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SITE SPECIFIC HEALTH AND SAFETY PLAN FOR THE WASTE PIT AREA VERTICAL BORINGS (WASTE PITS 1, 2, 3, 4 AND THE BURN PIT) MAY 1991

05/01/91

WMCO/DOE-FSO
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WORK PLAN
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SITE SPECIFIC HEALTH AND SAFETY PLAN

FOR

THE WASTE PIT AREA

VERTICAL BORINGS

(WASTE PITS 1, 2, 3, 4 AND THE BURN PIT)

MAY, 1991

APPROVALS

W Kwoka (with comments) 2/19/91
W. Kwoka, ASI
ASI H&S (WMD)

S. Duce, IT
Site Safety Manager

DOE Representative

S. Davis, IT
Southeast Regional Manager

I. W. Diggs 5/14/91
Ike Diggs, OU Manager

for D E Jones 5/14/91
John Volpe, WMCO Safety

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1.0 INTRODUCTION

This site specific safety plan has been prepared as a supplement to the overall Site Safety Plan - Volume II and contains information that is unique to the Waste Pit Boring Operations as well as information that applies to the entire RI/FS project.

The sampling program for which this safety plan was written was designed to:

- Provide samples of leachate from within the lower portions of the waste pits
- Provide samples for geotechnical and treatability testing
- Provide samples to assess the geochemical properties of the waste materials

For more information on the overall project, please refer to the "Initial Screening of Alternatives for Operable Unit 1," Task 12 Report, January, 1991.

2.0 WASTE PIT CHARACTERIZATION AND BACKGROUND INFORMATION

These waste pits (seen in Figure 1 and noted as 1, 2, 3, 4, and the Burn Pit) were constructed in the 1950s and early 1960s and operated for a number of years. The pits are currently closed and covered with soil or soil and hypolon liners. The first pit was covered in 1959 and the last was covered in 1986. Examination of site records and previous sample results indicates that the waste pits contain a wide variety of wastes from FMPC operations. The following is a brief discussion of the history and characteristics of each waste pit.

Waste Pit 1

Waste Pit 1, constructed in 1952, was excavated to a maximum depth of 17 feet into an existing clay lens and lined with additional clay from the site of the Burn Pit. The clay liner is four feet thick or less on the bottom and two feet or less on the sides. The pit has a surface area of 80,000 square feet and contains approximately 40,000 cubic yards of waste. Contents of the pit include neutralized filter cake, fly ash, 55 gallon drums, scrap graphite, brick scrap, sump liquor, sump cake, and depleted slag. Estimated uranium content is 120,000 pounds. Consistency of the pit contents is reported to be semisolid to saturated eight feet below the surface. The pit was backfilled and covered with clean soil in 1959.

Waste Pit 2

Waste Pit 2, constructed in 1957, was excavated to a depth of 17 feet into native clay at the site of a small pond east of Waste Pit 1. The pit has a surface area of 48,215 square feet and contains approximately 13,000 cubic yards of waste. Contents of the pit include neutralized filter cake, fly ash, 55 gallon drums, scrap graphite, brick scrap, sump liquor, sump cake, and depleted slag. Estimated uranium content is 2.7 million pounds. Pit 2 also contains a large quantity of concrete and other construction rubble. Consistency of the pit contents is reported to be semisolid and wet eight feet below the surface. The pit was backfilled and covered with clean soil in 1964.

Waste Pit 3

Waste Pit 3, constructed in 1959, was excavated to a depth of 27 feet into the underlying till. A clay layer was added along the walls. The pit has a surface area of 238,500 square feet and contains approximately 227,000 cubic yards of waste. Contents of the pit include lime-neutralized raffinate, raffinate concentrate, slag, slag leach residues, filter cake, fly ash, and lime sludge. Estimated uranium content is 290,000 pounds. Consistency of the pit contents is reported to be semisolid and wet eight feet below the surface. Disposal of wet wastes was discontinued in the fall of 1968. Disposal of dry material continued until 1977, at which point the pit was backfilled and covered with clean soil.

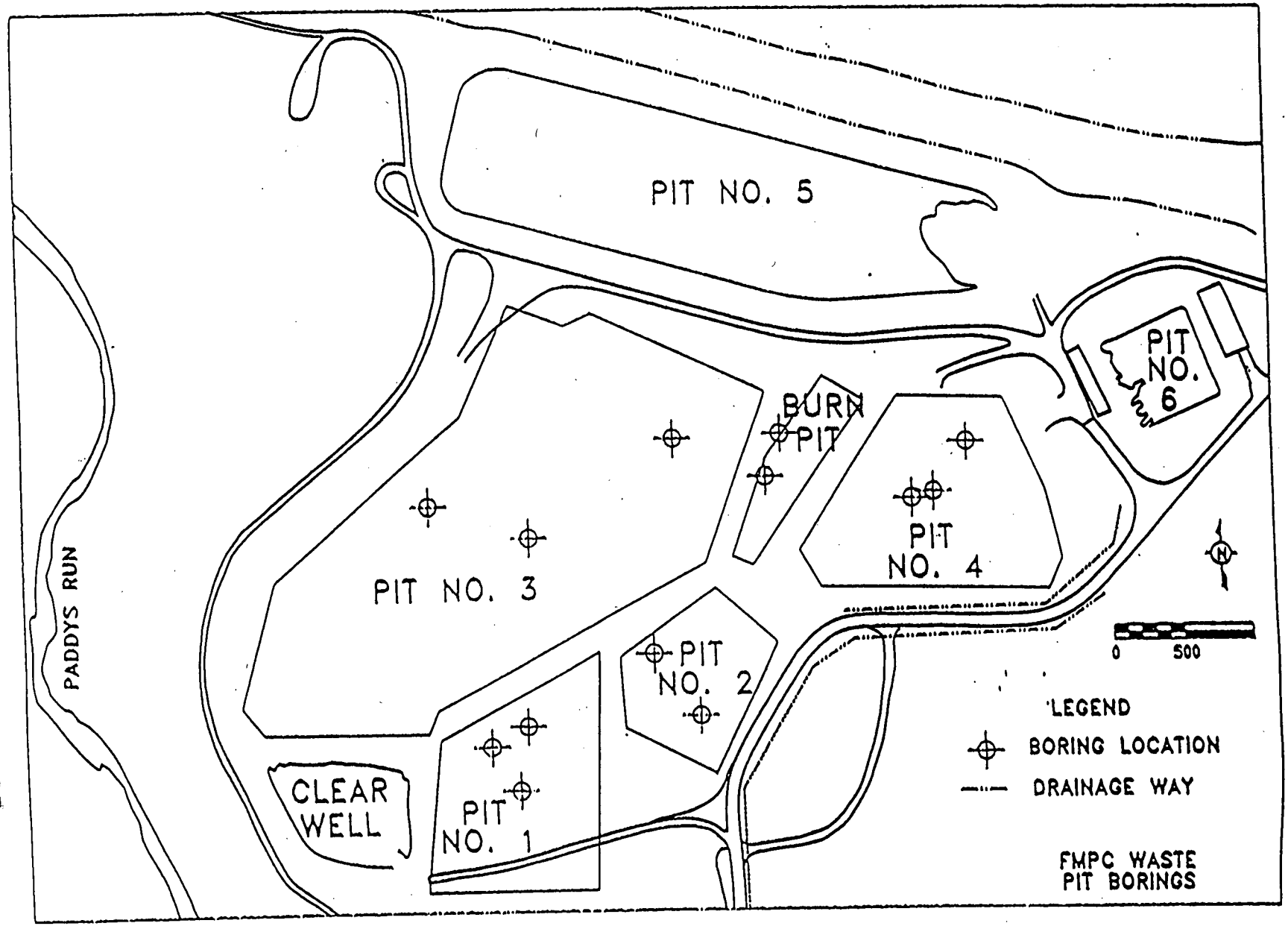

FIGURE 1. FMPC WASTE PITS AND BORING LOCATIONS

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Waste Pit 4

Waste Pit 4, constructed in 1960, was excavated to a depth of 24 feet in a manner similar to Pit 3. The pit walls are lined with a clay layer approximately one foot thick. The pit has a surface area of 85,685 square feet and contains approximately 53,000 cubic yards of waste. Contents of the pit include process residues, filter cake, slurries, raffinates, noncombustible trash, asbestos, and an estimated 23,500 pounds of barium chloride. Estimated uranium content is 6.7 million pounds. Pit 4 also contains 140,000 pounds of thorium metal in 55 gallon drums. Consistency of the pit contents is reported to be semisolid and wet to saturated nine feet below the surface. The pit was backfilled and covered with clean soil in 1986. In December, 1988, a clay cap and a 45-mil Hypalon upper liner were installed.

Burn Pit

The Burn Pit, constructed in 1957, was excavated to provide the clay lining for Waste Pits 1 and 2. The depth of the Burn Pit is not known with certainty because the floor was sloped as part of the excavation process. The maximum depth is believed to be about 20 feet. The disposed waste quantities are unknown. The pit was used to dispose of and burn laboratory chemicals, including pyrophoric and reactive chemicals, as well as waste oils and other low-level contaminated combustible materials such as wooden pallets. Preliminary sampling indicates that silt-sized semisolids, glass, organic materials (wood, grass, and roots), metals, and carbonized residues are in the Burn Pit. The pit appears to have been covered with soil but the date of covering is uncertain.

Summarized data from the "Characterization Investigation Study, Volume 2: Chemical and Radiological Analyses of the Waste Storage Pits," (CIS) have been examined to estimate the types and extent of hazardous materials in the pits. Four to six borings were made in each pit as part of this study and the resultant samples were analyzed for radioactive components, metals, and organics. As might be expected, all the pits contain significant concentrations of uranium and thorium. Concentrations of metals vary considerably from pit to pit, and concentrations of most are less than twice the maximum background ranges published by the U.S. Geological Survey, 1984. Exceptions include silver in Pit 1; beryllium, cadmium, cobalt, selenium, and silver in Pit 2; arsenic, barium, beryllium, cadmium, copper, lead, selenium, silver, and vanadium in Pit 3; barium, cadmium, and silver in Pit 4; and barium, cadmium and silver in the Burn Pit. Detected concentrations of organics ranged to a high of 80 mg/kg for naphthalene in Pit 4, with most concentrations less than 2 mg/kg. Organics detected at concentrations greater than 2 mg/kg were phenanthrene, aroclor-(1248, 1254, and 1260), and 2-butanone in Pit 1; fluoranthene, naphthalene, acetone, 2-butanone, and di-n-octyl phthalate in Pit 2; 2-butanone in Pit 3; tetrachloroethane, and methyl parathion in Pit 4; and pentachlorophenol, aroclor-1254, and bis (2-ethylhexyl) phthalate in the Burn Pit. It is worth noting that one of the reasons for conducting further boring and sampling in the waste

pits is that previous sampling procedures may have resulted in the loss of some of the volatile constituents of the samples and thus an underestimation of the volatile components.

3.0 TASKS TO BE PERFORMED

Thirteen vertical borings, as detailed in the Work Plan and shown in Figure 1, will be performed with hollow stem augers. One boring in each pit will be completed with the installation of a monitoring well or porous cup lysimeter. Shelby tube and split-spoon samples will be collected for subsequent analysis.

Will site activities:

Disturb surface soil?	yes	Sample surface water?	no
Disturb subsurface soil?	yes	Sample lagoons?	no
Use heavy equipment?	yes	Use boat?	no
Enter confined space?	no	Involve radioactivity?	yes
Involve trenches?	no	Involve high electromagnetic field strength?	no
Disturb containerized matter?	potentially	Involve electricity?	no
Involve shock-sensitive wastes?	potentially	Involve high noise levels?	potentially
Involve unknown chemicals?	yes	Involve microbiological hazards?	potentially
Involve animal and plant hazards?	potentially	Involve LASERs?	no
		Involve height hazards?	no

A map of the boring locations can be seen in Figure 1.

