damage. Inhalation causes nausea, vomiting, headache, dizziness, difficult breathing, peripheral neuropathy, loss of consciousness.

Exposure Routes: Skin, eyes, and respiratory tract

First Aid: Inhalation - Remove victim to fresh air. If breathing stops, administer CPR. Give oxygen if necessary.

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

Trichloroethylene:

Health Risks: Acute inhalation causes irritation to nose, eyes, and throat, nausea, blurred vision, CNS disturbance, cardiac failure. Chronic inhalation may cause liver damage. Defatting action of liquid solvent on skin causes dermatitis.

Exposure Routes: Skin, eyes, and respiratory tract

First Aid: Inhalation - Remove victim to fresh air. If necessary, provide CPR and oxygen. Do not administer adrenalin or epinephrine.

Eyes - Flush 10 minutes with water
Skin - Wash with soap and water

Freon-11 (Trichlorofluoromethane):

Health Risks: Inhalation of concentrations approaching 10% in air will cause drowsiness, unconsciousness, and possible cardiac arrest.

Skin or eye contact causes rapid freezing of tissue.

Exposure Routes: Skin, eyes, respiratory tract

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

Skin/Eyes - Treat as for frostbite and wrap then rewarm in water 102-105°F.

1,1,1-Trichloroethane:

Health Risks: Inhalation causes narcotic effects at low concentrations to loss of consciousness and death at higher levels. Vapor slightly irritating to eyes, but causes no lasting damage.

Repeated liquid skin contact causes defatting and dermatitis.

Exposure Routes: Skin, eyes, inhalation

First Aid: Inhalation - Remove victim to fresh air and give CPR and oxygen if necessary.

Skin/Eyes - Flush with water for 10 minutes after removing contaminated clothing.

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.

1,2-Dichloroethane:

Health Risks: Moderately toxic by inhalation and skin contact. Poison by ingestion. Paralysis, somnolence, cough, jaundice, nausea, vomiting, hypermotility, diarrhea, ulceration or bleeding from stomach, fatty liver degeneration, change in cardiac rate, cyanosis, and coma. Experimental transplacental carcinogen and mutagen. Dermatitis, lung edema, kidney toxicity, corneal effects, a strong narcotic.

Exposure Routes: Skin, eyes, respiratory tract.

First Aid: Inhalation - Call a doctor. Remove from contaminated area. Keep warm and quiet. If breathing has stopped, give artificial respiration. Administer oxygen.

Eyes - Flush with large amounts of water or weak bicarbonate of soda solution.

Ingestion - Attempt to empty stomach. Dilute by administering fluids (tap water, soapy water, salt water, or milk.

1,2-Dichloroethylene:

Health Risks: Mildly toxic by inhalation and ingestion. Narcotic and irritating in high concentrations. Inhalation causes nausea, vomiting, weakness, tremor, epigastric cramps, central nervous system depression. Contact causes irritation of eyes and on prolonged contact skin irritation. Ingestion causes slight depression to deep narcosis.

Long term: Liver and kidney damage in experimental animals. Suspect carcinogen. Mutagenic data.

Exposure Routes: Skin, eyes, respiratory tract.

First Aid: Inhalation - Remove from further exposure. If breathing is difficult, give oxygen. If victim is not breathing, give artificial respiration, preferably mouth-to-mouth. Give oxygen when breathing is restored.

Eyes - Flush eyes for at least 15 minutes.

Ingestion - Give gastric lavage and cathartics.

Carbon Tetrachloride:

Health Risks:

Long term: Damages liver, kidneys, and lungs. Alcohol use and previous kidney/liver damage increases vulnerability to damage. An experimental carcinogen, neoplastigen, tumorigen, teratogen, and suspected human carcinogen. Human poison by ingestion.

Short term: Human systemic effects by inhalation: a narcotic which causes headache, dizziness, spots before the eyes, hazy visual field, anesthesia, and unconsciousness; nausea or vomiting, pupillary constriction, coma, anti-psychotic effects, tremors, somnolence, and anorexia.

Dermatitis from repeated skin contact.

Eye exposure causes irritation, burning, and lacrimation.

Exposure Routes: Skin, eyes, and respiratory tract.

- First Aid:**
- Inhalation -** Immediately remove to fresh air. Keep patient warm and quiet, get medical attention immediately. Start artificial respiration if breathing stops.
 - Eyes/Skin -** Flush with plenty of water. Get medical attention for eye contact. Remove contaminated clothing and wash before reuse.
 - Ingestion -** Induce vomiting and get medical attention. No specific antidote is known.

