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**RI/FS FMPC - CONCURRENCE BY DOE
CONCERNING INSTALLATION OF 45
MONITORING WELLS**

08/14/87

**DOE-266-87
DOE-ORO/USEPA
271
LETTER**

3 *Care*



Department of Energy
Oak Ridge Operations
P. O. Box E
Oak Ridge, Tennessee 37831

AUG 14 1987
DOE 266-87

Ms. Catherine McCord
US-EPA
Region V - 5E-12
230 S. Dearborn Street
Chicago, Illinois 60604

REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) - FEED MATERIALS PRODUCTION CENTER (FMPC)

Dear Sir:

Reference is made to Bill Muno's July 15, 1987 letter to me regarding the same subject as above.

DOE concurs in the conditions outlined in the referenced letter relative to the installation of forty-five (45) monitoring wells. Specifically, USEPA-5 and OEPA groundwater monitoring and sampling comments on the RI/FS have been fully addressed as demonstrated in Attachment 1 to this letter. A monitoring well location map is provided as Attachment 2 which confirms the result of the July 10, 1987 site walkover. A tentative schedule for the installation of the monitoring wells is provided as Attachment 3. As this schedule is periodically updated, we will provide the schedule updates to your office as well as Ohio EPA. DOE will specify that the RI/FS contractor perform continuous sampling on all till wells. In addition, the Health and Safety Plan addressing the drilling program is provided as Attachment 4 for your information.

The projected schedule of RI/FS activities for August is as follows:

- August 4 - Meeting at FMPC on IT litigation support and historical dispersion modeling.
- August 4-6 - Sampling team training

- August 13 - Mobilize two drill rigs and materials
- August 17 - Initiate drilling of monitoring wells
- August 20 - Initiate radiological survey for soil
- August 24 - Initiate biological sampling
- August 24 - Initiate surface water and sediment sampling
- August 24 - Provide DOE response on RI/FS comments to USEPA-5/OEPA
- August 25 - Technical Information Exchange Meeting

The staff of USEPA-5 and OEPA is welcome to participate in any of the above activities. Please contact Rick Collier of my staff (FTS 774-6660) if participation is desired.

Sincerely,

for Ray Hansen
 for James A. Reafsnyder
 Site Manager

Attachment: As stated

cc w/att

Amy Blumberg, USEPA-5
 Rich Bendula, OEPA
 Graham Mitchell, OEPA
 Margaret Wilson, SE-31, OR
 ✓ Bob Conner, WMCO

cc w/o att.

Bill Bibb, DP-80, OR
 Bob Sleeman, ER-121, OR
 Bill Weinreich, WMCO
 Lou Bogar, WMCO

EPA COMMENT RESPONSE TO GROUND WATER SAMPLING PLAN**GENERAL COMMENTS:**

The main purpose of a ground water quality investigation is to determine the extent of contamination, rate of migration, and concentration of any contaminant. The ground water sampling plan does not clearly reflect this. While ground water monitoring well coverage on site appears comprehensive, no additional monitoring wells are proposed for installation off site. Three off-site wells are known to be contaminated. A determination of the extent of contamination is essential to this investigation. This information must be used to determine what dose is likely to be received by users of these wells and is essential to performing an exposure (risk) assessment of the site.

Ground water investigations need to define if a cone of depression exists around the production wells and what effect this has on flow patterns in shallow and intermediate aquifers.

When exceedances of drinking water standards are discovered, they should be noted. DOE standards of 1,200 pCi/l for uranium in drinking water are not appropriate for comparisons and decisions on health impacts since U.S. EPA is proposing new drinking water standards for uranium in the 10 to 100 pCi/l range. DOE should report any levels of uranium above 10 pCi/l.

RESPONSE:

- An off-site ground water monitoring well program will be proposed and forwarded to EPA by August 24, 1987. The proposal will be consistent with comments and responses addressed at the July 22, 1987 RI/FS work plan comment issue meeting.
- Ground water modeling will be used to evaluate the influence of the on-site production well on the shallow and intermediate flows systems before additional wells are proposed.
- Actual results of the laboratory analysis will be reported without regard to usage standards.

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EPA COMMENT RESPONSE TO GROUND WATER SAMPLING PLAN

SECTION/FIGURE: Section 3.0

PAGE: I.3-3

Well 131 is unlabeled in Figure 3.2. Wells 310 and 401 are shown in Figure 3.2 but not in Figure 3.1. Also, it is unclear in Figure 3.2 what some designations mean, such as 10(310) and 10(410).

RESPONSE:

Figures 3.1 and 3.2 will be corrected and clarified. The well designations 10(310) and 10(401) are incorrect and will be changed.

SECTION/FIGURE: Section 3.0

PAGE: I.3-7

Wells 220 and 320 are shown in Figure 3-3 but are not in Table 3-1.

RESPONSE:

Table 3-1 will be updated and corrected.

SECTION/FIGURE: Section 3.2.2

PAGE: I.3-9

DOE should install one three-well cluster south of the waste pit area at Well 205. The proposed shallow wells given in Figure 3.2 will only "isolate" ground water contamination effects from Pits 4, but not from Pits 1, 2, 3, 5, or 6. Therefore, the objective of these wells as stated in this paragraph will not be met.

RESPONSE:

Twelve additional 100-series wells are currently planned for the waste pit area to isolate the ground water contamination effects of the individual pits.

Three well clusters are planned for Well Sites 4, 34, 11, 38, and 10 in the waste pit area. These proposed cluster well locations will adequately surround the waste pit area and provide the necessary information required to assess the chemical quality of water in the three ground water horizons identified. These proposed well locations were reviewed and agreed to during the July 10, 1987 site walkover with U.S. EPA and OEPA.

EPA COMMENT RESPONSE TO GROUND WATER SAMPLING PLAN

SECTION/FIGURE: Para. 2PAGE: I.3-11

Additional off-site wells must be installed to determine the extent of contamination south of the site. A minimum of three well clusters should be placed to define the limits of the contaminant plume. The FFCA, SOW, Task 3b.7, calls for preparation of chemical concentration isopleth maps that extend off site as necessary to identify areas of contaminant transport. DOE needs to ensure that there are a sufficient number of off-site wells to adequately characterize any plumes that may extend beyond the site boundary.

RESPONSE:

No off-site wells are proposed at this time. DOE will develop and propose an off-site monitoring well program by August 24, 1987 which will be consistent with comments and concerns addressed at the July 22, 1987 meeting.

SECTION/FIGURE: Section 3.2.10PAGE: I.3-11

Background concentrations should also be established for radiological constituents. Since background data are needed for statistical and modeling purposes, a 100-series well in the 266/366 nest should be added (Figure 3.3). A true 100-series upgradient well would aid in the contamination assessment.

RESPONSE:

No 100-series wells will be installed at Site 66. Ground water flow in the till may be very local, i.e., water in the till at Site 66 may never reach the pit area due to the presence of Paddy's Run between the two sites. The RCRA background 100-series well will be at Site 24. This location was agreed to during the July 10, 1987 site walkover.

SECTION/FIGURE: Para. 4PAGE: I.3-12

Two additional wells are needed downgradient of the fly ash piles; one till well downgradient of Fly Ash Pile No. 2 and one sand and gravel well downgradient of Fly Ash Pile No. 1.

EPA COMMENT RESPONSE TO GROUND WATER SAMPLING PLAN

RESPONSE:

Location of Well 145 has been moved to Location 49 so that water quality downgradient of Fly Ash Pile No. 2 can be examined. Well Cluster 16, which contains a 200-series well, is located generally downgradient of Fly Ash Pile No. 1. These well locations were agreed to during the July 10, 1987 site walkover with OEPA and U.S. EPA.

SECTION/FIGURE: Section 3.2.14

PAGE: I.3-13

To provide additional upstream control on Paddy's Run and maintain ground water upgradient control, it would be appropriate to install Wells 266 and 366 adjacent to the creek. Also, by adding a 100-series well at this location, DOE could attain important information on the relationship between the creek and the waterbearing unit(s) within the till.

RESPONSE:

Wells 266 and 366 have been located away from Paddy's Run so that upgradient regional ground water conditions could be examined. Locating these wells adjacent to Paddy's Run may result in sampling local recharge water in the 200 series well.

The relationship of the creek and local water bearing units will be examined by using wells at Sites 9 and 14.

SECTION/FIGURE: Section 3.2.15

PAGE: I.3-14

The locations of water level recorders in Paddy's Run is unclear. The relocated Well Nest 166/266/366 should be instrumented with water level recorders. Additionally, Paddy's Run should be monitored for flow (volume) both upstream and downstream of the areas of ground water discharge/recharge. DOE should provide water level recorders at Wells 109, 209, and 309.