4.0 SITE CONTROL

Access to the work site is controlled by WMCO Health Physics and ASI/IT Health Safety Technicians. Personnel are not allowed into an exclusion area who do not meet minimum personal protective equipment (PPE) requirements and are not properly trained.

4.1 Access/Egress

Access to the Feed Materials Production Center (FMPC) is limited by WMCO Security. All site personnel and visitors must register and be issued a pass to enter the DOE property. An FMPC TLD badge is required for each worker in this area. Special permission is required to enter the waste pit area from the process area, and access is controlled by Westinghouse Security. Egress out of the area is through the same points used for entry.

4.1.1 Site Control Zones

The Exclusion Zone is the zone of high potential hazard due to physical or chemical dangers. Access to the Exclusion Zone is restricted to employees who are required to enter in order to perform their job functions. A minimum radius of four feet from the rotating auger will be considered to be the Exclusion Zone for boring operations. The zone may be expanded if airborne hazards are detected. The Exclusion Zone will be marked with cones or other easily recognizable devices. All areas requiring the use of respiratory protection are included in the exclusion zone.

The Contamination Reduction Zone (CRZ) is the area immediately surrounding the Exclusion Zone. This zone is where initial task-specific decontamination takes place. All entry and exit will be through a well marked access point in the CRZ.

The Support Zone is the area surrounding the CRZ. This area should be clean, or at least as clean as background.

4.1.2 Site Entry Procedures

X Call the health and safety office by telephone (738-3100) when weather conditions are questionable for worker heat or cold exposure. The health and safety field technician can also stop work based on heat/stress monitor or windchill meter results.

X Radio CONTROL daily to establish radio contact, location, start time, and stop time.

X Procure radiation work permit from WMCO for drill rig operations -
- Identifies degree of radiological hazard
- May limit allowable work time
- May specify minimum PPE requirements

X Procure a work permit from WMCO for drill rig operations -
- Chemical Work Permit
- Welding Permit

X Procure penetration permit from WMCO for drill rig operations -
- Identifies potential underground hazards such as utilities and buried tanks.

X Procure utilities clearance from WMCO subcontractor.

X Conduct ASI/IT Magnetometer survey in area where boring is to be initiated.

X All heavy equipment is required to undergo a safety inspection by WMCO Fire and Safety personnel upon initial entry to the FMPC.

X All subcontractors' equipment and tools will be inspected by WMCO IRS&T personnel upon initial entry to the FMPC.

X Perform tailgate meeting to familiarize team with site-specific hazards and current daily working conditions. Identify exclusion zone and break area. Discuss alternate communications signals (if applicable).

X Calibrate instruments and log calibrations.

X Visually scan the site for signs of contamination.

X Monitor for volatile organics using real time instruments such as an HNU.

X Monitor for radiation using radiation meters for alpha and beta/gamma.

X Use buddy system; teams of at least two individuals are used for all activities within an exclusion zone. Team members monitor each other for signs of heat stroke or other distress and will render aid.

X Perform respirator inspection and positive and negative fit check prior to each use.

X Verify ready access and test eyewash/shower. This applies to portable or fixed units.

Note: The ASI Chief of Health and Safety (CHS) and any member of the ASI/IT field team have the authority to stop work when imminent or serious safety hazards or conditions exist. Restart of work will be allowed only after the hazard or condition has been abated or reduced to a level deemed acceptable by the CHS (or his designated representative) and Project Manager. If there is a question about what is acceptable, the work should be discontinued and the matter discussed with the Director of Health and Safety, Waste Management Division: William Kwoka, (615) 483-1274 - Work; (615) 482-2885 - Home. In Mr. Kwoka's absence, please call the Director of Health and Safety, Corporate Office: Greg McAnarney, (505) 883-0959 - Work; (505) 293-0794 - Home.

4.1.3 Site Exiting Procedure

Decontamination reduces contaminant concentrations to acceptable levels, but does not generally remove it totally. All on-site personnel will follow WMCO decontamination procedures, including showering before donning street clothes. Note that reusable protective clothing (including respirators) will be cleaned by WMCO.

In addition, all on-site personnel will adhere to the directives listed below for themselves and the equipment:

Use dry removal of disposable protective equipment at the outer edge of the exclusion zone; wash hands, face and any other exposed skin. Detergent and water should be used to scrub skin surfaces which have contacted potentially contaminated wastes. The effectiveness of decontamination will be determined by frisking with a hand held radiation monitor.

The monitor must be held within 1/4 inch of the surface and moved at a rate of approximately 1" per second for effective monitoring. If frisking count exceeds DETECTABLE, additional decontamination is required. This field decontamination will be conducted by scrubbing with soap and water. If skin contamination is experienced, notify the CHS of contamination level and location. This can be done at close of business on the day of the incident.

In the event that contamination cannot be removed to below the action level (100 cpm beta/gamma or detectable alpha above background), notify STEPHEN DUCE. WMCO radiological safety will also be contacted.

Any exposed areas of the monitoring equipment surface will be wiped with a damp paper towel/cloth to remove contamination. Wiping with cloth dampened with detergent solution may be necessary to remove greasy materials.

Vehicles and other equipment used on site must be monitored for contamination (and decontaminated if necessary) before moving them to noncontaminated areas. Radiation Technicians will determine when the equipment is safe to move to clean areas.

Heavy equipment generally requires decontamination at the equipment pad for nonproduction area environmental work. Frisking and/or wipe tests will be performed to confirm the effectiveness of decontamination.

Decontamination of drill rigs generally requires the use of power cleaners such as pressure sprayers or steam cleaners. Wipe tests are required to confirm the effectiveness of decontamination efforts. No contaminated heavy equipment is to leave the site without the written permission of the site operator (Westinghouse).

4.2 Bioassay Sampling

A baseline urine sample will be submitted to WMCO prior to the start of activities in the waste pit area. Workers will submit urine samples for uranium assay to WMCO at the end of each ten-day work period.

Additional bioassay will be required if air samples indicate an acute exposure of 40 DAC-hours (2 percent of the annual limit of intake [ALI]). This correlates to a gross alpha activity for the most conservative nuclide, Th-232, of 1E-8 μCi/ml averaged over a one-hour exposure. A respirator protection factor of 2000 was assumed.

4.3 Medical Monitoring

In accordance with 29CFR1910.120 OSHA requirements, all ASI/IT and subcontractor field 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 potential exposures
- Exit medical examination
- Annual WMCO respirator physical

4.4 Safety Meetings

Safety meetings will be conducted on a regular basis by the health and safety field technician. Generally this will occur during the morning tailgate meeting. Special safety meetings can be called by the health and safety field technician if hazardous conditions warrant.

4.5 Training Requirements

All ASI/IT and subcontractor personnel assigned to the site tasks will, as a minimum, meet the following training requirements before working on this project:

- 40-hour OSHA training
- 8-hour annual refresher training
- 8-hour supervisory training (for supervisors)
- 24-hour supervised field experience
- Review of site specific hazards and procedures (tailgate safety meetings)
- Annual WMCO radiation safety training
- Annual WMCO respiratory training and fit test
- WMCO radiation worker training
- WMCO nuclear criticality safety training
- WMCO fire extinguisher use training
- WMCO general safety training

4.6 Baseline Soil Atmosphere Sampling Prior To Workers And Equipment Arriving Onsite

Before the soil has been compacted or otherwise disturbed by personnel and equipment, an initial survey of the site soil atmosphere should be made by health and safety field personnel. The EPA protocol for soil gas sampling using industrial hygiene equipment is straightforward and can collect samples from the surface down to one meter in a relatively short time. These samples should be collected far enough in advance to receive any laboratory results before work begins.

5.0 TASK SPECIFIC HAZARD ANALYSIS

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The following hazard identification is based on historical information and previous sample results in the area. The boring log for Boring 1073 (Pit 3) was examined in an attempt to estimate potential employee exposures to radioactive and chemical hazards. CIS data indicates that Pit 3 represents a worst-case situation for radiation exposure and a reasonably representative situation for chemical exposure. This log showed no volatile organics or radioactivity above the established action limits.

In addition to this assessment, the field team routinely reassesses the hazards before starting work to assure that conditions have not changed. All newly identified hazards will be addressed with the ASI /IT health and safety department (Stephen Duce or Lee Vittitow) to determine the degree of hazard and if any changes to the safety plan are needed.

5.1 Routes of Entry and General Hazard Assessment

The potentially significant site contaminants may reach employees through inhalation or skin absorption. Ingestion should not be significant so long as established exposure control methods are followed.

Inhalation of hazardous chemicals may occur through volatilization or resuspension of particulates. Examination of the measurements of volatile components (mercury, acetone, etc.,) of the waste pits indicates that breathing zone concentrations of these materials are very unlikely to reach the action levels through volatilization. Previous experience with waste site borings indicates that, assuming a highly volatile (worst case) material such as acetone, soil concentrations must be greater than 100 mg/kg to produce detectable concentrations in the breathing zone. There is a possibility that the measurements of organics may have underestimated the concentrations of volatile organics. To provide some assurance that this does not allow unacceptable employee exposures, real-time monitoring will be conducted for airborne organic contaminants. Previous experience also indicates that soilborne radioactivity levels greater than 40,000 pCi/g U-238, 6000 pCi/g Th-230, or 1000 pCi/g Th-232 are required to produce airborne concentrations during drilling that approach 0.25DAC. CIS sampling results indicate that none of these activity levels were exceeded except for Th-230 in Waste Pit 3. This indicates that Pit 3 borings have a greater probability of producing airborne concentrations of radionuclides in excess of 0.25DAC. An additional source of inhalation exposure is the decontamination of sampling equipment with methanol. However, this is done with small (<1 liter) quantities in an open tub for short periods, and is unlikely to produce significant exposure or fire hazard.

Water soluble radionuclides and several of the identified organic chemicals such as parathion, aroclor, etc., pose a skin absorption hazard. Because these materials are generally present at low concentrations (<20 mg/kg), and site procedures (gloves, protective

clothing) limit skin contact, the potential for adverse effects is minimal.

5.1.1 Physical Hazards

- Drill rig operation
- Noise
- Heat stress
- Cold stress
- Heavy equipment
- Slick surfaces (slips and falls)
- Tripping hazards (air lines, etc.)

5.1.2 Radiological Hazards

Worker exposure rates from fixed sources will be measured daily (see Table 1).

5.1.3 Chemical Hazards

As expected, previous boring samples were found to contain a large number of potentially hazardous chemical species. Most organic compounds were measured at concentrations of less than 2 mg/kg (approximately 2 ppm) and most metals were measured at or near U.S. Geological Survey established background concentrations. The sampling of organic vapors was carried out using an HNU photoionization meter. There are several limitations of the HNU photoionization meter which should be taken into account when considering these results. These are discussed in Section 5.1.3.1, Unknown Chemical Exposures. Because of these drawbacks, samples will be collected with an air sampling pump and absorption media or gas collection bag. These samples will be sent to an analytical laboratory for quantitative and qualitative analysis which will identify specific compounds in the samples. Unfortunately, these analyses take time before results are available. To help solve this problem, a portable gas chromatograph may be used on site when one is available. This will shorten the time it takes to generate results from days to a few hours. Although this is not a perfect system, it is certainly a start in identifying chemicals at the earliest possible time.

When considering exposure limits and PPE, it is important to remember several items. It is possible to work in areas of high concentrations above the limits in Table 2 as long as the PPE protection factor is more than adequate for the exposure hazard. In fact, Level A is going to cover most situations. Proper PPE and adherence to established decontamination control procedures will greatly reduce any possible exposure. Only organic chemicals and metals which were detected at greater than twice the maximum U.S. Geological Survey background have been addressed in this plan. The waste pit contents are not homogenous and there exists the possibility of boring into drums or other containers containing other materials that have not been detected in previous sampling. These unknowns are considered potentially significant chemical hazards. The known chemical constituents are listed in Table 2 are considered a starting point of risk analysis.