Chloroform:

Health Risks: Inhalation causes dilation of pupils, warmth of the face and body, excitation of CNS, then CNS depression, hallucinations and distorted perceptions, nausea, vomiting, and unspecified gastrointestinal effects, anesthesia, cardiac and respiratory failure, then unconsciousness. 68,000 ppm in air fatal to most animals in a few minutes.

Long term: Suspected human carcinogen. An experimental mutagen, carcinogen, tumorigen, neoplastigen, and teratogen.

Irritation of conjunctiva and dermatitis of skin on liquid contact.

Exposure Routes: Skin, eyes, and respiratory tract.

- First Aid:**
- Inhalation -** If ill effects develop, get victim to fresh air, keep warm and quiet, and get medical attention. If breathing stops, give artificial respiration.
 - Eyes -** Flush with plenty of water for 15 minutes and get medical attention.
 - Skin -** Wash with soap and water. Remove contaminated clothing and free it of chemical.

8.0 SITE ENTRY PROCEDURES

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

- Perform daily safety meeting to familiarize team with site specific hazards.
- Discuss alternate communications signals (if applicable).
- Perform respirator check out and negative/positive pressure fit test prior to use.
- Use buddy system. Teams of at least two individuals will be used for all activities for this removal action.

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

- Radiation Work Permit
- Penetration Permit
- Chemical/Hazardous Material Permit
- Work Permit

Entrance to the Exclusion Zone shall be controlled by 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 each day.

Under routine operation no decontamination procedures will be necessary. In the event of a spill, the decontamination procedures, as well as the cleanup, will be under the direction of the Assistant Emergency Duty Officer (AEDO).

Employees having excessive levels (over 100 cpm above background) of radioactive contamination will be decontaminated according to FMPC Standard Operating Procedure SOP-SP-P-35-017, "Procedure for Personnel Decontamination," and topical manual FMPC-2084. In the event exposure to asbestos or nitrogen dioxide inhalation, the affected employees will be sent to Medical Services for evaluation.

Employees coming in contact with nitric acid or organics will remove the affected clothing as soon as possible, and soak the affected area for 10 minutes using the nearest safety shower or eye wash. The employee will then immediately report to Medical Services for surveillance.

10.0 WASTES

Wastes include, but are not limited to:

- Disposable PPE
- "Spent" activated carbon, if used in treatment
- 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 compactible, 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

The plans shall be consistent with FMPC-2046, "FMPC Emergency Plan".

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

Incidents or injuries involving potential intake of uranium or other hazardous substances shall be reported to supervisor and the site Medical Section by the involved employee and an Incident Investigation Report completed by the involved employee. Incident urine samples shall be submitted at the end of the shift and at the start of the next shift if exposure involved uranium.

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, Plant 6 supervisor, 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 3-3, 3-3 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:

- | | |
|--|---|
| <input type="checkbox"/> fire extinguisher | <input type="checkbox"/> manual fire alarm |
| <input type="checkbox"/> eye wash | <input type="checkbox"/> two-way radio |
| <input type="checkbox"/> safety shower | <input type="checkbox"/> emergency SCBA units |
| <input type="checkbox"/> telephone | <input type="checkbox"/> respirators |
| <input type="checkbox"/> spill drums | <input type="checkbox"/> clean-up materials |
| <input type="checkbox"/> absorbent | <input type="checkbox"/> local evacuation alarm |
| <input type="checkbox"/> other - List | |

No spill containment equipment is required beyond the existing floor sump system. If a spill were to occur, the material will go to an existing floor sump and will be transferred for later processing.

11.6 Emergency Notification

All emergencies, including spills and leaks, 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. If a fire is in the incipient stage and perceived controllable without endangering oneself, personnel may use available fire extinguishers. If not in the incipient stage, personnel in the immediate area shall evacuate to a safe position and await instructions.

11.8 Additional Information

11.8.1 Hospitals

The FMPC Medical Facility (Building 53) is the primary choice for on-site injuries (see Figure 3 for travel routes from plant 6 to medical facility). The FMPC ambulance will transport the injured to the nearest hospital if necessary. FMPC maintains an emergency response capability which includes an ambulance and Emergency Medical Technicians.

11.8.2 Emergency Telephone Numbers

Ambulance: 6511
Hospital: 6511
Fire: 6511

<u>Name</u>	<u>Work</u>	<u>Radio</u>
EMERGENCY RESPONSE	6511	Control
Industrial Hygiene	6207	357
Radiation Safety	6889	355
Fire and Safety	6235	303
(Safety and Health Officer)	6231	
Assistant Emergency Duty Officer (AEDO)	6431 or 6295	202

12.0 **CONFINED SPACE ENTRY**

During the perched water source contamination detection task, entry will have to be made into a storm sewer manhole to plug drainage lines for pressure testing. The clarifier pit in Plant 6 is defined as a confined space. It is not anticipated that entry to the clarifier pit will be required as part of the perched water source determination. However, entry to the clarifier pit is required for pumping operations. Entry to all confined spaces 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 O₂, CO, H₂S, and any flammable 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 SOP 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

13.1 Provisions

This Removal Action Site Specific Health and Safety Plan is intended for the FMPC and specifically for the following activities related to the Plant 6 modified removal action:

- Contaminant Source Detection
- Installation of Header Piping
- Installation of Treatment System
- Pumping of the Contaminated Water

The personnel performing these tasks must read and understood this Health and Safety plan and agree to follow its provisions¹. Written documentation with signatures of those personnel performing these tasks must be maintained.