RESPONSE:

Water level recorders will be installed in Wells 109, 209, 309, 114, and 214 located adjacent to Paddy's Run. Additionally, stream stage will also be

EPA COMMENT RESPONSE TO GROUND WATER SAMPLING PLAN

monitored at these sites so that stream/aquifer relationships can be evaluated.

Well Cluster 266/366 will not be located near Paddy's Run and will not be instrumented. This was agreed to during the July 10, 1987 site walkover.

SECTION/FIGURE: Section 3.2.17

PAGE: I.3-14

Off-site wells to examine ground water quantity are also required; they may be useful to resolve the contention that the Albright & Wilson well contamination arose from contamination in the aquifer, rather than intrusion of the company's materials into the well.

RESPONSE:

An off-site ground water monitoring program will be proposed and provided to EPA by August 24, 1987 for comment.

SECTION/FIGURE: Section 3.3.1

PAGE: I.3-15

In the eleventh line of the first paragraph, there is a reference to "the distribution constituent." DOE should define this term.

RESPONSE:

The line should read. . . until the distribution of constituents in the till. . .

SECTION/FIGURE: Section 3.3.2

PAGE: I.3-15

The plan does not explain how the augers will be decontaminated. Also, the phrase "auger boring borehole advancement" is redundant and should be reworded.

RESPONSE:

The QAPP addresses decontamination of drilling equipment (Section 5.2, Drilling Procedures).

EPA COMMENT RESPONSE TO GROUND WATER SAMPLING PLAN

The phrase "auger boring borehole advancement" will be changed to read "auger boring advancement."

SECTION/FIGURE: Section 3.3.2

PAGE: I.3-15 and I.3-16

The last sentence on Page I.3-15 which continues onto the next page, describes removal of the drill cuttings. The plan should include a sentence that states the cuttings will also be containerized until analysis has been completed and that they will be disposed of properly.

RESPONSE:

All cuttings will be containerized until analysis has been completed and then disposed of properly.

SECTION/FIGURE: Section 3.3.2

PAGE: I.3-16

The plan does not explain how drilling tools and casing will be decontaminated. It should also state that the decontamination fluids will be containerized and disposed of properly.

RESPONSE:

As described in Section 5.2, the drilling procedures section of the QAPP, drilling tools, casing, and well screens for each monitoring well will be cleaned with a high pressure, hot water wash before drilling and well completion. Decontamination will be performed on constructed pads where all wastewater will be collected, treated, and disposed of according to existing NPDES permits.

SECTION/FIGURE: Section 3.3.3

PAGE: I.3-16 and I.3-17

This section proposes that PVC casings and screens be used for the monitoring wells. However, Task 3c of the SOW specified that the monitoring wells be constructed with teflon or stainless steel 316, not PVC. Although existing PVC wells are currently being used at the site, the new wells should be constructed to ensure unbiased results for the analyses of all hazardous substances being monitored. Since PVC pipe can adsorb and release trace

EPA COMMENT RESPONSE TO GROUND WATER SAMPLING PLAN

amounts of various organic constituents, it should not be used when monitoring for organics. Additionally, the use of screens in excess of ten feet in length may dilute the contaminant of interest. Therefore, screen lengths of five to ten feet must be maintained. No cement grout mixtures should be placed in the saturated zone. Untreated bentonite slurries may be used to seal the annulus in the saturated zone. This will prevent any effects of pH in the water chemistry caused by the contact of cement with ground water. Sand pack materials, grouts, and cement should be analyzed at the same time as ground water samples, not after the sample analysis is completed. The intermediate wells must extend five feet above the water table to allow for seasonal fluctuations.

RESPONSE:

- Stainless steel well screens and casing will be used to construct the monitoring wells.
- 100- and 300-series wells will have ten feet or less of well screen. 200-series wells will have 15 feet of well screen; five feet above the water table and ten feet below.
- Cement grout will not be used in the borehole. American Colloid Company Volclay grout is the preferred annular sealant.
- Sand pack materials, grouts, and cement will be analyzed for contamination at the start of the drilling program.

SECTION/FIGURE: Section 3.3.3**PAGE:** I.3-17

DOE should clarify and expand on its well development techniques. The plan should describe how pumping and flushing will be accomplished and how long it will continue. If any water is added during drilling, at least five times the amount of water added must be removed and three constant readings of pH, conductivity, and temperature obtained prior to ceasing development of the well.

EPA COMMENT RESPONSE TO GROUND WATER SAMPLING PLAN**RESPONSE:**

Monitoring wells will be developed by overpumping and bailing until a turbidity of 5 NTUs is achieved. Five times the water volume added during drilling and development will be removed from the well. In areas where contamination has not affected the pH, conductivity, or temperature of the formation water, pumping will continue until stabilization of these constituents is achieved.

SECTION/FIGURE: Section 3.3.5**PAGE:** I.3-18

In addition to the top of the well casing, land elevation should also be surveyed. The plan should indicate how this location will be marked. The plan does not indicate that the length of well casing stickup will be recorded in the field notebook.

RESPONSE:

The well location and elevation survey will provide the following information:

- Ohio state planar coordinates of well
- Elevation of land surface at the well
- Elevation of the top of the casing
- Length of well stickup above land surface.

This information will be recorded in the surveyors' notebook and the well location plotted on the site map.

SECTION/FIGURE: Section 3.4.1**PAGE:** I.3-19

Hermit data loggers can serve as the water level recorders recommended at other well locations (166, 266, and 366).

RESPONSE:

The Hermit data logger is the preferred water level recording instrument.

SECTION/FIGURE: Section 3.4.2**PAGE:** I.3-19

Well 103 is referred to in the text but is not shown on any of the figures. In light of the goals of the slug tests, the suggested additions to the well

EPA COMMENT RESPONSE TO GROUND WATER SAMPLING PLAN

network and the concern over the ground water/surface water connections, DOE should also perform slug tests on wells at the following locations: 166 (266/366), 114, 165, and either 109 or 116.

RESPONSE:

Well No. 103 should be changed to Well No. 104.

Ten wells are proposed for slug test analysis. These wells are listed in Section 3.4.2 of the sampling plan. Some modification of the testing program will be made based on information obtained during the drilling program. This modification is especially important since 12 wells have been added to the monitoring network. The five wells proposed by EPA will be considered along with other 100 series wells. Additionally, some in situ permeability testing may be performed during drilling operations.

SECTION/FIGURE: Para. 1

PAGE: I.3-20

We would expect that any discharge from the site would comply with any applicable NPDES permitting requirements. Therefore, add the following sentence to the end of this paragraph, "Any discharge will comply with all NPDES permit requirements and a NPDES permit will be in place prior to discharge. Any discharge which would exceed the discharge limits specified in the NPDES permit will be containerized."

RESPONSE:

The suggested sentence will be added to the sampling plan.

SECTION/FIGURE: 3.5

PAGE: I.3-20 and I.3-21

Procedures should describe how DOE will handle any water purged from the wells and how DOE will properly dispose of water after it is pulled from the well. The fourth bullet (Page I.3-21) item is contradictory to purging procedures described on Page I.3-20. The plan should specify that at least three well casing volumes will be removed; however, if pH, temperature, and specific conductance have not stabilized, purging will continue until they do.

EPA COMMENT RESPONSE TO GROUND WATER SAMPLING PLAN

RESPONSE:

- Purge water will be drummed, analyzed, and disposed of properly based on the degree of contamination present.
- The purging procedure described on Page I.3-20 would be used for low yield wells only, i.e., 100-series wells.
- The intent of the purging is to remove at least three well volumes if possible and to obtain a representative sample of the formation water. If possible contamination has not altered the pH, temperature, or specific conductance, then purging would continue (if recharge is adequate) until these parameters stabilize.

SECTION/FIGURE: 8th BulletPAGE: I.3-21

Pumping rates should not exceed 100 milliliters per minute to prevent possible volatilization of organic contaminants.

RESPONSE:

When samples are collected to test for volatile organic contamination, the pumping rate of the sampling pump will be reduced to 100 milliliters per minutes.

SECTION/FIGURE: 1st BulletPAGE: I.3-22

Prior to purging or sampling a well, the equipment must be properly decontaminated. When inorganics are of concern, the equipment should be washed with nonphosphate detergent and rinsed with 0.1N hydrochloric acid or nitric acid, tap water, and distilled water. If organics are of concern, the equipment should be washed with nonphosphate detergent and rinsed with tap water, distilled water, acetone, and pesticide-quality hexane. It is unclear whether the equipment will be allowed to dry before being reassembled or wet and then wrapped in aluminum foil or some other inert material.