TABLE 1
RADIONUCLIDE AIRBORNE LIMITS

Contaminant	Derived Air Concentration (DAC)	Action Level
Radium-226	3E-10 μCi/ml μCi/ml	7.5E-11
Technetium-99	3E-7 μCi/ml	7.5E-8 μCi/ml
Thorium-228	4E-12 μCi/ml	1E-12 μCi/ml
Thorium-230	3E-12 μCi/ml μCi/ml	7.5-13
Thorium-232	5E-13 μCi/ml	1.25E-13 μCi/ml
Uranium-234	2E-11 μCi/ml	5E-12 μCi/ml
Uranium-235 (trace levels of actinium series)	2E-11 μCi/ml	5E-12 μCi/ml
Uranium-238	2E-11 μCi/ml	5E-12 μCi/ml

TABLE 2
CHEMICAL LIMITS

Substance	TWA[a] PEL (OSHA)[b]	TWA[a] REL (NIOSH)[c]	TWA[a] TLV (ACGIH)[d]	STEL[e]	Action Level[f]	IDLH[g]	Listed Carcinogen[h]
Acetone		250 ppm	750 ppm	1000 ppm	375 ppm	20,000 ppm	
Aroclor-1248			1 mg/m^3		0.5 mg/m^3		Ca
Aroclor-1254	0.5 mg/m^3	0.001 mg/m^3			0.25 mg/m^3	5 mg/m^3	Ca
Aroclor-1260			0.5 mg/m^3		0.25 mg/m^3		Ca
Arsenic	0.010 mg/m^3	0.002 mg/m^3 (15 min)	0.01 mg/m^3		0.005 mg/m^3	100 mg/m^3	Ca, A2
Asbestos	0.1 f/cc		0.2 f/cc		0.1 fcc		Ca, A1
Barium	0.5 mg/m^3		0.5 mg/m^3		0.25 mg/m^3	1100 mg/m^3	
Beryllium	0.002 mg/m^3	0.0005 mg/m^3	0.002 mg/m^3	Ceiling 005 mg/m	0.001 mg/m^3	10 mg/m^3	Ca, A2
Bis (2-Ethylhexyl) phthalate	5 mg/m^3	5 mg/m^3	5 mg/m^3	10 mg/m^3	2.5 mg/m^3	Unknown	Ca
2 Butanone	200 ppm	200 ppm	200 ppm	300 ppm	100 ppm	3000 ppm	
Cadmium (dusts and salts)	0.2 mg/m^3		0.05 mg/m^3	Ceiling 0.6 mg/m^3	0.1 mg/m^3	50 mg/m^3	Ca
Cadmium (fume)	0.1 mg/m^3		0.05 mg/m^3			9 mg/m^3	Ca
Cobalt (metals dusts and fumes)	0.05 mg/m^3	0.05 mg/m^3	0.05 mg/m^3		0.025 mg/m^3	20 mg/m^3	
Copper (dusts) Copper (fume)	1 mg/m^3	1 mg/m^3	1 mg/m^3 0.2 mg/m^3		.05 mg/m^3		
4, 4-DDT	1 mg/m^3	0.5 mg/m^3	1 mg/m^3		0.5 mg/m^3		Ca
Di-n-octyl Phthalate		None	None				
Fluoranthene[i]	0.2 mg/m^3	0.1 mg/m^3			50 mg/m^3	700 mg/m^3	

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TABLE 2
(CONTINUED)

Substance	TWA[a] PEL (OSHA)[b]	TWA[a] REL (NIOSH)[c]	TWA[a] TLV (ACGIH)[d]	STEL[e]	Action Level[f]	IDLH[g]	Listed Carcinogen[h]
Lead (inorganic dust and fume)	0.05 mg/m^3	0.100 mg/m^3	0.15 mg/m^3		0.025 mg/m^3	700 mg/m^3	
Methanol (for equipment decontamination)	2 ppm	200 ppm	200 ppm	250 ppm	1 ppm	25,000 ppm	
4-Methylphenol (Para-Cresol, all isomers)	22 mg/m^3	10 mg/m^3	22 mg/m^3		11 mg/m^3	250 ppm	
Naphthalene	10 ppm	10 ppm	10 ppm	15 ppm	5 ppm	500 ppm	
Nuisance Dust	15mg/m^3		10 mg/m^3		7.5 mg/m^3		
Organics (Unknown)	Default Values						
Parathions	0.1 mg/m^3	0.05 mg/m^3	0.1 mg/m^3		0.05 mg/m^3	20 mg/m^3	
Penta-chlorophenol	0.5 mg/m^3	0.5 mg/m^3			0.25 mg/m^3	150 mg/m^3	
Phenanthrene[g]	0.2 mg/m^3				0.1 mg/m^3		
Phenol	5 ppm	5 ppm			2.5 ppm	250 ppm	
Pyrene	0.2 mg/m^3				0.1 mg/m^3		
Respirable Dust	5 mg/m^3				2.5 mg/m^3		
Selenium	0.2 mg/mg^3	0.2 mg/mg^3	0.2 mg/mg^3		0.1 mg/m^3	Unknown	
Silica (respirable dust)	10 mg/m^3		0.05 mg/m^3		0.025 mg/m^3		Ca
Silver (soluble compounds)	0.01 mg/m^3	0.01 mg/m^3	0.01 mg/m^3		0.005 mg/m^3		
Tetrachlor-oethane (Perchlor-oethylene)	1 ppm	1 ppm	1 ppm		85 mg/m^3	150 ppm	Ca

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TABLE 2
(CONTINUED)

Substance	TWA[a] PEL (OSHA)[b]	TWA[a] REL (NIOSH)[c]	TWA[a] TLV (ACGIH)[d]	STEL[e]	Action Level[f]	IDLH[g]	Listing Carcinogen[h]
1,1,1 Trichloroethane (methyl chloroform)	350 ppm	350 ppm (Ceiling)	350 ppm	450 ppm	175 ppm	1000 ppm	
Tributyl phosphate	0.2 ppm	0.2 ppm	0.2 ppm		0.1 ppm	125 ppm	
Uranium (soluble	0.05 mg/m^3	0.05 mg/m^3	0.2 mg/m^3	0.6 mg/m^3	0.025 mg/m^3	20 mg/m^3	Ca
Uranium (insoluble)	0.2 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	0.6 mg/m^3	0.1 mg/m^3	20 mg/m^3	Ca
Vanadium (respirable)	0.05 mg/m^3	0.05 mg/m^3 (Ceiling)	0.05 mg/m^3		0.025 mg/m^3	70 mg/m^3	
Xylenes	100 ppm	100 ppm	100 ppm	150 ppm	50 ppm	1000 ppm	

[a]TWA = Time weighted average, or average exposure allowed over an 8 hour shift.
[b]OSHA PELs = Permissible exposure limit TWA concentrations that must not be exceeded during any 8-hour work shift of a 40-hour workweek.
[c]NIOSH RELs = Recommended exposure limit time-weighted average (TWA) concentrations for up to 10-hour workday during 40-hour workweek.
[d]TLVs (ACGIH) = Threshold limit values are airborne concentrations of substances under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effect.
[e]STEL = Short term exposure limit, or maximum average exposure during a 15 minute period.
[f]Action Level = An OSHA and NIOSH term used to express the level of toxicant which exposure to will require medical surveillance, generally one half of the PEL.
[g]IDLH = Immediately dangerous to life or health concentrations represent the maximum concentration from which in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.
[h]A1 = ACGIH designation for confirmed human carcinogen
A2 = ACGIH designation for suspected human carcinogen
Ca = NIOSH designation for an occupational carcinogen
[i]For coal tar pitch volatiles.

5.1.3.1 Unknown Chemical Exposures

The possibility exists of encountering chemicals of unknown composition primarily from the contents of 55 gallon drums dumped into the waste pits. Thermochemical, photochemical, and other types of chemical reactions probably have caused the original chemicals to recombine and form new compounds. Drilling into these drums or into different trapped layers of waste could cause the release of gases of unknown composition. There are special considerations in conducting sampling operations under these conditions. For example, the lack of known target compounds make the selection of a sampling and analytical method very difficult. There is not one method which will work on every possible chemical. In general, the HNU photoionization detector is good for warning that a chemical is there in real time. The drawback is that to be detected, a chemical must fall within the range of the 10.2 or the 11.7 lamps of the detector. There are many chemicals, such as PBCs, which do not fall in this range. In addition, the HNU will indicate that something is there, but the chemical identity is still unknown. Drager detection tubes are good if the chemical present is known, otherwise it is possible to run through the 300 drager tube types and still not find the right tube for the chemical present. The recognized method for collection and analysis of unknown chemicals is to use a series of broad spectrum scans of chemical groups. NIOSH and the EPA have developed the methods to do this. The drawback is that these methods take time to analyze. These methods are analyzed by gas chromatography/ mass spectrometry in a laboratory. Some of these methods are as follows:

- Total Hydrocarbon Scan using Tenax tube collection - EPA Method TO-1
- Polynuclear Aromatic Hydrocarbons - EPA Method TO-13 or NIOSH P&CAM 184
- Aldehydes and Ketones - EPA Method TO-5
- Alphatic Amines - NIOSH P&CAM 221
- Phenols - NIOSH 3501
- Ketones - NIOSH 1300
- Elements - NIOSH 7300
- Pesticides - EPA Method TO-10
- Volatile Nonpolar organics - EPA Method TO-4

A few total hydrocarbon samples will be collected (using Tedlar bags or TENEX Tubes) at locations showing high HNU readings. Analysis results will be reported when available to work crew leaders and the CHS.

5.1.4 Extremely Low Frequency (ELF) Electromagnetic Field Hazards

Site exposure to electromagnetic radiation will come primarily from 345,000 volt transmission lines which run through the FMPC. There are also electrical transmission substations which may be a problem for some drilling operations. Table 3 lists sources of magnetic field exposure and range of potential exposure. The unit mT indicates millitesla and is a measurement of magnetic field strength. Electric field strength is measured in volts (V) or

TABLE 3
SOURCES OF MAGNETIC FIELD EXPOSURE

Measurements are in millitesla (mT)[a] for magnetic field strength; electric field strength is in volts (V) or kilovolts(KV)

Power Generating Station:

20 KV
3.0 mT

Step-Up Transformer:

5 - 20 mT

Transmission Lines:

69 - 765 KV
5 - 70 mT with the magnetic field drop-off at $1/r^2$

Step-Down Transformer:

5 - 20 mT

Primary Distribution Lines:

4 - 35 KV
1 - 5 mT with magnetic field drop-off at $1/r^2$

Distribution Step-Down Transformer:

0.1 - 1 mT with a fast magnetic field drop-off at $1/r^3$

Secondary Distribution Lines:

115/230V
0.1 - 1 mT with a slow magnetic field drop-off of 1/r (due to unbalanced phase and neutral lines)

Electric Utility Ground:

Water pipes carry return current and reduce unbalanced fields. Ground currents can be a primary source of continuous exposure in some buildings with a slow field drop-off at 1/r.

[a]1 tesla = 10,000 gauss = 80,000 A/m
1 millitesla = 100 gauss = 800 A/m

Kilovolts (KV). An ELF survey will be performed once around the Waste Pit area prior to the start of any drilling to identify field strengths. Workers will be notified of the survey results.

5.1.5 LASER Hazards

The only possible LASER hazards would come from LASER ranging equipment used in site surveys. At this site, ranging equipment operates in the infrared range; therefore, LASERS are not a problem.

5.1.6 Microbiological Hazards

Interest in microbiological exposure on the project site will mainly be concerned with exposure to contaminated dust in buildings and dust generated in open fields during drilling operations. Both areas have the potential to expose employees to opportunistic pathogens from airborne dust. In buildings, the dust comes from contaminated bat, pigeon, or other bird excrement. In fields, the soil can contain spores from bird roost, pasture land, or old barnyards. These spores can remain viable for more than 50 years. There have been cases of Aspergillus niger remaining viable for thousands of years in prehistoric tombs. This means that soil will be contaminated for years after a farm has disappeared or the trees of a black bird roost have been cut down. Examples of organisms which cause infection through inhalation are the following:

Anthrax - affects the lymphnodes and blood stream; can cause septicemia and death if untreated. Three percent of U.S. cases are pulmonary through inhalation.