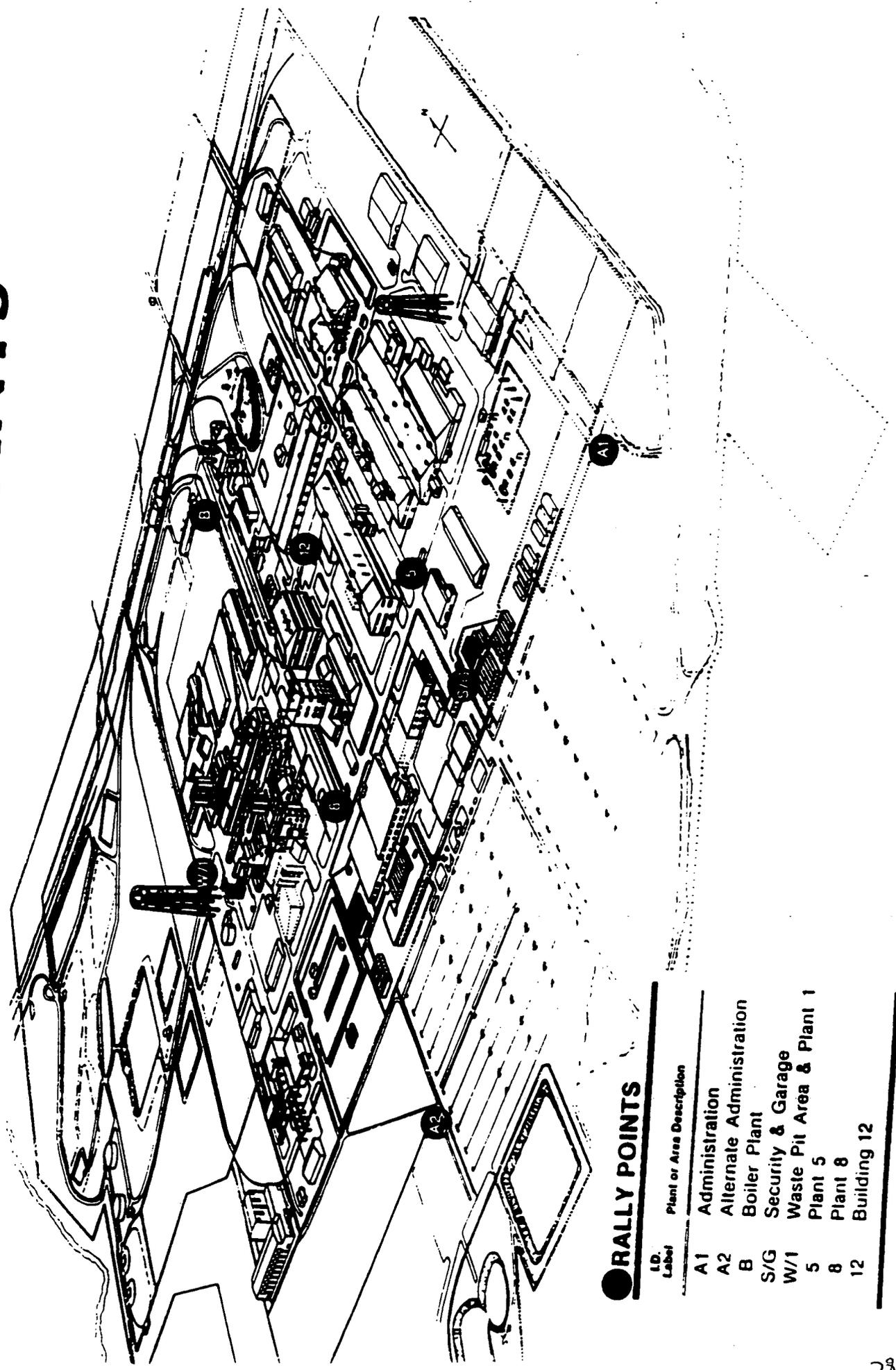
13.2 Amendments To Plan

This Health and Safety Plan is based on information available at the time of preparation. Unexpected conditions may arise which require reassessment of safety procedures. Unplanned activities and/or changes in the hazard status shall require a review of and may require changes in this plan. Changes in the anticipated hazard status or unplanned activities are to be submitted as an amendment to this plan. Amendments must be approved by the plan author and IRS&T prior to implementation of the amendment.