RESPONSE:

Because the final two rinses in the decontamination procedure are tap water and deionized water, respectively, it is not necessary to allow the equipment to dry prior to reassembly and/or storage in aluminum foil.

EPA COMMENT RESPONSE TO GROUND WATER SAMPLING PLAN

A final rinse in hexane as proposed above may extract substances from the plastic sheeting or the oil film present on aluminum foil. Additionally, acetone should not be used for equipment decontamination because it contains traces of the Hazardous Substance List (HSL) parameters; ketones, 2-butanone, 4-methyl-2-pentanone, 2-hexanone, and is itself an HSL volatile organic compound. With the exception of the concerns expressed above, the decontamination procedures can be modified to include a nonphosphate detergent rinse for inorganics. If hexane is used as a rinse after methanol in the organic decontamination procedure, it should be followed by a methanol rinse, tap water rinse, and deionized water.

SECTION/FIGURE: Section 3.5

PAGE: I.3-22

It is unclear whether the preservatives will be added prior to the sampling events. HSL organic samples and radiological samples must be preserved to a pH below 2.0. DOE should state how it will ensure that sufficient acid is placed in the bottle before the sample is added.

RESPONSE:

HSL organic samples are not preserved to pH less than 2.0. Correct preservation requirements are presented in Table 6-5, Section 6.0, Pages 41 to 43. Metals and radiological samples are preserved to pH <2.0 with nitric acid. The preservatives are added to the sample containers prior to the sampling event as a convenience for field sampling. pH paper and additional nitric acid is carried in the field and samples are checked following collection to ensure that sufficient acid is present to maintain a sample pH less than 2.0. The third bullet on Page I.3-22 will be modified to reflect this precautionary procedure.

SECTION/FIGURE: Section 3.5

PAGE: I.3-23

Line 6 of the second paragraph on this page states that the bailer will be decontaminated under "more" controlled conditions, but does not explain what "more" means. In addition, the plan should state that the decontamination fluids will be containerized and disposed of properly.

EPA COMMENT RESPONSE TO GROUND WATER SAMPLING PLAN

RESPONSE:

The phrasing "previously decontaminated under more controlled conditions" refers to decontamination and packaging of the sampling equipment in the laboratory. This phrase is ambiguous and should be changed to read "previously decontaminated in the laboratory."

The decontamination procedures described on Page I.3-22 will include an additional entry stating that decontamination fluids will be containerized and disposed of under the facility's TSD permit or existing Feed Materials Production Center waste disposal procedures, whichever is more appropriate.

SECTION/FIGURE: Section 3.8

PAGE: I.3-25

In Table 3.2, the holding time for HSL base, etc. is "10/40a." However, the "a" footnote states extract within seven days. DOE should clarify this inconsistency.

RESPONSE:

The holding times in days for HSL volatiles and HSL base-neutral/acid and pesticide/PCB extractables are incorrect and should be seven days and 5/40 days, respectively. The footnote should read "Extract within five days. . ."

SECTION/FIGURE: Para. 3

PAGE: I.3-26

The FFCA requires that DOE analyze all ground water samples for HSL parameters. Since hazardous substances are not believed to be present in significant quantities in ground water, a phased approach may be implemented. At a minimum, samples from the monitoring wells surrounding the waste pit area, sanitary landfill, and sludge pond area must be analyzed for HSL parameters (this statement excludes RCRA monitoring wells located adjacent to Waste Pit No. 4). The remaining wells may be sampled and analyzed for the proposed parameter list (i.e., radionuclides, drinking water standards, etc.) with the inclusion of Total Organic Halogen (TOX) and Total Organic Carbon (TOC). If elevated levels (above background) of pH, specific conductance, TOX, or TOC are identified in these samples, then a subsequent HSL analysis shall be required.

EPA COMMENT RESPONSE TO GROUND WATER SAMPLING PLAN**RESPONSE:**

Ten monitoring wells will be sampled for HSL parameters as agreed to at the July 22, 1987 work plan issue meeting. These well locations will be identified by August 24, 1987.

SECTION/FIGURE: Para. 4**PAGE:** I.3-26

Pesticides must be included in the HSL analysis.

RESPONSE:

HSL pesticides/PCBs will be included in the sampling and analysis program of monitoring wells surrounding the waste pit area, sanitary landfill, and sludge pond area as requested by U.S. EPA if these contaminants are found in the waste samples analyzed by Weston.

EPA COMMENT RESPONSE TO SUBSURFACE SOILS SAMPLING PLAN

GENERAL COMMENT:

The FFCA calls for the construction of at least four hydrogeologic cross-sections. This task should be specified in the plan. The plan should outline how past subsurface information was collected if DOE intends to use it to characterize the geology of the site.

RESPONSE:

At least four hydrogeologic cross-sections will be constructed for the study area. Boring and monitoring well logs used for geologic interpretation and characterization of the site will be provided in the final RI report. Past subsurface information will be evaluated and incorporated into the RI as part of the historical data base.

SECTION/FIGURE: Figure 4.2

PAGE: I.4-3

Many of the proposed boring locations in this figure would make ideal locations for additional monitoring wells to fulfill the objectives stated in Section 3.2.2 (see comment on Section 3.2.2).

RESPONSE:

The borings proposed in this section will be completed as monitoring wells rather than being plugged.

SECTION/FIGURE: Para. 2

PAGE: I.4-4

The FFCA requires that continuous split-spoon sampling be conducted during the boring program. A representative number of continuous cores must be collected such that the site geology may be adequately characterized. A minimum of ten continuous cores should be collected at the waste pit area alone.

RESPONSE:

Continuous soil samples will be collected in the till at each well site. More than ten continuous cores will be collected in the waste pit area.

EPA COMMENT RESPONSE TO SUBSURFACE SOILS SAMPLING PLAN

SECTION/FIGURE: Para. 4

PAGE: Page I.4-4

It is unclear whether DOE will collect two subsurface soil samples only if clay layers are present. Shelby tube samples should be collected of the "blue clay" for permeability testing and USCS soil classification.

RESPONSE:

Up to two Shelby tubes will be collected in the till borings in the first and second clay layers or if the clay or silt is continuous at five-foot and 15-foot depths.

Shelby tube samples will be collected from the "blue clay" (if the clay layer is present) at the bottom of monitoring well Borings 334, 311, and 338. The clay will be analyzed for contamination and permeability and classified according to the unified soil classification system.

SECTION/FIGURE: Para. 1

PAGE: I.4-5

This section states that a full HSL analysis is contingent upon the sample having unusual or visual evidence of organic or inorganic contamination, or a high reading for volatile organics. DOE should run a full HSL analysis on a minimum number of samples even if no samples meet the criteria listed above, because inorganic contamination present may not be visible.

RESPONSE:

Section 4.4 describes field screening procedures for subsurface soil samples. Section 4.7.4 describes the criteria for full HSL analysis. All soil samples will be screened for radionuclides and HSL volatile organic compounds. A minimum number of soil samples to be analyzed for full HSL parameters will be specified after review of Weston waste pit characterization data.

EPA COMMENT RESPONSE TO SUBSURFACE SOILS SAMPLING PLAN

SECTION/FIGURE: Para. 2

PAGE: I.4-5

What is the justification for using three standard deviations over background as a criteria for lab analysis of soils? On Page I.5-15, Section 5.7.2, the criteria for lab analysis is twice background. Why is that criteria different than the one proposed in this paragraph? The U.S. EPA recommends a consistent criteria of twice background (e.g., if background is 100 cpm, anything over 200 cpm is an analysis candidate).

Also, there is a lack of clarity here as to whether the excess over background or a multiple of background will be used as the action criteria (e.g., 20 uR/hr over background of 10 uR/hr or two times background, 20 uR/hr).

RESPONSE:

The criteria for field screening should be consistent throughout the sampling plan. A statistically based criteria for establishing background levels and exceedance of these levels must be applied to assess the potential for radiological contamination of soil, because counting of radionuclides is a statistical process based on the probability of decay of radiological constituents in the soil. The criteria of twice a given background reading is inappropriate because the precision of the radiological screening is not considered. At low background readings, one or two standard deviations above the background may exceed the factor of two action criteria and still reflect satisfactory precision for the screening procedure. This would result in an excessive number of false positive readings and corresponding radiological analysis. The purpose of the screening procedure is to identify the areas of greatest contamination. Subsequent investigations would provide better definition of the extent and level of contamination. Accordingly, three standard deviations above the statistical background level is a more appropriate screening criteria because it considers the precision of the analytical techniques.