Aspergillosis - infects the ear, lung, parinasal sinuses, or orbit. A secondary invasion can attack the kidneys, heart, and brain.

Farmer's Lung - causes acute respiratory infection, can develop into acute asthmatic attacks.

Brucellosis - causes flu-like fever, headache and myalgias. Chronic brucellosis can cause splenic abscesses, bone and joint disease, renal and bladder disease. Late complications can occur 10 to 20 years after an acute episode.

Histoplasmosis - effects range from slight infection to fatal complications. It resembles tuberculosis. Results can be pneumonia, cerebral histoplasmoma, and meningitis.

Tuberculosis - affects the lungs; symptoms include fever, night sweats, emaciation, and productive cough.

Sampling for problem organisms should consist of site soil sampling before work begins for identification and concentration. Initially, a baseline of airborne dust generated during an operation will be made using the Model 87 Rotorod Sampler. This

method will provide both organisms identification and quantitative result per cubic meter of air sampled.

If these initial results are negative, then no further sampling will be required. If, however, positive results are obtained each shift will be monitored for airborne organisms. Site exposure controls such as watering soil surfaces must be used. Disinfectants are another option. Respirator protection must also be used. Failure to control this hazard can result in lost worker days due to illness, workers on 20, 50 or 100 percent disability, or worker death in immune system suppressed individuals.

5.1.7 NOISE

OSHA Regulation 29CFR1910.95 covers occupational noise exposure. According to this regulation, an employer must administer a continuing and effective hearing conservation program, whenever employee noise exposure equals or exceeds an 8-hour time-weighted average (TWA) sound level of 85 decibels as measured on the A scale.

A baseline sample will be taken using a noise dosimeter on the first shift. If the noise levels are below the TWA of 85 decibels, sampling may occur intermittently during the course of the work.

5.1.8 Animal and Plant Hazards

For this project, plants and animals do not represent a significant threat. Some possible hazards may include feral dogs, copperhead snakes (*Agkistrodon contortrix mokasen*), bees (*Hymenoptera*), black widow spiders, brown recluse spiders, ticks, chiggers, and poison-ivy.

Most of the resultant hazards are secondary infections or allergic reactions from stings and bites. Copperhead snakes are venomous and their bit is highly dangerous but rarely fatal. Generally, if left alone, they leave people alone. The best prevention for tick and chigger bites is to avoid high weeds, wear long-sleeved shirts and long pants, and use insect repellent. Feral dogs, skunks, and other mammals may carry rabies and therefore should be avoided. Use common sense to avoid being bitten. Should bites occur, they must be reported and taken care of at the WMCO medical facility. The best antidote for poison-ivy is to recognize and avoid it.

6.0 MONITORING AND ACTION LIMITS

Air monitoring will be performed to assure that contaminant concentrations in the breathing zone do not exceed the concentrations specified by established exposure levels. The action levels include an additional safety factor of two to account for potential inaccuracies associated with the use of field measurements. Because prediction of airborne concentrations from soil contamination can never be completely accurate, real-time air monitoring for volatile organics will be conducted. Default action levels have been established for this type of broad spectrum monitoring. Real-time radiation monitoring will also be conducted. This will detect unacceptable radiation levels as well as act as a marker system for other waste particulates, such as metals, that can not be monitored on a real-time basis.

An HP/IH field technician from ASI/IT will monitor all locations prior to start of work and will monitor exposures in all areas which exceed the 2 mR/hr action limit. Measures such as increasing shielding, increasing distance, or reducing exposure time will be taken when appropriate to minimize exposures; see Table 4.

ASI/IT policy requires engineering controls or the use of PPE to limit on-site exposures to the action limits values. It is advisable to keep exposures to chemicals as low as possible since there is insufficient data to predict the combined effects of most chemical mixtures. Prejob checklists will be completed prior to start of work. Prework inspection of the workplace will be performed to identify any slip or trip hazards and these will be remediated or clearly identified prior to work.

6.1 Electromagnetic Field Exposure Limits

Site exposure to electromagnetic radiation will come in the form of 345,000 volt sources at 60 Hertz (Hz). The exposure limits are as follows:

ACGIH limits for subradiofrequency (30 kHz and below) - static electric fields

Occupational exposure should not exceed a field strength threshold limit value (TLV) rms of 25 kV/m from 0 Hz (DC) to 100 Hz.

ACGIH limits for subradiofrequency (30 kHz and below) - magnetic fields

Occupational exposure should not exceed B_{TLV} = 60 mT - Hz/f (in Hz) where B_{TLV} stands for biological TLV.

The permissible magnetic flux density of 60 mT - Hz/f (Hz) at 50 Hz corresponds to a maximum permissible flux density of 1 mT.

TABLE 4
ACTION LIMITS

Instrument	Need	Interval	Limit	Action
Exposure rate meter	Yes	Pre-job	>2mR/hr >20mR/hr (Whole Body)	H.P. Review Withdraw
Alpha probe	Yes	Pre-job & split spoon	500 cpm[a] 250,000 cpm	SAR[b,c] Withdraw
Beta/Gamma probe	Yes	Pre-job & split spoon	5000 cpm[a]	SAR
Soil atmosphere sampler	Yes	Pre-job 2-3 weeks before work starts	Vapors identified as possible inhalation or contact hazard	I.H. Review for appropriate PPE level
HNU meter	Yes	Intermittent[d]	Detection to 10 PPM[e]	SAR
Breathing zone[f] air sample pump	Yes	1-2 per shift	Radiological Activity 0-0.075 WL 0.075-1.65 WL 1.65-33 WL >33 WL	None Level B or A SAR[g] APR, SAR, SAB
Area air sample pump	Yes	1 per shift	Radiological Activity 0-0.075 WL 0.075-1.65 WL 1.65-33 WL >33 WL	None APR, SAR, SAB Level B or A SAR[g]
pH Paper (moist tailings)	Yes	Intermittent	<3 >10	Withdraw to change to appropriate PPE
Combustible gas indicator	Yes	Initial, intermittent[f]	Within 10% of the lower side LEL or the upper side of the UEL or anywhere inbetween	Withdraw immediately

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TABLE 4
(CONTINUED)

Instrument	Need	Interval	Limit	Action
ELF radiation survey meter (50-60 Hz	Potentially	Pre-job clearance test	E Field[h]: 25 kV/m H field: 1mT or 0.1mT for pacemaker wearers	Withdraw I.H. Review Engineering Controls of source
Noise dosimeter	Yes	Initial 8-hr shift	85dB for an 8 hr shift TWA as measured on the A scale	Maximum ear protection and Engineering control of Source
Model 87 Rotorod sampler	Potentially	Initial	10,000 CFU/m^3[i] or more and colony counts of any one specie of fungus, bacteria or thermophilic actinomycetes <500 CFU/m^3. Any organism listed in Section 5.6, Microbiological Hazards	Level B or above PPE[b]. Engineering controls
hs-371 heat stress monitor	Yes if temperature is above 72°F doing hard work	All shifts	Deep body temperature 99°F	Institute engineering controls and reduced work schedule. Deep body temperature 100.4°F Stop work
Taylor wind chill meter	Yes if temperature is below 40°F	All shifts	Cooling rate of 1750 W/m^2	Institute engineering controls and reduced work schedule cooling rate of 2250 W/m^2 stop work

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TABLE 4
(CONTINUED)

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a Above background

b Full-face supplied air (airline) respirators with disposable protective clothing, such as Chemron Chemrel Max rain suit and a step-off decontamination will also be required any time respirators are used, Level B protection as required.

c At intervals of 30 minutes or less at the borehole and in the breathing zone.

d Two to three feet from borehole for drilling, <14" in front of employee's shoulder for other operations.

e Detection is defined as an HNU reading greater than 10 ppm over background.

f At intervals of 30 minutes or less within 2 feet of the borehole.

g Air sampling pump samples will be collected for analysis at random of parameters listed in Table 2. This includes nuisance dust and uranium for gravimetric analysis. If the TWA of any compound is exceeded, work will stop for IH review and the PPE level will be increased to level B or A. Under no case will the STEL or IDLH level be exceeded in less than Level A PPE. Appropriate safety backups for life support and rescue will be in place before work can continue.
Grab air samples using the HNU meter are used to screen for detectable levels of something in the work area. If elevated levels are found, a chemical ID shall be made by collecting a gas sample using an air collection bag and air pump. This sample will be analyzed in a laboratory using GC/MS analysis. The level of PPE can then be adjusted accordingly.h Supplied Air Bubble Suit, Level B protection as required.

h The TLV is in root-mean-square (rms).

i CFU is a Colony Forming Unit.

Note that for workers wearing cardiac pacemakers, the TLV may not protect against electromagnetic interference with pacemaker functions. The TLV for pacemaker wearers should be reduced by a safety factor of 10. For example, the magnetic flux density of 60 Hz would be 0.1 mT for pacemaker wearers.

In addition, static field strengths greater than approximately 5.7 kV/m can produce a wide range of safety hazards such as startle reactions associated with spark discharges and contact currents from underground conductors within the field. In addition, safety hazards associated with combustion, ignition of flammable materials, and electro-explosive devices may exist when a high intensity electric field is present. Care should be taken to eliminate ungrounded objects, to ground such objects, or to use insulated gloves when ungrounded objects must be handled. Prudence dictates the use of protective devices such as suits, gloves, and insulation in all fields exceeding 15 kV/m. Induced current in metal objects can be extremely dangerous.[1]

Another adverse effect of magnetic fields may be produced at higher flux densities resulting from fields acting upon implanted ferromagnetic medical devices such as suture staples, aneurism clips, prostheses, etc.

Soil and air humidity can dramatically effect the way static fields behave. This includes increasing or decreasing the intensity of the effects.

7.0 AS LOW AS REASONABLY ACHIEVABLE (ALARA) MEASURES:

The following ALARA measures will be observed in the waste pit area:

1. Eating, drinking, and smoking will be prohibited inside the waste pit boundaries.

2. Breaks and/or planning meetings will be held in a low-radiation exposure area, in order to minimize time in elevated radiation areas.

3. In order to minimize time in elevated radiation areas, maintenance of equipment requiring more than one hour will not be done within the Exclusion zone.

4. Workers will be made aware of the need to work efficiently, in order to minimize their exposure times.

5. Respirators will be utilized as described in Table 5, Personal Protective Equipment (PPE), in order to minimize internal exposures.

6. Work crews will be limited to the minimum number required to perform the task; in all cases, less than five individuals will be used to drill and sample the boreholes.

7. Only one drill rig per pit will be allowed.

7.1 Personal Protective Equipment

All employees in the task exclusion area will wear the PPE listed in Table 5. If an ASI/IT Action Level is exceeded, protective equipment will comply with the Action Limits section (see Table 4).

7.2 Nonwearable Safety Equipment

The following is a listing of the principal safety equipment that will be located or used in the contaminated, contamination reduction, and support zones:

- Cascade system for breathing air
- Industrial first aid kit
- Fire extinguishers - ABC dry chemical and Metal X
- Portable eye wash/shower
- Portable radiation contamination monitors
- Alpha radiation continuous air monitor (Alpha CAM)
- HNU, volatile organic detectors
- Decon equipment as appropriate
- Model 87 Rotorod Microbiological Sampler
- ELF Radiation Survey Meter

TABLE 5
TASK SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

Need to use is indicated by N = no, Y = yes, O = optional.