¹Compliance with the provisions of this Health and Safety Plan may be audited through announced or unannounced site visits. Assurances should be provided that this safety plan is implemented. Reasons for field actions/changes, when necessary, shall be documented. Site visits may be performed by authorized personnel.

FIGURE 2

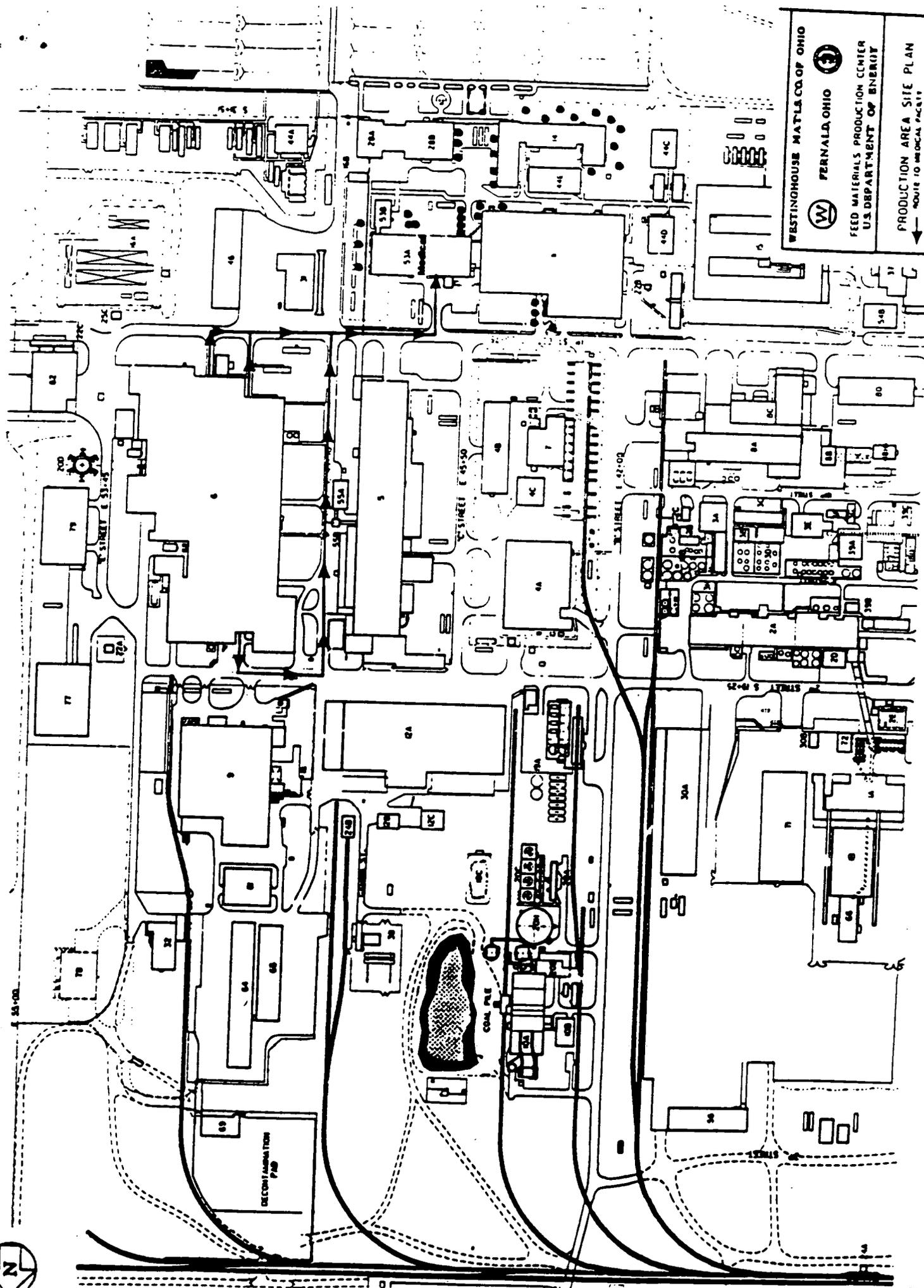
FMPC RALLY POINTS



● **RALLY POINTS**

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

FIGURE 3



WESTINGHOUSE MAT-LAS CO. OF OHIO
FERNALD, OHIO
FEDERAL MATERIALS PRODUCTION CENTER
U.S. DEPARTMENT OF ENERGY
PRODUCTION AREA SITE PLAN
ROUTE TO MEDICAL FACILITY

507

79