EPA COMMENT RESPONSE TO SUBSURFACE SOILS SAMPLING PLAN

SECTION/FIGURE: Section 4.7.1

PAGE: I.4-6

DOE must take at least one sample from each horizon per location for complete radiological analysis.

RESPONSE:

The text will be modified to state that one sample per horizon will undergo radiological analysis.

SECTION/FIGURE: Section 4.7.3

PAGE: I.4-8

The number of samples should be specified as a minimum of 20.

RESPONSE:

The text will be modified to state that a minimum of 20 samples will be collected.

SECTION/FIGURE: Section 4.7.4

PAGE: I.4-9

At least two samples per borehole which meet one or both of the criteria specified in this section should be subjected to a full HSL analysis. This section also appears to be contradictory to the last paragraph of Section 4.2.1.4 on Page 4-14 of the Work Plan which states that a composite sample from each borehole from the new till wells will be tested for HSL parameters.

RESPONSE:

Two samples per borehole which meet one or both of the screening criteria will be analyzed for each borehole. Accordingly, Section 4.7.4 on Page I.4-9 of the sampling plan and Section 4.2.1.4 on Page 4-14 of the work plan will be modified to reflect this change.

OEPA COMMENT RESPONSE TO WORK PLAN VOLUME

Comment No. 28; Page 4-14, second full paragraph:

The borings that are drilled around the waste pits must be backfilled with bentonite-cement grout.

Response:

Backfilling of borings will be done with American Colloid Company "Volclay" grout mixed to manufacturers specifications.

Comment No. 29; Page 4-18, Section 4.2.1.6:

The second paragraph in this section is out of place. It should be moved to Section 4.2.1.5 under Ground Water - Sampling Locations and Frequency.

Response:

Agree. This paragraph will be moved to Section 4.2.1.5.

OEPA COMMENT RESPONSE TO DESCRIPTION OF CURRENT SITUATION VOLUME

Comment No. 1; Page 3-69, Section 3.8.2.2:

Discussion of the 41 site monitoring wells is meaningless without their locations being identified on a site map and included in this section. It is not clear which "off-site" and "on-site" wells make up the 41-well monitoring system.

Response:

The text should read: A total of 61 wells are used for the current environmental monitoring program; 26 off site and 35 on site. When the Task 1 Description of Current Situation document is finalized, a map identifying the 61 site monitoring wells will be added. These well locations can be seen in Figure 11 (Page 22) of the Feed Materials Production Center Environmental Monitoring Annual Report for 1986.

Comment No. 3; Page 3-72, Table 3.18:

Sampling Points T1S and 1D are not shown in Figure 3.8. Why are the results of the remaining wells shown in Figure 3.8 not listed in Table 3.18?

Footnote "b" does not make any sense.

Response:

When the Task 1 Description of the Current Situation document is completed Wells T1S and 1D will be added to Figure 3.8. Footnote "b" will be written to state that "Guidelines used by FMPC for uranium are more stringent than levels set by 10CFR Part 20, Appendix B, which sets standards for above background concentrations in air and water.

Comment No. 5; Page 3-74, second bulleted item:

The first sentence uses poor grammar and its meaning is unclear. In the fourth bulleted item, what is meant by the "TP" designation after the well numbers?

Response:

When the Description of the Current Situation document is completed, the second bulleted item will be rewritten. TP stands for Test Pit.

OEPA COMMENT RESPONSE TO SAMPLING PLAN VOLUME

Comment No. 7; Page I.3-1, Section 3.1:

A sixth bulleted item should be added that states that ground water sampling is also being conducted in order to determine the extent (both vertically and horizontally) of contamination from FMPC.

Response:

Add 6th bullet:

- Determine the extent (both vertically and horizontally) of contamination from FMPC.

Comment No. 8; Figures 3.1, 3.2, 3.3, and 3.4:

Additional monitoring wells should be located immediately downgradient of Waste Pits Nos. 1, 2, 3, 5, and 6. Additional intermediate and/or shallow

monitoring wells should also be located downgradient of the lime sludge ponds, Fly Ash Piles 1 and 2, and the sewage treatment plant. Well 131 is not labeled on Figure 3.2

Response:

- Twelve 100-series wells will be completed in the borings for the waste pit area.
- The locations of required 100- and 200-series wells in the fly ash pile and waste pit areas were agreed to during the July 10, 1987 site walkover and discussed at the July 22, 1987 issue resolution meeting. A monitoring well network will be proposed for EPA comment at the August 25 Technical Information Exchange Meeting.
- Well 131 will be labeled in Figure 3.2.

Comment No. 9; Page I.3-8, Section 3.2.1, first paragraph:

Page I.3-8, Section 3.2.1, first paragraph: The proposed wells shown in Figure 3.2 do not fulfill the objective as stated in this paragraph - that it is "necessary to place a grouping of shallow wells immediately around the waste storage units..."

Response:

The 12 borings proposed for the waste pit area will be completed with monitoring wells to fulfill this requirement.

Comment No. 10; Page I.3-9, Section 3.2.2., first paragraph:

The proposed shallow wells given in Figure 3.2 will only "isolate" ground water contamination effects from Pit No. 4, but not from Pits Nos. 1, 2, 3, 5, or 6. Therefore, the objective of these wells as stated in this paragraph will not be met.

Response:

The 12 borings proposed for the waste pit area will be completed with monitoring wells to meet this objective.

Comment No. 11; Page I.3-16, Section 3.3.3, first paragraph:

The intermediate wells must extend at least five (5) feet above the water table to allow for seasonal fluctuations.

Response:

To meet this requirement, the screen length of the 200-series wells will be increased to 15 feet. Ten feet of screen will be placed below the water table and 5 feet above.

Comment No. 12; Page I.3-17, first paragraph:

Monitoring well screens should be no longer than ten (10) feet.

Response:

- 100-series wells will have screen lengths ranging from about two to ten feet
- 200-series wells will require 15 feet of screen if five feet is required above the water table
- 300- and 400-series wells will have screens ten feet long.

Comment No. 13; Figure 4.2:

Many of the proposed boring locations in this figure would make ideal locations for additional monitoring wells and should, therefore, be used as such.

Response:

Agree. All 12 borings will have monitoring wells completed in them.

Comment No. 14; Page I.4-9, Section 4.7.4:

At least two samples per borehole which meet one or both of the criteria specified in this section should be subjected to a full HSL analysis. This section also appears to be contradictory to the last paragraph of Section 4.2.1.4 on Page 4-14 of the Work Plan which states that a composite sample from each borehole from the new till wells will be tested for HSL organics and inorganics.

Response:

If one or both of the criteria are met for samples from a single borehole, then a single composite sample will be submitted for HSL analysis. The composite will be made of samples from a single borehole meeting the criteria.

Comment No. 15; Page I.5-5, first full paragraph:

If soil borings or surface soil samples on site, especially around the waste pits, show the presence of organic compounds, then sediments from Paddy's Run and the Great Miami River will have to be resampled and analyzed for the complete list of CLP organics. There also seems to be some contradiction regarding the analysis (or lack of analysis) of HSL compounds between this section and Section 4.2.1.6 (Page 4-19) of the Work Plan which states that half of the surface water samples and sediment samples will be analyzed for HSL and additional site-specific parameters.

Response:

Ten monitoring wells will be sampled for HSL parameters as agreed to at the July 22, 1987 issue resolution meeting.

Comment No. 16; Page 5-6, Figure 5.1:

A sediment sample should be obtained immediately downstream of the discharge from the buried effluent line into the Great Miami River.

Response:

Some additional sediment sampling will be completed downstream of the buried effluent line.

Comment No. 17; Page I.5-15, Section 5.8:

How can sediment samples be field screened for TOC, TOX, and general water quality parameters (i.e., metals, etc.)? All surface water locations shown in Figure 5.1 (including the location in Comment No. 16) must have sediment samples collected and analyzed for TOC, TOX, and the general water quality parameters listed on Page I.5-16.

Response:

Unless HSL compounds are found in the waste on FMPC, no change in the analytical program is proposed at this time.

Comment No. 3; Page 27 of 63, Section 6.2, second bullet:

Where potable water is used as a drilling fluid, samples of the fluid must be taken from the hose of the water tank/truck and analyzed for HSL compounds. This is to document that the "clean" drilling water has not been contaminated by what may have been in the tank prior to the tank's use at FMPC.

Response:

Agree. Water samples will be collected from the on-site source and the water tank(s) hose and analyzed for the full list of organic, inorganic, and radiological parameters.

OEPA COMMENT RESPONSE TO QAPP VOLUME**Comment No. 5; Page 28 of 63, Section 5.2, last bullet:**

Only air rotary drilling should be used for holes advanced into bedrock.