Item	Need	Justification per Task/ Action Level
APR	N	Potential for ≥ 500 cpm Alpha
Cartridges - Combination OV, AG, HEPA	N	≥ 5000 cpm B-G
Supplied air respirator	Y	Potential for chemical or airborne radioactivity
Hearing protection	Y	For drilling
Hard hat	Y	Minimum requirement
Viton boots (Latex boots will be used if Viton is not commercially available)	Y	Potential skin hazard
Safety shoes	Y	Minimum requirement
Gloves	Y	Potential skin hazard
Inner gloves	Y	As required on RWP
Leather-palm gloves	O	For drilling
Viton gloves	Y	For drilling and for methanol decontamination of equipment
Nitrile gloves	N	Based on possible chemical type
PVC gloves	N	Based on possible chemical type
Safety glasses	Y	At any time respirators not in use
Safety goggles	N	If danger of splashing exists and full-face respiratory protection not in use
Process coverall	Y	Minimum requirement
Plain Tyvek	N	Based on possible chemical type
PE Tyvek	N	Based on possible chemical type
Saranax Tyvek	N	Based on possible chemical type
Chemron Chemrel Max	Y	Potential skin hazard
Full-body harness fall protection	N	Potential fall hazards above 20 feet
Ice creepers	N	Potential ice conditions
Personal floatation devices	N	Potential fall hazard into water or liquid chemicals

8.0 ENGINEERING CONTROLS

When possible, various types of engineering controls may be used to control worker exposure to hazardous vapors or liquids. These controls do not need to be complicated or expensive. Some examples of engineering controls which can be used on site are as follows:

- Plastic vapor barriers
- Splash guards
- Wind breaks
- Water fogs
- Spray foams
- High-volume air scavaging systems
- Dike materials
- Spill absorption pads
- Kitty litter
- Neutralizing agents

There are other controls available which are just as viable as those on this short list. The key to their use is innovation.

9.0 INVESTIGATION-DERIVED WASTES

Investigation-derived wastes are wastes generated in the performance of on-site activities. These wastes include, but are not limited to:

- Auger cuttings
- Disposable PPE such as Tyvek coveralls, gloves, booties, used respirator cartridges, etc.
- Excess sample materials such as soil or water
- Decontamination solutions such as methanol

All potentially contaminated waste materials resulting from ASI/IT site activities will be collected and placed in drums or other containers specified by the client. Protective clothing will be placed in plastic bags and disposed of as compactible, potentially contaminated waste through WMCO. Wastes will be segregated; specifically, waste solvent such as methanol will not be combined with other wastes such as disposable protective clothing.

Investigation-derived wastes are the property of the client and are to be left on site unless otherwise specified in the written contract. The client will be responsible for proper transport, shipment or disposal unless otherwise specified in the written contract.

10.0 PERSONAL PROTECTIVE EQUIPMENT

This discussion of PPE is generic in nature. Specific requirements are presented in Table 5.

10.1 Level-A

Hardhat (optional if there are no overhead hazards)
Positive-pressure, full-facepiece SCBA or positive-pressure supplied air (airline) respirator with NIOSH approved escape SCBA
Totally encapsulating chemical-protective suit
Inner and outer chemical-resistant gloves
Surgical gloves or cotton glove inserts (optional)
Plastic sock over regular sock and taped
Chemical-resistant boots with steel toe and shank
Latex outer booties
Inner disposable coveralls (lightweight)
Long underwear (optional)
Cooling garment or vest (optional)
Two-way radio communications

Level A is to be used:

- When the chemical substance has been identified and requires the highest level of PPE
- When hazardous substances may be harmful to skin
- When hazardous substances may be absorbed through skin
- When there is potential for splash or immersion in a liquid
- When the oxygen level or toxic concentrations are not known or are near IDLH levels
- When a SCBA is required
- When confined space entry may be involved and the need for Level A cannot be ruled out (but explosion hazards has been ruled out)

10.2 Level-B

Hardhat (optional)[1]
Face shield (optional)
Self-contained breathing apparatus (air line or bottled air)
Disposable coveralls: Saranex, Tyvek or equivalent
Inner gloves: Latex or PVC
Outer gloves: (chemical resistant): Nitrile, butyl, etc.
Chemical resistant boots
Latex booties (optional)
Level-B PPE is to be worn in any of the following environments:

- Atmospheres containing chemicals having poor warning properties

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[1] Shall be required except in those situations where worker safety is compromised by use of other required PPE.

- IDLH atmospheres that do not present a skin contact hazard
- Air concentrations exceeding 3X exposure standard which require the same respiratory protection as Level-A
- Contaminants do not pose significant threat of exposure through skin absorption

10.3 Level-C

Hardhat (optional)[1]
Face shield (optional)
Air purifying respirator cartridges (organic vapors, acid gas, pesticides, radionuclides, particulates)
5-minute escape apparatus (optional)
Disposable coveralls: Saranex, Tyvek or equivalent
Inner gloves: Latex or PVC
Outer chemical resistant: Nitrile, butyl etc.
Chemical resistant boots
Outer disposable booties: latex
Level-C is intended to be used where:

- Contaminants have been identified
- Contaminants have good warning properties
- Cartridges are approved for use with the contaminant
- Oxygen concentrations are between 19.5 and 22 percent
- Toxic contaminant concentrations are not IDLH
- Concentrations are known and continuously monitored
- Contaminant concentrations do not exceed 3X exposure

Cartridges will be changed:

- Daily
- If color indicator shows that the cartridge is spent
- If breakthrough is detected

10.4 Level-D

Hardhat (optional)
Eye protection: safety glasses or goggles
Coveralls
Work boots
Work gloves

Level D PPE is basically a work uniform and provides no protection against chemicals. Level D is intended for sites where there is no risk from contaminants which can enter the breathing zone or be absorbed into the skin. Since most nonvolatile chemicals can adhere to particulates and be resuspended in the air, Level D is generally not permitted on contaminated sites. Level D can be used to work in areas where there is no risk of contamination such as upgradient installation of "background" monitoring wells. Level D is not street clothes.

10.5 Testing Of SCBA Compressed Air Tanks And Airline Compressor Systems For Grade "D" Air Compliance

All sources of breathing air used for this work must be tested for Grade "D" compliance and a certificate showing that compliance must be available. The air in compressed air cylinders or from air compressors must meet the following standard:

OSHA Standard for Quality of Breathing Air[2]

Section 1910.134
(d) Air Quality. (1) Compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration shall be of high purity. Oxygen shall meet the requirements of the United States Pharmacopoeia for medical or breathing oxygen. Breathing air shall meet at least the requirements of the specification of Grade D breathing air as described in Compressed Gas Association Commodity Specification G-7.1-1966. Compressed oxygen shall not be used in supplied-air respirators or in open circuit self-contained breathing apparatus that have previously used compressed air. Oxygen must never be used in air line respirators.

(2) Breathing air may be supplied to respirators from cylinders or air compressors.

Table 6 outlines the allowable contamination levels for breathing air.

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[2] Excerpted from OSHA Health and Safety Standards (29CFR1910) Revised November 7, 1978.

TABLE 6
ALLOWABLE BREATHING-AIR CONTAMINATION LEVELS

Contaminant	OSHA Compressed Gas Association Grade "D"[a]	U.S. Navy	Canadian Standard
Carbon monoxide	20 ppm	20 ppm	5 ppm
Carbon dioxide	1000 ppm	500 ppm	500 ppm ± 25
Moisture			[b]
Odor	[c]	[c]	[c]
Particulates (including oil)	5 mg/m^3	5 mg/m^3	1 mg/m^3
Total volatile[c]			
Non-substituted hydrocarbons			5 ppm
Hydrocarbons (condensed) as oil and grease in gas at normal temperature[d] and pressure	5 mg/m^3		1 mg/m^3

[a]Normal temperature 70°F (19°C) Normal pressure 14.7 psig (100 kPa)
[b]Pressure dewpoint 10°C (122°F) below lowest airline (supply) temperature
[c]Free from any detectable odor
[d]For substitute hydrocarbons see CSA Standard 180.1-M1978

Source: Above information comes from Appendix H of Self-Contained Breathing Apparatus, 1982, Fire Protection Publications, IFSTA Headquarters, Oklahoma State University, Stillwater, OK 74078.

11.0 CALIBRATION OF EQUIPMENT AT SITE ENTRY

It is the designated Site Safety Officer's (SSO) duty to check the log book(s) before site entry to verify that the equipment was calibrated. If the following information is not present, the SSO should notify the team leader who is ultimately responsible for the overall operation. The team leader is then responsible for getting the items corrected. The ASI/IT CHS or designee should also be notified of all deficiencies.

11.1 HNU Photoionization Detector

The organic vapor monitors used are HNU model PI101. These calibration requirements are specific to that model. Annual calibration is by the manufacturer. Daily calibration and record-keeping includes the following information for each calibration:

- Date
- Time
- Site name
- Calibration gas: Concentration and identity
- Meter scale
- Span potentiometer setting
- Difficulties
- Calibrator's name (printed)
- Probe type
- Battery charge status
- Pre-calibration reading
- Post-calibration reading

11.2 Radiation Meter

Semi-annual calibration by manufacturer or NIST traceable standard. Daily field function check using check source or gas mantle bags.

Record:

- Date
- Time
- Radiation source
- Background
- Correction factor
- Battery charge status
- Pre-calibration reading
- Post-calibration reading

Note that the readings should be stable. If the results start to change while testing under the same conditions, notify the ASI/IT Health and Safety Department.

11.3 ELF Radiation Survey Meter (50-60 Hz)

Annual calibration by the manufacturer using NIST traceable standards; daily field function check.

Record the following data:

- Date
- Time
- Calibration method
- Calibration source, strength, and frequency
- Calibration source tolerance
- Internal noise zeroed out
- Detector function
- Correction function
- Battery charge status
- Pre-use calibration reading
- Post-use calibration reading
- Probe type

11.4 Noise Dosimeter

Annual calibration by the manufacturer using NIST traceable standards. Annual calibration by the manufacture of the tone generator using NIST traceable standards. Daily calibration and function check using a pure tone generator.

Record the following data:

- Date
- Time
- Calibration source
- Calibration tolerance
- Battery charge status

11.5 Exotox 50

Factory recommends factory calibration every 6 months; in-house gas calibration every 10 days; function check - each use; gas sensor replacement O_2 - every 18 months; CO and H_2S - every two years; and combustibles - every five years.

11.6 Drager Tube Hand Pump

In-house calibration recommended at every three months; Drager Tube expirations are dependent on tube type, but are generally two-three years.

11.7 Thermohygrometer M-10240

Factory recommends factory calibration; in-house calibration each day; and function check at each use.

11.8 Breathing Zone (BZ) Air Sampling Pumps

Calibrate using a bubble tube calibrator primary standard. Presample run calibration with sampling train in place using a calibrated Dwyer rotometer.

Record:

- Date
- Time
- Flowrate
- Barometric pressure
- Temperature
- Humidity

Postsample run calibration check with sampling train in place using a calibrated Dwyer rotometer.

Record:

- Date
- Time
- Flowrate
- Barometric pressure
- Temperature
- Humidity

11.9 Field Rotometer
Calibrate by checking the rotometer against a bubble tube calibrator primary standard. Record the difference between the rotometer readings and the bubble tube readings and plot a calibration curve on graph paper once each month.

11.10 Sample run watch calibration
In-house time calibration - each day; in-house barometer calibration check - three times each day.

12.0 DRILL RIG OPERATIONS

12.1 Drilling Hazards

12.1.1 Underground Hazards

No ground penetration employing heavy equipment is permitted until WMCO IRS&F personnel have determined that underground utilities, as listed below, are not present:

Electricity
Gas
Sewer
Telephone (metallic and fiberoptical cables)
Water
Steam
Cavities
Storage tanks

12.1.2 Overhead Hazards

Always maintain the following distances/clearances:

10 feet from a 50 KV or less line
20 feet from a 50 to 345 KV line
34 feet from a 345 to 750 KV line
Buildings (25 foot clearance needed to raise boom)
Tree limbs (25 foot clearance needed to raise boom)

12.1.3 Noise

Noise can exceed the levels set by OSHA during certain operations such as driving a split spoon. Hearing protection shall be worn any time noise levels exceed 85 dBA over a time weighted-average.