Response:

No bedrock drilling is proposed at this time. Cable-tool drilling is the preferred method at FMPC and has been agreed to by both U.S. EPA and OEPA.

Comment No. 6; Page 30 of 63, second bullet:

Sampling of soils in borings should be continuous to the base of the till and then every five feet or change in material thereafter.

Response:

Agree. This change will be made to the sampling plan.

Comment No. 7; Page 34 of 63, second bullet:

Well screens should not exceed ten (10) feet in length.

Response:

See response to Comment No. 12 of the sampling plan.

Comment No. 8; Page 38 of 63, second bullet:

Absolutely no mud should be used during well drilling.

Response:

No "mud" will be used during drilling.

OEPA COMMENT RESPONSE TO FMPC'S WORK PLAN

Comment No. 1; Page 2-2:

Identify soil types and properties based on Hamilton and Butler County Soil Surveys.

Response:

The Hamilton and Butler soil surveys will be used during the site investigation and during data analysis.

Comment No. 12; Page 2-22:

Include past protective pumping scenarios for protection of production wells from the waste pits.

Response:

A description of the "protective pumping" around the pits will be included in the data analysis task report. At this time, it is enough to note that a protective pumping program was implemented to control contaminant migration in the upper sand and gravel aquifer in the waste pit area.

OEPA COMMENT RESPONSE TO TASK 1 AND 2 OF THE RI FOR FMPC

Comment No. 1; Table I.2:

Table I.2 indicates modified proctor compaction tests on subsurface soils will be performed. Meaningful measurements of permeability, density, and consolidation must be performed on in situ soils.

Response:

Standard penetration tests will be completed during soil sampling. Additionally, ten slug-type tests will be performed in shallow wells in the waste pit area to determine the permeability of the water bearing unit.

Modified proctor compaction tests will be performed on soils proposed for capping waste areas, if this remedial alternative is identified during the FS.

Comment No. 2; Figure 3.1:

Figure 3.1 needs to include more downgradient monitoring wells around Fly Ash Pile No. 2, Sanitary Landfill Pit 1 through Pit 6.

Response::

Twelve additional wells are proposed for the waste pit area. The need for additional shallow wells will be determined after the 42 proposed 100-series wells are completed. Subsurface water quality and shallow ground water flow directions have to be determined before additional work is proposed.

Comment No. 3:

Monitoring well locations need to be located with respect to local and regional ground water flow patterns, i.e., sewage plant, scrap pile etc.

Response:

Proposed well locations were made with respect to known source locations and probable ground water flow directions.

Comment No. 4:

Ground water investigations need to define if a cone of depression exists around the production wells and what effect this has on flow patterns in shallow and intermediate aquifers.

Response:

The impact of the on-site production well pumpage on local flow patterns will be evaluated with computer simulations. Water table maps constructed from existing well data does not show a large scale influence.

Comment No. 5; Section 3.3:

Section 3.3, Monitoring Well Construction

- a. Hollow-stem augering is the preferred drilling method.
- b. Need to determine the frequency of soil sampling. Subsurface samples should be collected continuously until the detailed site-specific setting is defined then sampling at five-foot increments or at changes in lithology should be used for boreholes.
- c. If any water needs to be added during drilling:
 - i. Quantity and quality of water used must be recorded
 - ii. Samples of the drill water must be obtained at the hose before the water is pumping into the well
 - iii. During well development, at least five times the amount of water added must be removed and three constant readings of pH, temperature, and conductivity obtained at five-minute intervals to ensure proper well development.
- d. Abandonment of monitoring wells should include pulling the well casing.
- e. How will well logs and the hydrogeologic setting be described in a similar manner if engineers and geologists are logging the samples? All soil samples should be retained and one qualified geologist should review the samples and correct the logs for consistency when necessary. SWDO geologists would like to participate in this review of soil samples.
- f. Section 5, Page 28 states several times that approval will be required if the field program varies from the plan. Who will approve? OEPA and U.S. EPA should have direct input.
- g. A waiver may be required for the use of PVC well casing.
- h. Page 34, Volume V, Section 5 states that 316 stainless steel well casing will be used while Volume 1, Section 3 states PVC. Stainless steel well screens are preferred when low-level VOC's are suspected.
- i. Screen lengths should be limited to ten-foot lengths.

- j. The use of a submersible pump may aid in removing fines during well development.
- k. Water from well development, sampling, or pump tests should be placed in a 55-gallon drum, tested, and disposed of in the wastewater system unless it can be shown that the water is not contaminated. In no case should this water be discharged to Paddy's Run or other surface water without obtaining proper permits.
- l. The method of drilling wells to be used for slug tests needs to be defined on Page 51 in Section 5.
- m. Injection wells should not be used for aquifer characterization.
- n. Screen and pack material should be designed for each specific formation to be monitored and should not be arbitrarily chosen.

Response:

We agree with the comments to Section 3.3 with the following exceptions:

- Cable tool drilling is the preferred method
- Stainless steel casing and screen will be used.
- Screen length will be 10 feet for 300- and 400-series wells, 15 feet for 200-series wells and 2 to 10 feet for 100-series wells.
- Minor changes in the work plan required because of site conditions will be made by the site drilling supervisor and/or the task manager.

Comment No. 6:

Ground water sampling should be conducted quarterly for at least the first year to determine seasonal fluctuations and trends in the water quality data. the sampling program can be revised based on review of the first year's data.

Response:

We agree. Quarterly ground water sampling will be completed for one year.

Comment No. 9:

Should include Ammonia, COD, and TOC for ground water parameters on Page 3-2c.

Response:

TOC will be added to the list of analyses. We do not feel that Ammonia and COD analysis will provide enough additional information to be included in the laboratory program.

Comment No. 10:

Subsurface soil samples should be collected continuously in the till due to the depth of the waste pits and the heterogeneity of the soils.

Response:

Agree. Soil sampling will be continuous in the till.

Comment No. 11:

Shelby tube samples of the blue clay should be taken for permeability testing and USCS soil classification.

Response:

Shelby tube samples of the "blue clay" at the bottom of well borings 311, 334, and 338 will be collected for analysis.

PROPOSED DRILLING SCHEDULE

<u>WELL #</u>	<u>WELL #</u>
124	137
266	138
152	110
165	139
265	141
148	142
145	108
249	130
114	174
116	176
146	177
147	183
118	127
109	182
209	181
134	178
132	125
129	175
128	173
179	131
111	172
180?	104
135	

PROPOSED DRILLING SCHEDULEWELL #

124

• 266 August 18 - 21

152

165

265 August 24 - 28

148

145

249

114 August 31 - Sept. 4

116

146

147

118 Sept. 7 - 11

• 109

• 209

134

132 Sept. 14 - 18

129

128

179

111

180 Sept. 21 - 25

PROPOSED DRILLING SCHEDULEWELL #

135

137

138

110

139 Sept. 28 - Oct. 2

141

142

108

130

174 Oct. 5 - Oct. 9

176

177

183

127

182 Oct. 12 - Oct. 16

181

178

125

175

173 Oct. 19 - Oct. 23

131

172

104 Oct. 29 - Complete

FERNALD RI/FS
ENVIRONMENTAL, HEALTH, AND SAFETY PLAN
ADDENDUM

July 31, 1987

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APPENDICES

1.0 INTRODUCTION

The Feed Materials Production Center (FMPC) is a government owned contractor operated (GOCO) facility for the production of high purity uranium metal for the United States Department of Energy (DOE). The FMPC is operated by Westinghouse Materials Company of Ohio (WMCO) under prime contract with the DOE.

In accordance with a Federal Facility Compliance Agreement (FFCA) between DOE and the Environmental Protection Agency (EPA), a site-wide Remedial Investigation/Feasibility Study (RI/FS) is being conducted to determine the nature and extent of any release, or threat of release, of hazardous or radioactive substances, pollutants, or contaminants at or from the FMPC and to propose remedial actions. In order to meet these objectives the following seven tasks have been developed: radiation measurement, surface soil sampling, ground water sampling, subsurface soils sampling, surface water and sediment sampling, biological resources sampling, and facilities testing.

The RI/FS is being performed for DOE by Advanced Sciences, Inc. (ASI) under contract to the Small Business Administration. IT Corporation is the main subcontractor to ASI for the FMPC site-wide RI/FS.

The Environmental, Health, and Safety Plan (EHSP) and this addendum apply specifically to the RI/FS activities conducted by ASI and its subcontractors at the FMPC. The intent of the Environmental, Health, and Safety Program is to insure the health and safety of the workers and to comply with all applicable Federal, State, local, and DOE health and safety requirements.

3.0 SITE CONTROL

A site control program has been developed to control worker exposure to radioactive and hazardous materials and to prevent the spread of contamination. The FMPC site has been divided into three general work zones as shown in Figure 1. These work zones have been established based on worker exposure potential, established site control zones, and contamination control considerations.

Zone 1 is the FMPC Process Area. This area includes both the Production Area and the Waste Storage Area. Personnel access to the Process Area will be through the change rooms in the Service Building. Personnel entering the Process Area are required to change into WACO issued undergarments, coveralls, and boots. Showers, clothing change, and contamination monitoring are required when leaving the Process Area. Vehicle access to the Process Area will be through the South Gate. Vehicles leaving this Zone will be monitored for contamination. Eating, drinking, and smoking are only permitted in designated areas within this zone.

Zone 2 includes the fly ash piles, Paddy's Run, storm sewer outfall ditch, and the sewage treatment plant. These areas are outside of the security fence but within the site boundary. Access by RI/FS team members to these areas will be maintained administratively. Personnel working in these areas will be provided personnel protective equipment as required and will be monitored for contamination as they leave these areas.

Zone 3 includes the balance of the property within the FMPC site boundary and areas outside of the site (off site). Personnel protective equipment and personnel monitoring are not required for work in this zone. Personnel safety equipment, such as life vests when working on or near water, will be provided as needed. Area and job monitoring requirements will be determined by the Site Health and Safety Officer.

4.0 PERMISSIBLE EXPOSURE LIMIT GUIDELINES

For chemical exposures, the Threshold Limit Values (TLVs) for 1986 - 1987 adopted by the American Conference of Governmental Industrial Hygienists (ACGIH) will be followed. If no TLV has been established by the ACGIH for a material in question, other sources of permissible levels will be used. Other sources would include the National Institute of Occupational Safety and Health's (NIOSH) criteria documents, material safety data sheets as available, and toxicology textbooks. The Project Health and Safety Officer, or his representative will evaluate appropriate data and establish personnel protection requirements.

Radiation exposures will be maintained as-low-as-reasonably achievable within the standards prescribed in DOE Order 5480.1, Chapter XI, Requirements For Radiation Protection. The concentration guides given in Attachment 1, Table 1, Column 1, of the order will be used in evaluating the adequacy of health protection measures against airborne radioactivity in regulated areas.

Radiation protection standards for occupationally exposed persons and for members of the public are given in Tables 1 and 2, respectively.

5.0 SAFETY AND HEALTH RISK ANALYSIS

The RI/FS study area has been divided into three zones based on existing boundaries and exposure potential to radiological and chemical hazards. Zone 1, which includes the FMPC Production and Waste Storage Areas, represents the highest exposure potential to radioactive and hazardous materials. The principle radiation hazards within Zone 1 are from uranium, thorium, and their daughter products, although low-levels of other radioactive materials have been identified. These materials primarily represent an internal exposure hazard, that is, the primary hazard occurs when these materials enter into the body by inhalation, ingestion, or injection.

Inhalation of these materials can occur when the material becomes airborne, either through release of the material into the air from process stacks and vents, from storage areas, or by resuspension of contaminated soil or waste material. Sampling activities which generate airborne dusts have the potential for creating inhalation exposure hazards. When inhalation hazards exist or are suspected, respiratory protection and monitoring will be required.

Another route of entry of radioactive materials into the body is through the ingestion of contaminated food or drink or by transfer of radioactive materials to the mouth by way of contaminated hands. For these reasons eating, drinking, and smoking are only allowed within designated areas within Zone 1. As a minimum, the face and hands should be washed prior to eating after working in a potentially contaminated area.

Injection refers to the intake of radioactive material directly into the bloodstream and is usually associated with accident conditions. Intake by injection is not likely during this project.

Although the radioactive materials that may be found at the FMPC are primarily an internal exposure hazard, these materials also emit radiation that can present an external exposure hazard. However, results of previous site characterizations indicate that any external radiation exposure that results from RI/FS activities will be very small. External radiation dosimeters will be issued by WMCO to all personnel that have the potential to receive measurable radiation exposure. In addition, work inside the Process Area (Zone 1) will be covered by a WMCO issued RWP which includes an evaluation of worker exposure potential and required protective measures. The SHSO will review the RWP's to determine the need for additional protective measures or work restrictions.

Exposure to hazardous materials and chemicals is also possible in Zone 1. Process chemicals used on site include: anhydrous ammonia, anhydrous hydrofluoric acid, nitric acid, methanol, sulfuric acid, anhydrous hydrogen fluoride, potassium fluoride, ammonium, ammonium hydroxide, and sodium hydroxide. These materials are typically contained in diked pads or other controlled containment systems. Some other materials on site include trichloroethane, tributylphosphate (TBP), and kerosene - TBP mix. The greatest potential for exposure to hazardous materials will come during the subsurface soil and ground water monitoring program in the Waste Storage Area. Preliminary results from waste pit sample analysis have identified significant amounts of PCB's in Pit 1 samples. The principal hazardous constituents that have been identified in waste pit samples are chlorinated organic solvents. The drilling of the boreholes and monitoring wells will be continuously monitored for organic/inorganic chemical vapors and combustible gases using an HNu Photoionization Detector and combustible gas meter.

Zone 2 includes Paddy's Run, the storm sewer outfall ditch, fly ash piles, and the sewage treatment plant. This zone represents a lower exposure potential to radioactive and hazardous materials than Zone 1, although these materials have been identified in some of these areas. Personnel protective equipment and monitoring requirements will be based on an evaluation of the sampling/measurement task and a health protection survey of the area by the SHSO.

Zone 3 includes the balance of the RI/FS study area. Exposure to significant concentrations of radioactive and hazardous materials in this zone is highly unlikely.

In addition to the radiological and chemical hazards that may be encountered at the site, workers may be exposed to other types of hazards that are common at industrial facilities such as electrical hazards, working on or near water, flammable materials, working in or around heavy equipment, falling objects, and slip, trip, and fall hazards. The procedures and requirements that will be implemented to minimize the potential adverse effects from these hazards are described in the Environmental Health and Safety Plan.

Adverse climatic conditions are important considerations in planning and conducting site investigations. High ambient temperature can result in health effects ranging from transient heat fatigue, physical discomfort, reduced efficiency, personal injury, increased accident probability, etc. to serious illness or death. Heat stress is of particular concern when protective garments are worn, since these garments prevent evaporative body cooling. Wearing personal protective equipment puts a worker at considerable risk of developing heat stress. Because heat stress is probably one of the most common illnesses at sites, regular

monitoring and other preventative measures as described in the procedures will be conducted.

Since the RI/FS will extend into the winter months, employee exposure to cold must be considered. Exposure to cold can result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of fatal consequences. Procedures to evaluate and control cold stress will be followed.

5.1 RADIATION MEASUREMENT PLAN

Radiation measurements will be conducted to quantify surface radiation fields, develop exposure rate contours for selected areas, and to indicate sampling locations for biased surface soil sampling. Radiation measurements will occur primarily in Zones 1 and 2. In Zones 1 and 2 radiation measurement team members may be exposed to above background radiation levels and low level surface contamination. In addition, workers may come in contact with process and waste chemicals. All work in Zone 1 will be conducted under a WMCO issued Radiation Work Permit (RWP). The RWP, which will be reviewed by the SHSO, will include personnel and area monitoring requirements and protective clothing requirements. A complete clothing change, shower, and contamination monitoring is required when leaving the Process Area (Zone 1). Protective clothing, such as shoe covers, and monitoring requirements for work in Zone 2 will be specified by the SHSO.

5.2 SURFACE SOIL SAMPLING

Surface soil samples will be collected to determine the type and extent of contamination by hazardous chemicals and radioactive materials on or near the FMPC. Surface soil sampling will take place in all three zones. In Zones 1 and 2 sampling team members may be exposed to above background radiation levels and low level surface contamination. In addition, workers may come in contact with process and waste chemicals. Respiratory protection may be used in some areas in Zones 1 and 2 if significant generation of contaminated dust is expected. All work in Zone 1 will be conducted under a WMCO issued Radiation Work Permit (RWP). The RWP, which will be reviewed by the SHSO, will include personnel and area monitoring requirements and protective clothing requirements. A complete clothing change, shower, and contamination monitoring is required when leaving the Process Area. Protective equipment and monitoring requirements for sampling in Zone 2 will be specified by the SHSO.