12.1.4 Miscellaneous Hazards

Lightning
Rain on cathead
Weak cables, ropes or hydraulic lines
Loose fitting clothing which tends to snag on the rotating auger
Volclay contains crystalline silica which can cause silicosis
Ice hazards
Tornadoes

12.2 General Procedures

12.2.1 Safety Responsibilities

No one but the drillers should be within four feet of the rotating auger. Monitoring should be performed during periods of auger change or when the auger is stopped.

The drilling crew is responsible for maintaining the drill rig and stopping work if unsafe conditions develop. The designated health and safety personnel are expected to be familiar with the chemical and radiological hazards associated with the site operations, but are not experts in drill rig operations. If they notice something that appears to be a hazard, they will notify the drillers so that the drillers can assess the condition. Action (or lack of) taken will be documented. The safety personnel will also assure that:

- The drilling crew demonstrates to the field team that the kill switch is functional, showing its location. No drilling is to be permitted if the kill switch is not operational or if the field crew is not familiar with its location and operation.

- A minimum of two persons will be present at the drill rig at all times of operation.

- Respiratory protection and protective clothing will be worn when the conditions mandate it. It is true that PPE impairs the operator's vision of activities and that heavy gloves and SCBA tanks can make normal operations, such as turning a valve or picking up tools, more difficult to perform. In Level A suits the heat-load buildup from hard work can become dangerous if not properly monitored. For these reasons it is not practical to use Level A protection for all operations, nor is it necessary. But the worker should remember that some of these operations involve materials which are called hazardous for a reason. Although these hazards are listed in the Health and Safety Plan and are known to the managers, the ultimate responsibility for using the proper PPE lays with the individual, who will be the one to pay the ultimate price.

- That at least five feet of clearance is maintained on all sides of the drill rig for emergency egress.

12.2.2 PPE

PPE should include:

Hard hat
Eye protection such as safety glasses or goggles
Safety boots
Hearing protection
Gloves

13.0 CONFINED SPACE ENTRY

No confined space entry is planned or permitted for this effort.

14.0 HEAT STRESS

Heating of the body occurs from three sources:

1. Radiant heating from heat sources or sunlight
2. Convective heating from contact with a warmer object or liquid
3. Metabolic heating caused by activity

Cooling occurs through three mechanisms:

1. Respiration: the air we exhale is warm; as the body overheats, the respirations become more rapid.
2. Radiation: heat is released at the surface of the skin; as the body overheats, the superficial blood vessels dilate and allow more heat to be lost.
3. Evaporation: perspiration is released to the skin surface and evaporates; the skin is cooled by evaporative cooling.

PPE reduces the body's ability to shed excess heat through radiation and evaporation of sweat. PPE (for chemicals) can also act like a greenhouse and collect radiant heat.

These facts mean that heat stress can be a serious problem to hazardous waste site workers. The following discussion is intended to familiarize personnel with the symptoms of heat stress.

Heat stress is a progressive condition. Its mildest form is a slight elevation of body temperature. Normal body temperature is generally near 98.6°F. Working in high temperatures may elevate the temperature to 100-101°F. By the time the body temperature reaches 101°F, the worker generally has a headache. This is not a serious condition and can be treated through increased rest periods and cool fluid intake. The worker should not be allowed to work until the body temperature has been reduced to below 99°F.

If work continues when the first symptoms occur, the person may develop heat cramps. Heat cramps are brought about by long exposure to heat. The outside temperature does not have to be much higher than the "normal" environment. The person perspires heavily, often drinking large quantities of water. As the sweating continues, salts are lost by the body bringing about painful muscle cramps.

Treatment: Any worker with a heat-related illness or emergency will be immediately transported to the WMCO medical department for medical evaluation. The worker should be given rest, cool fluids, and removed from work for at least the remainder of the day. The person is likely to have an increased susceptibility to heat for the next few days.

14.1 Heat Exhaustion

Heat exhaustion symptoms include a near-normal body temperature and profuse sweating. The body temperature may reach 103°F. Victims of heat exhaustion have cold, wet, pale, clammy skin and can feel lethargic, dizzy, and/or nauseous.

Treatment: Remove the person from field work. Have the person rest in a cool area such as an air conditioned car or shaded area. Provide cool liquids to drink. Avoid beverages which contain caffeine or alcohol. Do not allow the person to go back to work for at least one or two days.

14.2 Heat Stroke

Heat stroke is a life-threatening condition. The person's body temperature-regulating mechanism fails and the body can not rid itself of excess heat. Heat stroke symptoms include high body temperatures and HOT DRY SKIN. Most cases of heat stroke are reported on hot humid days.

Treatment: Heat stroke victims must be transported to a hospital for immediate treatment. The individual must not be allowed to drive since cases are on record where the victim's condition worsens, lapsing into unconsciousness and death. Heat stroke victims are not to return to field work without the physician's consent.

14.3 Prevention of Heat Stress-Induced Illness

Become acclimatized to heat for several days whenever possible. Work in the cooler portions of the day. Early morning and evening hours are cooler.

Take frequent breaks and consume at least one pint of cool fluid every hour. Replenish electrolytes through the consumption of diluted drinks. The body loses more water than electrolytes. Concentrated salt, electrolyte, or juices can make you more suspectable to heat stress.

14.3.1 Monitoring

Heat stress monitoring should be performed whenever temperatures exceed 80°F and respiratory protection is required. Oral temperatures and pulse rates will be taken at the end of each break. Elevated temperatures or elevated pulse rates will be handled as follows:

Oral Temp.:	less than 99°:	Continue work
Oral Temp:	99-100.3°F	Reduce rate of work or take more frequent breaks; consume more cool fluids.

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Oral Temp: > 100.4°F	Remove from work until temperature reduced to 99°F or less.
Pulse Rate: > 110 bpm	Remove from work until pulse rate falls below 110 beats per minute.

If the body temperature exceeds 100.4°F, or the pulse rate exceeds 110 bpm at rest, the person must not continue to work. These precautions have been found to prevent most heat related illnesses.

Occasionally, high heat conditions combined with poor eating, sleeping, and drinking habits have resulted in heat stroke occurring in less than 20 minutes.

Additional information on heat related illnesses is presented in Table 7.

TABLE 7.
SIGNS AND SYMPTOMS OF HEAT RELATED ILLNESS

Condition	Signs/Symptoms
Heat rash	Results from continuous exposure to heat or humid air.
Heat cramps	Caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include muscle spasms, pain in the hands, feet, and abdomen
Heat exhaustion	Occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include pale, cool, moist skin heavy sweating, dizziness, nausea, fainting
Heat stroke	The most serious heat related illness. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms include red, hot, usually dry skin, lack of/or reduced perspiration, dizziness and confusion, strong, rapid pulse, coma.

The Heat Stress Monitor[1]

Heat stress will be monitored by the H&S field technician using a Metrosonics hs-371 Heat Stress Monitor/Logger when conditions warrant. The heat stress monitor is based on the Wet Bulb Globe Temperature Index (WBGT). The WBGT values are calculated by using the following calculations:

1. For work outdoors with a solar load:
   WBGT = 0.7 NWB + 0.2 GT + 0.1 DB

2. For work indoors without a solar load:
   WBGT = 0.7 NWB + 0.3 GT

   NWB = Natural Wet-Bulb Temperature
   DB = Dry-Bulb Temperature
   GT = Globe Temperature

TABLE 7
(CONTINUED)

The work load category may be calculated by ranking each job into light, medium, or heavy categories for metabolic heat on the basis of the work being performed:

1. Light work (up to 200 kcal/hr or 800 Btu/hr): e.g., sitting or standing to control machines, performing light hand or arm work.

2. Moderate work (200-350 kcal/hr or 800-1400 Btu/hr): e.g., walking about with moderate lifting and pushing.

3. Heavy work (350-500 kcal/hr or 1400-2000 Btu/hr): e.g., pick and shovel work.

Exposure Limits

See Figure 2.

Alerting Mechanism

The primary means for alerting work crews of dangerous heat stress conditions will be the area heat stress monitor. Other methods include contacting the health and safety office by telephone (738-3100), or by weather radio.

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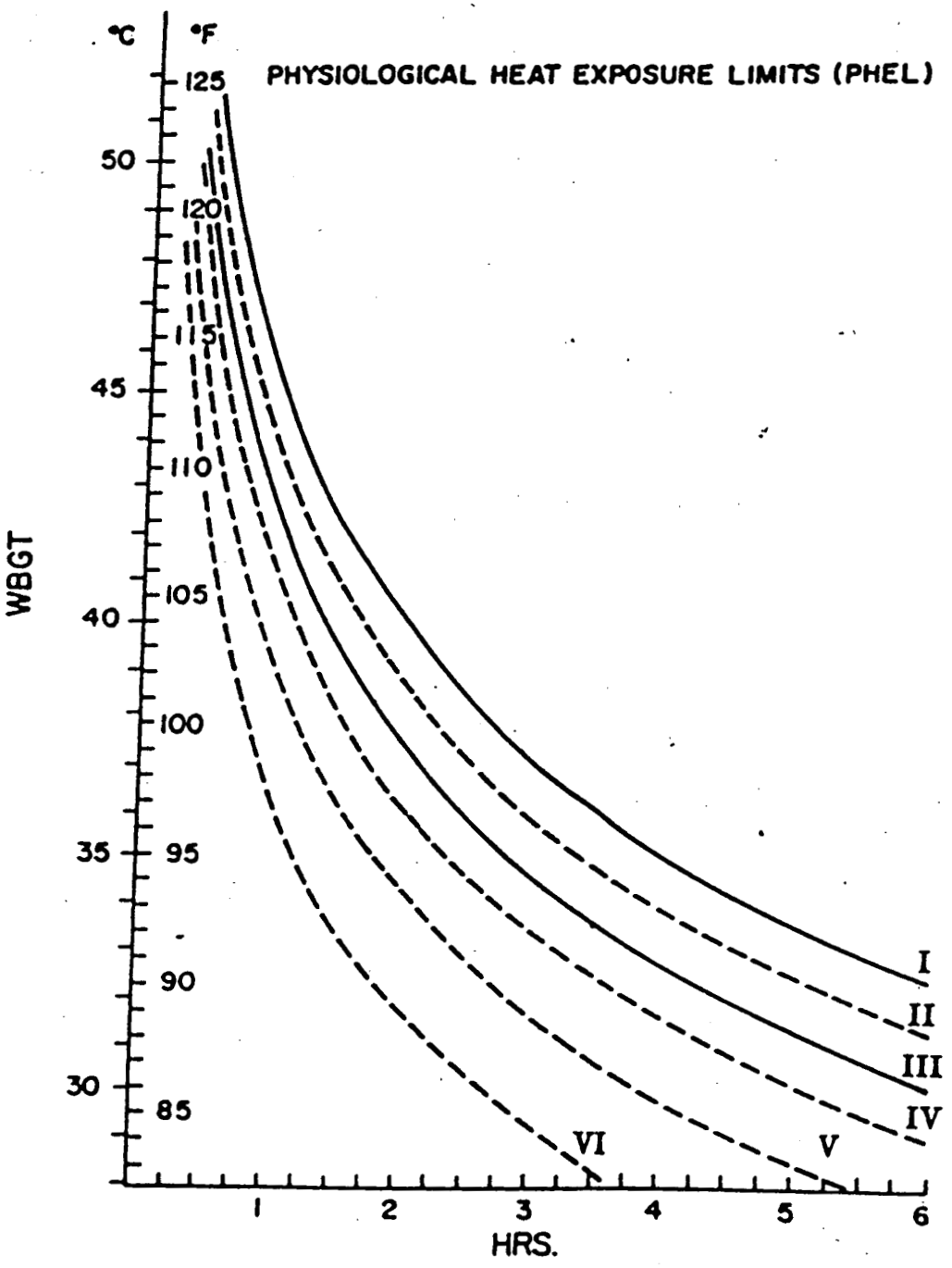
[1]For additional information on clothing correction factors and TLV see: ACGIH, 1990-1991, "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices," American Conference of Governmental Industrial Hygienists, Cincinnati, OH, pgs. 87-94.