5.3 GROUND WATER SAMPLING

The ground water sampling plan is designed to determine the effect that the facility operations and waste disposal practices have had on ground water. Drilling and well installation will occur in all three zones. In Zones 1 and 2 drillers and sampling team members may be exposed to above background radiation levels and low level surface contamination. In addition, workers may come in contact with process and waste chemicals. Drilling of the monitoring wells comprises the greatest potential exposure hazard during the ground water sampling program. Exposure to airborne contaminants as well as skin contact with hazardous materials is possible during drilling operations. Protective clothing and respiratory protective equipment requirements will be determined by the PHSO and/or SHSO based on monitoring results and analytical results as they become available. The highest level of protection expected for drilling operations is Level B, although most drilling is expected to occur at Level C or D. All work in Zone 1 will be conducted under a WMCO issued Radiation Work Permit (RWP). The RWP, which will be reviewed by the SHSO, will include personnel and area monitoring requirements and protective clothing requirements. A complete clothing change, shower, and contamination monitoring is required when leaving the Process Area.

Requirements for work in Zones 2 and 3 will be specified by the SHSO.

5.4 SUBSURFACE SOILS SAMPLING

The subsurface soils sampling plan is designed to determine the nature and extent of contamination of subsurface soils and the geochemical and geotechnical properties of the soils. The subsurface soil sampling program will be a part of the ground water monitoring well program in that samples will be collected during the well drilling operations. Drilling will occur in all three zones. In Zones 1 and 2 drillers and sampling team members may be exposed to above background radiation levels and low level surface contamination. In addition, workers may come in contact with process and waste chemicals. Drilling of the borings comprises the greatest potential exposure hazard during the subsurface soil sampling program. Exposure to airborne contaminants as well as skin contact with hazardous materials is possible during drilling operations. Protective clothing and respiratory protective equipment requirements will be determined by the PHSO and/or SHSO based on monitoring results and analytical results as they become available. The highest level of protection expected for drilling operations is Level B,

although most drilling is expected to occur at Level C or D. All work in Zone 1 will be conducted under a WMCO issued Radiation Work Permit (RWP). The RWP, which will be reviewed by the SHSO, will include personnel and area monitoring requirements and protective clothing requirements. A complete clothing change, shower, and contamination monitoring is required when leaving the Process Area.

The potential exists for exposure to chemical and radiological hazards in Zone 2. Monitoring and protective clothing requirements for sampling in this zone will be specified by the SHSO. Exposure to radiation and hazardous materials is not a concern when sampling in Zone 3.

5.5 SURFACE WATER AND SEDIMENT SAMPLING

The surface water and sediment sampling program is designed to determine the extent and distribution of radiological and chemical contamination in sediments, determine the presence and concentration of radionuclides in the Great Miami River, and to determine if the FMPC is a significant source of organics and selected inorganics to the Great Miami River. As in all other RI/FS sampling programs, samples will be collected in all three zones. In Zones 1 and 2 sampling team members may be exposed to above background radiation levels and low level surface contamination. In addition, workers may come in contact with process and waste chemicals. All work in this zone will be conducted under a WMCO issued Radiation Work Permit (RWP). The RWP, which will be reviewed by the SHSO, will include personnel and area monitoring requirements and protective clothing requirements. A complete clothing change, shower, and contamination monitoring is required when leaving the Process Area.

The potential exists for exposure to chemical and radiological hazards in Zone 2. Monitoring and protective clothing requirements for sampling in this zone will be specified by the SHSO. Exposure to radiation and hazardous materials is not a concern when sampling in Zone 3.

5.6 BIOLOGICAL RESOURCES SAMPLING

Samples of agricultural products, garden produce, terrestrial and aquatic organisms on or near the FMPC will be collected and analyzed to identify the pathways by which humans may be exposed to hazardous, toxic, or radioactive substances and to determine the effects to the area ecosystem. Sample sites will be located in all three Zones.

Vegetation and terrestrial and aquatic organism sampling will occur in all three zones. Garden produce and agricultural crop samples will only be collected in Zone 3. In Zone 1 sampling team members may be exposed to above background radiation levels and low level surface contamination. In addition, workers may come in contact with process and waste chemicals. All work in this zone, including vegetation sampling, will be conducted under a WMCO issued Radiation Work Permit (RWP). The RWP, which will be reviewed by the SHSO, will include personnel and area monitoring requirements and protective clothing requirements. A complete clothing change, shower, and contamination monitoring is required when leaving the Process Area.

The potential exists for exposure to chemical and radiological hazards in Zone 2. Monitoring and protective clothing requirements for sampling in this zone will be specified by the SHSO. Exposure to radiation and hazardous materials is not a concern when sampling in Zone 3.

Biological resources sampling team members may be exposed to hazards from wildlife and water. The potential exists for being bitten or stung while collecting samples, therefore gloves will be worn when handling wildlife and first aid kits will be available at the sampling sites. Sampling team members in boats or on banks near deep water are required to wear life vests.

5.7 FACILITIES TESTING

The facilities testing program is designed to determine if leakage has occurred from facilities which might potentially release hazardous materials. The facilities to be tested include underground storage tanks in the Production Area (Zone 1) and the Main Effluent Line. As with all work in Zone 1 sampling team members may be exposed to above background radiation levels, low level surface contamination, and process and waste chemicals. All work in this zone will be conducted under a WMCO issued Radiation Work Permit (RWP) which will be reviewed by the SHSO. A complete clothing change, shower, and contamination monitoring is required when leaving the Process Area.

In the event that tank entry is deemed necessary, confined space entry procedures will be adhered to strictly. Procedures for confined space entry-industrial and confined space entry-leaded product will be included in the Field Procedures Manual.

6.0 TRAINING

All RI/FS team member will receive forty hours of off-site training and a minimum of 3 days of actual field experience under the direct supervision of a trained and experienced supervisor. The training program is designed to meet the requirements of OSHA 1910.120. The training program will include safe work practices, protective clothing and equipment, site health and safety plan, decontamination, safe drum handling, respirator program requirements, hazard assessment, toxic hazards, flammable hazards, and emergency procedures.

WMCO requires Radiation Worker Training for all persons engaged in activities within the production area. In addition, a site specific training course will be conducted which covers names of key personnel, emergency procedures, site control, personnel protective equipment, safe work practices, site specific health and safety requirements, radiation work permits, safety and health hazards at the site, medical surveillance requirements, and monitoring.

Tailgate safety meetings will be conducted at the beginning of each shift or when new workers arrive on the site. The purpose of these meetings is to discuss the day's activities, review protective equipment and monitoring requirements, review the hazards that may be encountered, and review emergency procedures.

The above training must be verified and documented by the Project or Site Health & Safety Officer before team members will be allowed to start work on site.

7.0 PERSONNEL PROTECTIVE EQUIPMENT

Personnel protective equipment (PPE) refers to the protective clothing and equipment used to protect individuals from chemical and physical hazards which may be encountered at the site. As a minimum, WMCO requires a complete clothing change, safety glasses, and safety shoes for work in the Process Area (Zone 1). In addition to the standard clothing issued by WMCO, protective clothing and equipment will be provided to team members based on the hazards expected for specific operations and areas. The types of protective equipment used may range from fully encapsulating chemical resistant suits with supplied air respirators for emergency response, to basic work clothes, such as coveralls and safety shoes, for sample collection in Zone 3. The type of protective equipment selected will be based on the type of operation, area in which the sampling takes place, monitoring results, and chemical and/or radioactive hazards involved. In any case, the equipment selected will be designed to protect the employee from the hazard involved.

As mentioned in the Safety and Health Risk Analysis section, the primary exposure hazards are from airborne uranium, thorium, and their decay products, and from skin contact with chlorinated organic solvents. Respiratory protection for these airborne radionuclides can be achieved through the use of full-face air purifying respirators with high efficiency particulate air (HEPA) cartridges. If concentrations of organic vapors, as measured with the HNu, are above background but less than 10 ppm, full-face air purifying respirators with organic vapor and HEPA cartridges will be used. When skin contact with organic solvents is likely, protection will be achieved using polyethylene coated Tyvek and chemical resistant boots and gloves.

If higher levels of protection are deemed necessary, for example, if the concentration of organic vapors in the workers breathing zone exceeds 10 ppm as measured with the HNu, then positive pressure supplied air respirators will be required. Operations will be suspended if concentrations exceed 100 ppm. Since some of the suspected contaminants cannot be measured with the HNu, the PPE requirements will also be based on traditional industrial hygiene monitoring techniques.

Based on current information, the following protective equipment is prescribed for the sampling and measurement tasks as given below.