Curve I ("A") for t_{wm} MR 88.5 $W \cdot m^{-2}$; Curve II for t_{wm} MR 100.0 $W \cdot m^{-2}$; Curve III ("B") for t_{wm} MR 111.7 $W \cdot m^{-2}$; Curve IV for t_{wm} MR 123.3 $W \cdot m^{-2}$; Curve V for t_{wm} MR 134.9 $W \cdot m^{-2}$; and, Curve VI ("C") for t_{wm} MR 146.5 $W \cdot m^{-2}$.

FIGURE 2. HEAT STRESS EXPOSURE CHART

PHEL Curves For Intermittent Work-Rest

Physical Activity **	Work O_2 Consump. ($L \cdot min^{-1}$)	No. Minutes Work/No. Minutes Rest				
		10/50	20/40	30/30	40/20	50/10
Standing	0.50	---	---	---	---	I
Average Light Work	0.75	---	I	II	III	IV
Upper Light to Lower Moderate Work	1.00	---	II	IV	VI	---
Average Moderate Work	1.25	I	III	VI	---	---
Upper Moderate to Lower Heavy Work	1.50	II	V	---	---	---
Average Heavy Work	1.75	II	VI	---	---	---
Upper Heavy to Lower Very Heavy Work	2.00	III	---	---	---	---
Average Very Heavy Work	2.25	IV	---	---	---	---
Upper Very Heavy Work	2.50	IV	---	---	---	---

** As indicated in Table 5 of ASHRAE Handbook of Fundamentals.

FIGURE 2 (CONTINUED).

FIGURE 2 (CONTINUED).

EPRI STAY TIMES

Ranges of stay times in minutes (or "h" for hours) for different WBGTs (and Botsball readings) in °C and °F by combinations of clothing ensemble and metabolism

WBGT (Botsball)		Work Clothes			Cotton Coveralls			Double Cottons			Cottons plus Plastics		
		Metabolism			Metabolism			Metabolism			Metabolism		
°C	°F	Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High
50 (47)	122 (116)	15-30	0-10		5-15	0-5		5-15					
48 (45)	118 (112)	20-45	5-15		15-30	5-10		10-20			5-15		
46 (43)	115 (109)	20-45	5-20		20-45	5-15		15-30	0-10		15-20		
44 (41)	111 (105)	30-60	10-25		20-45	5-20		20-45	5-15		15-30	0-10	
42 (39)	108 (102)	45-90	15-30	5-10	30-60	10-25		20-45	5-20		20-45	5-15	
40 (37)	104 (99)	60-90	15-45	10-20	45-90	15-40	5-10	30-60	10-25		20-45	5-20	
38 (35)	100 (95)	90-120	20-45	15-30	60-90	15-45	10-25	45-90	15-30	5-10	30-60	10-25	
36 (33)	97 (92)	2h-4h	30-60	15-40	90-120	25-45	15-30	60-90	15-45	10-20	45-90	15-30	5-10
34 (31)	93 (88)	3h-8h	45-90	20-45	2h-4h	30-60	15-45	90-120	20-45	15-30	60-90	15-45	10-20
32 (29)	90 (85)	NL	90-120	30-60	3h-8h	60-100	25-50	2h-4h	30-60	15-40	90-120	20-45	15-30
30 (27)	86 (81)	NL	2h-4h	60-120	NL	1h-2h	30-90	3h-8h	45-90	20-45	2h-4h	30-60	15-40
28 (26)	82 (78)	NL	NL	2h-4h	NL	1h-4h	1h-3h	NL	90-120	30-60	3h-8h	45-90	20-45
26 (24)	79 (75)	NL	NL	4h-8h	NL	NL	3h-8h	NL	2h-4h	60-120	NL	90-120	30-60
24 (22)	75 (71)	NL	NL	NL	NL	NL	NL	NL	NL	2h-4h	NL	2h-4h	60-120
22 (20)	72 (68)	NL	NL	NL	NL	NL	NL	NL	NL	4h-8h	NL	NL	2h-4h
20 (18)	68 (64)	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	4h-8h
<20	<68	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL

SOURCE:
"Metrosonics hs-371," Heat Stress Monitor Manual Rev. F, West Henrietta, NY, pg. 6.

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15.0 COLD STRESS

Cold stress will be an occupational hazard if project work takes place in the winter months. Persons working outdoors in temperatures at or below freezing may be frostbitten. Extreme cold for a short time may cause severe injury to the surface of the body, or result in profound generalized cooling, causing death. Areas of the body which have high surface area-to-volume ratio such as fingers, toes, and ears, are the most susceptible.

Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10°F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at negative 18°F.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is soaked with perspiration.

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be categorized into:

- Frost nip or initial frostbite: characterized by suddenly blanching or whitening of skin
- Superficial frostbite: skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient
- Deep frostbite: tissues are cold, pale, and solid; extremely serious injury
- Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature; its symptoms are usually exhibited in five stages:
  - shivering
  - apathy, listlessness, sleepiness, and sometimes rapid cooling of the body to less than 95°F
  - unconsciousness, glassy stare, slow pulse, and slow respiratory rate
  - freezing of the extremities
  - death

15.1 Prevention of Cold Stress Injuries

Thermal socks, long cotton or other thermal underwear, hard hat liners, glove liners, and other cold weather gear can aid in the prevention of hypothermia. Blankets, warm drinks (other than caffeinated coffee), and warm break areas are essential. The overall goal is to keep from getting wet. If workers do get wet, they should dry off and change clothes.

Cold stress training is appropriate for work at this site and can be carried out during the daily tailgate safety meeting.

15.1.1 The Windchill Meter

Windchill will be monitored by the H&S Field Technician using a Tayor Windchill meter or equivalent when conditions warrant.

15.1.2 Exposure Limits

See Windchill chart in Table 8.

15.1.3 Alerting Mechanism

The primary means of alerting work crews of dangerous windchill conditions will be the windchill meter on site. Other methods include contacting the health and safety office by telephone (738-3100), or by weather radio.

TABLE 8

Cooling Power of Wind on Exposed Flesh Expressed as Equivalent Temperature (under calm conditions)*

Estimated Wind Speed (in mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	*LITTLE DANGER* In < hr with dry skin. Maximum danger of false sense of security				*INCREASING DANGER* Danger from freezing of exposed flesh within one minute.				*GREAT DANGER* Flesh may freeze within 30 seconds.			
	Trenchfoot and immersion foot may occur at any point on this chart.											

* Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

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16.0 CONTINGENCY PLANS

WMCO has an established Emergency Response Plan and organization and this will be utilized for any emergency other than minor injuries. The WMCO program includes emergency medical service, fire suppression service, and security on all shifts, seven days a week. ASI/IT personnel will not attempt to treat injuries, will not attempt a confined-space rescue, to fight significant fires, or control significant chemical spills. When necessary, contact CONTROL by radio or by calling 6511 on the phone system.

16.1 Injuries

In the event of injuries, site personnel will try to minimize the consequences when possible. The process of determining what is appropriate to do requires that each situation be evaluated on a case-by-case basis.

16.1.1 Minor Injuries

Minor injuries (sprains, strains, and cuts) are expected to be controlled by on-site personnel using standard first aid practices. All injuries will be given final treatment by WMCO medical and reported to ASI/IT project health and safety (Stephen Duce)

16.1.2 Serious Injuries

WMCO CONTROL will be notified immediately of any serious injury by radio or calling 6511. The ASI/IT crew will use standard first aid procedures to stabilize the injury pending arrival of WMCO response personnel. CPR should be administered only by persons currently certified in CPR. Prior to performing CPR, the rescuer should consider what caused the victim to collapse. Chemicals around the nose and mouth can endanger the rescuer.

16.1.3 Chemical Splashes

16.1.3.1 Eyes

Move the victim to an uncontaminated area. Hold the victim's eyes open and flush eyes for 15 minutes with water or isotonic saline. The natural response to eye pain is to close the eyes. The rescuer must keep the eyes open to remove chemicals from under the eyelids. The flushing solution can cause extreme discomfort if it is too hot or too cold; try to maintain solution near body temperature.

Additionally:

- Notify CONTROL.
- Request an ambulance
- Tell CONTROL the name of the chemicals, if known
- Tell CONTROL what was done to treat the patient(s)
- Tell how many patients to expect

16.1.3.2 **Skin**

Move the victim to an uncontaminated location. Remove contaminated clothing and wash the affected skin areas. Flush the skin for 15-30 minutes and notify Medical.

16.1.4 **Injuries Complicated by Contamination**

Radio CONTROL or call 6511. All injuries within the process area will be assumed to involve contamination until proven otherwise by WMCO. Injuries complicated by chemical contamination will be evaluated after considering the hazards associated with the contamination. In most instances, the site contamination is of concern only if long-term exposures occur. In these instances, the injury will be given the highest priority and contamination reduced as soon as practical.

Injuries of persons contaminated with acutely toxic chemicals will be treated so as to minimize the hazard to both the rescuer and the victim. If the rescuer cannot safely attempt rescue, he/she should not attempt it.

16.1.5 **General Procedures for Injuries**

- The victim should be moved into an uncontaminated area and given a preliminary decontamination.
- Preliminary decontamination generally consists of flushing with water to dilute and remove most of the chemical. It also includes removal of contaminated clothing.
- As soon as the chemical hazard has been reduced to an acceptable level, the rescuer should stabilize the victim. More thorough decontamination can be performed at a later time.
- Care should be taken to minimize the spread of contaminant through runoff.
- Notify WMCO CONTROL of:
  - The chemical involvement
  - Extent of injuries
  - What treatment has been performed (including decontamination)
  - Number of victims
  - Your location
  - Telephone number
- CALLER HANGS UP LAST. The dispatcher is trained to be calm and ask for the appropriate information in the order that it appears on his/her form. In some instances, the facility may be complex and require additional information such as cross streets or an escort from the entrance to the site.
- If rescuer calls the hospital, notify the emergency room of the chemical involvement so that they can prepare for the arrival.

16.2 Chemical/Radiological Releases and Spill Containment

The proposed operations pose a possibility for spilling or releasing hazardous materials. Potentially spillable materials include gasoline and methanol. There is also a possibility that the boring itself may release pressurized, reactive, or highly volatile materials. If a minor spill of methanol or gasoline (<1 gal) occurs, ASI/IT will take steps to control or clean the release such as shoveling contaminated soil into a drum. If a large release in the form of a spill greater than one gallon, or a vapor cloud is observed, ASI/IT personnel will immediately withdraw at least 300 feet upwind or offwind and notify WMCO emergency services.

Radio CONTROL or call 6511. CONTROL will dispatch the necessary personnel to handle the situation. If possible, the following information should be included in the notification:

- Cause of release, if known
- Location of release
- Time of release
- Chemical identity
- Quantity involved
- If radioactive material is involved
- If materials are leaving the area as a vapor/gas
- If fire is involved
- The number of known exposures or injuries (if any)

Additional information may be requested such as:

- What has been/is being done to minimize the hazard
- Degree of hazard to responders based on caller's knowledge of the contaminants

16.3 Fire Hazards

Radio CONTROL or call 6511. Fire hazard operations include field activities such as drilling into containers of pyrophoric materials, using flammable decontamination solutions, etc. Report all fires before making any effort to control or fight the fire. All uncontrolled fires will be reported to WMCO, and the fire brigade requested before attempting any fire suppression activity. Small fires which appear to be controllable by field personnel will be controlled only if the safety of the field personnel is not jeopardized. Resources such as water, fire extinguishers, and soil may be used to contain or extinguish small grass or solvent fires. Metal-ex, a fire suppressing compound also will be provided on site for use on metal fires.

16.4 Adverse Weather

Work will be stopped if lightning, heavy or persistent rain, or other adverse weather conditions are in the area. This includes any weather conditions whose impact is judged to be detrimental by the drill crew, ASI/IT field staff, or appropriate Health and Safety representatives.

16.5 Emergency Telephone Numbers and Points of Contact

		Radio
Ambulance:	(513)738-6511	CONTROL
Hospital:	(513)738-6511	CONTROL
Fire:	(513)738-6511	CONTROL

POINTS OF CONTACT	Work	Home	Radio
ASI/IT			
Bill Kwoka, H&S (WMD)	(615)483-1274	[redacted]	
Alvin Luttrell, V.P. (WMD)	(615)483-1274		
John Wood, Proj. Director	(513)738-3100		
Doug Harmel, Field Manager	(513)738-3100		
Stephen Duce, H.P., CHS	(513)738-3100		
Lee Vittitow, Sr. IH	(513)738-3100		
Wm. Hertel	(513)738-3100		
Susan Birner, Personnel	(505)883-0959		
Greg McAnarney, H&S (Corp.)	(505)883-0959		
Mark Turner, H.P.			824
Ron Gill, H&S			
DOE			
Oba Vincent	(513)738-6937		
WMCO			
Leo Singleton			
Dick Kasparek			
Utility Engineer			202
Industrial Hygiene			357
Radiation Safety			355
Fire and Safety	(513)738-6235		303

ADDITIONAL HELP NUMBERS

Center for Disease Control	(404)633-5313
Chemtrec	(800)424-9300
CMA Chemical Referral Center	(800)262-8200
DOT Hazardous Materials Information	(202)366-4488
Emergency Planning and Community Right-to-Know	(800)535-0202
Federal Emergency Management Agency	(817)898-9104
National Response Center Hotline	(800)424-8802
Occupational Safety and Health Administration	(800)582-1708

HOSPITALS

The nearest medical facility is the WMCO medical department. It is the primary choice for on-site injuries. First aid and ambulance service is available at the WMCO medical department. Radio or call 6511 to contact CONTROL. WMCO maintains an emergency response capability which includes an ambulance and EMT trained personnel. The WMCO ambulance will transport the injured workers to the nearest hospital if necessary.

If WMCO ambulances are unavailable for any reason, CONTROL will call for a community ambulance. Confirm that an ambulance has been called. Location of the WMCO Medical Department can be seen in Figure 3.

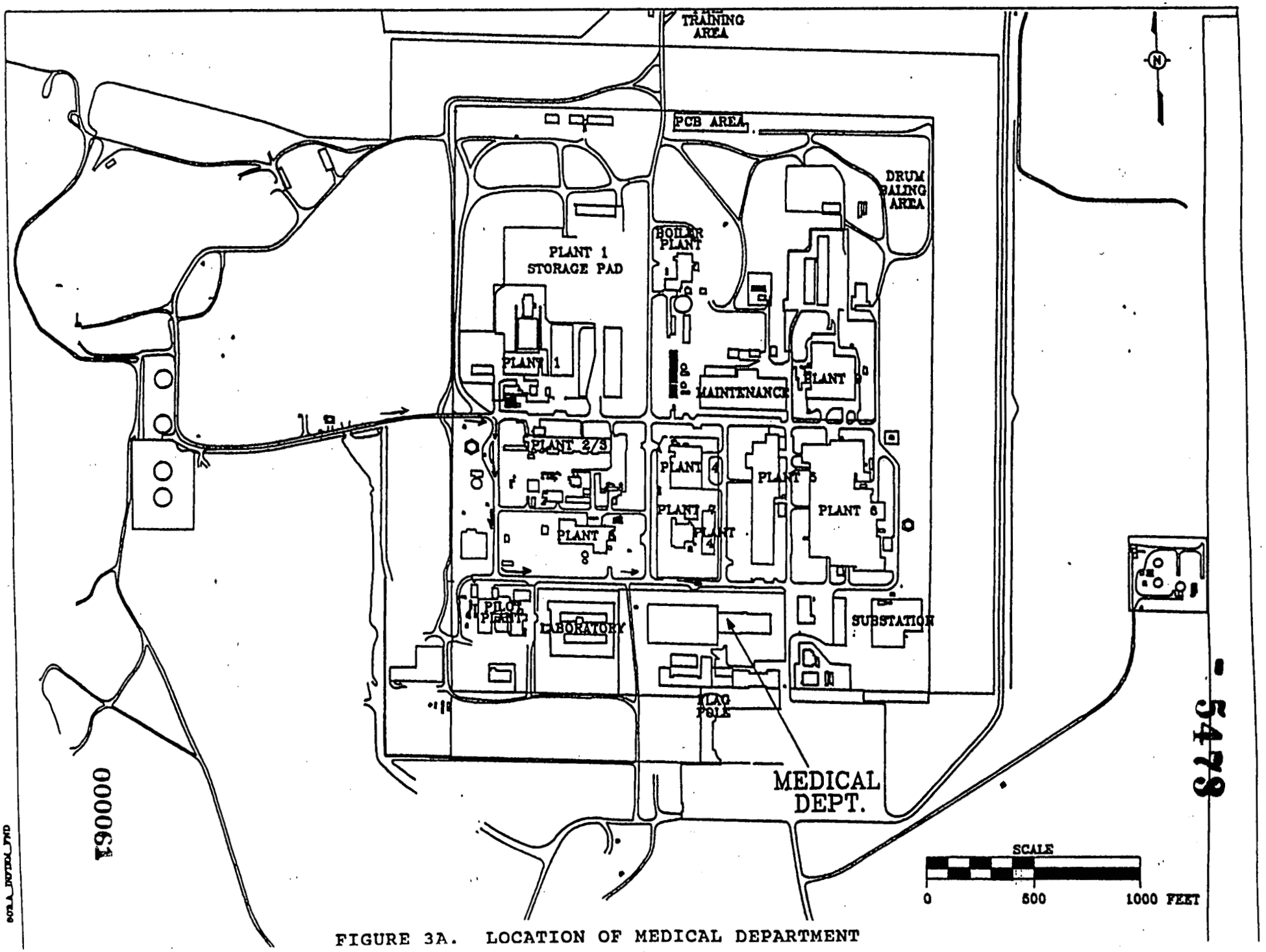

FIGURE 3A. LOCATION OF MEDICAL DEPARTMENT

17.0 SAFETY CHECKLIST

HEALTH AND SAFETY PRE-WORK CHECKLIST (*)

DATE:_____ BORING OR WELL NO._____

TIME:_____ LOCATION:_____

HEALTH & SAFETY PERSON:_____ CREW SUPERVISOR:_____

NAMES OF CREW WORKERS:_____

_____

_____

I. Documentation

Site Safety Plan in Place? Yes/No

Site Safety Plan Worker Training Completed? Yes/No

All Workers Meet Project Training Requirements? Yes/No

Tailgate Safety Meeting Conducted? Yes/No

II. General Safety

WMCO Penetration Permit Processed? (DOE Property) Yes/No/Not Required

ERA Penetration Review Completed? (DOE Property) Yes/No/Not Required

ASI/IT Magnetometer Survey Completed? Yes/No

(Off-site) CG+E Utility (Gas and Electric) Survey Completed? Yes/No/Not Required

Overhead Lines or Obstructions Acceptable? Yes/No

Visual Inspection of Workplace Performed? Yes/No (Tanks, Drums, Process Lines)

Slip, Trip, Fall Hazards Identified? Yes/No

Drill Rigs, Support Cables, and Ropes Acceptable? Yes/No

Emergency Egress From All Sides of Rigs Acceptable? Yes/No

Kill Switch on Rig Functional? Yes/No

All Flammables Stored in Proper Cans? Yes/No

All Flammables Away From Ignition Source? Yes/No

Fire Extinguisher and First Aid Kit onsite? Yes/No

III. Radiological Safety

WMCO Radiation Work Permit Processed? (Production Area)
Yes/No/Not Required

ASI/IT Radiation Survey Performed? Yes/No

Breathing Zone Sampler (Production Area)
Yes/No/Not Required

General Air Sampler (Production Area Buildings)
Yes/No/Not Required

Constant Air Monitor (Production Area Buildings)
Yes/No/Not Required

IV. Industrial Hygiene

WMCO Work Permit Processed (Production Area)
Yes/No/Not Required

Combustible Gas Monitor Onsite (Production Area Buildings) Yes/No/Not Required

HNu Detector Onsite? Yes/No

Hearing Protection Available? Yes/No/Not Required

Proper Respirator and Cartridges? Yes/No/Not required

Respirator Check Performed? Yes/No/Not Required

Are Chemical Material Safety Data Sheets Available?
Yes/No/Not Required

Comments: _____

(*) Identified to be a Basic Checklist for Pre-Work Health and Safety Requirements. To be used in conjunction with site Health and Safety Plan. A No answer must be resolved to allow work to be initiated. A form must be completed for each new boring/well location.

RLG/as

HEALTH AND SAFETY
DRILLING AND WELL SITE INSPECTIONS (*)

DATE: _____

TIME: _____

NAME: _____

LOCATION: _____

BORING OR WELL NO.: _____

NAME OF SITE SUPERVISOR: _____

NAMES OF WORK CREWS: _____

1. Is there a Site Specific Safety Plan present ? Yes/No
   a. Is there a radio present at the well site ? Yes/No
   b. Is there a Standby person present ? Yes/No
   c. Copy of Radiation Work Permit? Yes/No/Not Required
   d. Copy of WMCO Penetration Permit? Yes/No/Not Required
   e. Copy of ERA Survey? Yes/No/Not Required
   f. Documentation of Tailgate Meeting. Yes/No
   g. Are Material Safety Data Sheets Available ? Yes/No
2. Monitoring Results

H-Nu Readings

Background Reading Documented Yes/No/Not Required

Breathing Zone Readings Documented: Yes/No/Not Required

Radiation Readings

Background Reading Documented? Yes/No

Monitoring Results Documented? Yes/No

Monitoring Out? Yes/No

Are Instruments Calibrated ? Yes/No

Are Air Samplers Functional/Calibrated? Yes/No/Not Required

Are Radiation Dosimeter Worn? Yes/No/Not Required

Is Control Zone banner tape in place? Yes/No/Not Required

3. Personal Protective Equipment

Hearing Protection: Yes/No/Not Required

Respirators worn at sight: Yes/No/Not Required

Gloves Worn: Yes/No/Not Required

Type of Gloves: Nitrile or Leather Palms

Tyvek/Coveralls Worn: Yes/No

Safety Glasses/Goggles being Worn: Yes/No

Process Clothing Worn: Yes/No/Not Required

Hard Hats Worn: Yes/No/Not Required

Latex Boots: Yes/No/Not Required

Safety Shoes: Yes/No

4. Contingency Plan

Fire Extinguisher? Yes/No

First Aid Kit? Yes/No

Know Emergency Contact? Yes/No

Waste Stored Properly? Yes/No

Emergency Egress OK? Yes/No

Comments: _____

(*) Identified to be a Basic Checklist for Health And Safety Inspections During Operations to be used in conjunction with Site Specific Safety Plan. A no answer must be resolved to allow work to continue.

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18.0 APPROVAL AND COMPLIANCE STATEMENT

This site-specific safety plan was produced for the use of ASI/IT employees and subcontractors. It was intended for the Feed Materials Production Center, Fernald, Ohio.

The undersigned persons have read and understand the attached site specific safety plan and agree to follow its provisions*:

Name (lettered)	Signature	Date
TEAM LEADER		
DESIGNATED SITE SAFETY OFFICER		
EQUIPMENT OPERATOR		

The following individuals are not obligated, by contract, to follow ASI/IT safety policies, but have read and understood the safety plan:

* Compliance with the provisions of this HASP may be audited through announced or unannounced site visits. Be sure that you are implementing the provisions of the safety plan and documenting the reasons for field actions/changes when they are necessary. Site visits may be performed:

___ By ASI/IT

___ By WMCO

___ By DOE

19.0 AMENDMENTS

All changes to the document will be reviewed by WMCO's IRS&F organization prior to implementing the modification.