7.1 RADIATION MEASUREMENT PLAN

The following personnel protective equipment, as a minimum, is required for making radiation measurements in Zone 1:

- Hard hats
- Safety glasses
- Safety shoes
- Coveralls (supplied by WMCO)

The PPE required for radiation measurements made in Zone 2 may include:

- Coveralls or other work clothes
- Work shoes
- Boot covers

7.2 SURFACE SOIL SAMPLING

Surface soil samples will be collected within the FMPC site and off site where vegetation samples are collected. If significant generation of contaminated dust is expected respiratory protection may be used in Zones 1 and 2. However, under normal conditions, respiratory protection will not be used.

Sampling within Zone 1 will require:

- Hard hats
- Safety glasses
- Safety shoes
- Coveralls (supplied by WMCO)
- Gloves (cotton, leather, or chemical resistant)
- Air-purifying respirator with HEPA canister (possible)

7.3 GROUND WATER SAMPLING

Drilling of the monitoring wells comprises the greatest potential hazard during the ground water sampling program. Based on currently available information, Level B protective clothing may be required for certain on-site drilling locations.

Supplied-air respirator (airline, pressure demand)
Coated Tyvek coveralls, hooded (polyethylene or saranex)
Gloves (outer), chemical-resistant (nitrile or viton)
Gloves (inner), chemical-resistant (latex)
Boots (outer), chemical-resistant (PVC or neoprene)
Boot covers (outer), disposable (latex)

Sampling ground water will usually require chemical resistant gloves and coveralls as described above.

7.4 SUBSURFACE SOILS SAMPLING

Equipment requirements similar to ground water sampling. Level B is the highest level expected although sampling could occur at Level C or D.

7.5 SURFACE WATER AND SEDIMENT

In addition to the WMC0 clothing requirements, the following protective equipment is required for sampling in Zones 1 and 2:

Tyvek coveralls
Chemical-resistant gloves (Nitrile or Viton)
Chemical-resistant overboots (latex)

7.6 BIOLOGICAL RESOURCES SAMPLING

WMCO issued clothing is required in Zone 1. In addition the following protective equipment is required as appropriate:

- Waders
- Life jackets
- Leather gloves

7.7 FACILITIES TESTING

Additional protective equipment requirements will be specified if tank entry is deemed necessary.

- Hard hats
- Safety glasses
- Safety shoes
- Coveralls (supplied by WMCO)

8.0 MEDICAL SURVEILLANCE

All ASI/IT personnel who perform sampling or site characterization activities for the Fernald RI/FS are required to participate in an annual medical examination. The objective of the medical monitoring program is to determine the physical and emotional fitness of employees who work while wearing respiratory protection, who are exposed routinely to hazardous substances, and whose duties involve heat and physical stress. Only those employees who have been determined to be physically capable for work by an occupational physician will be allowed to perform sampling or site characterization activities. All employees who are required to wear respiratory protection devices must be medically approved and fit tested. Documentation of medical approval must be on file with the Project Health and Safety Officer prior to initial on site activities.

Exit physical examinations will be provided for employees who leave the project by resignation, termination, layoff, or at the project end. The Project Health and Safety Officer will determine the need for exit physical examinations based upon, among other factors, the nature of the individual's job assignment, monitoring results, and time since the last physical exam.

9.0 MONITORING METHODS AND EQUIPMENT

A health physics and industrial hygiene monitoring program will be conducted for the duration of the RI/FS. The components of the monitoring program include: external radiation monitoring, radioactive contamination monitoring, air monitoring for radioactive and chemical contaminants, sound level monitoring, and bioassay. The results of the monitoring program will be used to dictate protective equipment requirements, evaluate employee exposure control measures, and to determine potential employee exposure to radiation and hazardous materials.

The monitoring methods, frequency, and equipment used will depend on the type of sampling/measurement activity and the zone in which the activity takes place. For example, in Zone 1, WMCO procedures and equipment, as a minimum, will be used for personnel radiation contamination monitoring when exiting this area. Persons working in Zone 1 will wear WMCO issued coveralls and boots while in the area and will shower before leaving. All personnel are required to monitor themselves for radioactive contamination with WMCO's monitoring equipment before leaving the change room. Additional personnel radiation contamination monitoring may be required by the SHSO for certain areas and tasks within Zone 1.

The components of the Health Physics and Industrial Hygiene monitoring program are given below.

External Radiation Monitoring - All members of the RI/FS sampling/measurement teams that work in Zone 1 will be issued radiation dosimeters which are read monthly. The PHSO will review and maintain copies of dosimeter results and will issue a monthly dosimeter report. In addition to personnel dosimeters, the SHSO will routinely survey work areas to measure external radiation fields. Work restrictions and personnel monitoring requirements will be based on survey results.

Radioactive Contamination Monitoring - All personnel leaving Zone 1 will be required to monitor themselves for radioactive contamination using the hand and foot monitors and friskers available at the exit points. All equipment and vehicles leaving Zone 1 must be monitored for contamination. Additional personnel and equipment contamination monitoring may be required by the SHSO for exclusion zones established within Zone 1. Personnel and equipment monitoring requirements for work in Zone 2 will be established by the SHSO. Surface Radioactivity Guides from ANSI Draft Standard N13.12 or FMPC Surface Contamination Limits, whichever is most restrictive, will serve as release levels.

Air Monitoring - Air monitoring will be performed during certain tasks in the work area and in the workers breathing zone for radioactive particulates, combustible gases, and chemical vapors. Radioactive particulate monitoring will be performed using personal sampling pumps and glass fiber filters. The filters will be screened in the field laboratory. Drilling operations will be monitored using an HNu Photoionization Detector and a combustible gas meter. When a change in airborne chemical vapors is detected with the HNu or when measured concentrations of combustible gases exceed 10 percent of the lower explosive limit (LEL), operations should be suspended and the SHSO should be notified. Since the HNu is not sensitive to several of the suspected contaminants, traditional industrial hygiene monitoring techniques will be used to assess employee exposure and will serve as an additional basis for modifying levels of protection.

Sound Level Monitoring - Employee exposure to sound will be monitored using a sound level meter which meets the requirements of the American National Standard Specification for Sound Level Meters, S1.4, Type S2A. Hearing protection devices will be provided whenever employee noise exposures equal or exceed an 8-hour, time-weighted average sound level of 85 dBA.

Bioassay - The bioassay program provides for monitoring of internal deposition of radioactive material. All site personnel who enter and work in contaminated areas will submit a baseline bioassay sample and will be evaluated at intervals deemed appropriate by the PHSO. Instructions for bioassay will be given during the Site Health and Safety Training. Action levels and a more complete discussion of this activity are given in the Environmental Health and Safety Plan.

The monitoring equipment needed for this project will include, but is not limited to, Pancake G-M Detectors, H-Nu Organic Vapor Detector, Alpha Scintillation Detector, Sound Level Meter, Exposure Rate Meter, Combustible Gas Meter, and traditional industrial hygiene monitoring equipment (portable sampling pumps, and collection media, etc.)

The general procedure to be followed for monitoring and controlling the health & safety of each task on this project will be as follows. The supervisor or team leader should inform the SHSO of work plans well in advance so that radiation work permits and prework surveys of the work areas can be completed and documented before work begins. After the prework survey the SHSO and the task supervisor will discuss the findings of the survey

and any other possible hazards. A monitoring and safety outline will be put in place for each specific job and area. This outline is subject to change as conditions change and as monitoring results become available.

The monitoring methods and equipment for each task is given below.

9.1 RADIATION MEASUREMENT

Monitoring for the radiation measurement task will include external radiation monitoring and contamination monitoring when leaving Zone 1. In Zone 2, the task supervisor will be responsible to see that his workers monitor themselves for contamination with the equipment provided. Contamination monitoring is not required in Zone 3, however, the SHSO will perform spot checks on a regular basis.

9.2 SURFACE SOIL SAMPLING

The general requirements for personnel radiation monitoring and exit contamination monitoring in Zone 1 will apply. If respiratory protection is indicated, personal breathing zone samplers will be used. Workers will be required to submit bioassay samples if exposure to airborne radionuclides approaches or exceeds 25 percent of the maximum permissible time-weighted exposure. In Zone 2 the task supervisor will be responsible to see that his workers monitor themselves for contamination with the equipment provided. Contamination monitoring is not required in Zone 3, however, the SHSO will perform spot checks on a regular basis.

9.3 GROUND WATER SAMPLING

Zone 1 general monitoring requirements will apply. Before actual samples are taken from ground water wells an HNu will be used to determine if there is any need for respiratory equipment. Once the sample has been taken, the container will be checked for radioactive contamination by using a G-M pancake detector. If the container is contaminated it will be wiped with disposable towels and wrapped in a plastic bag, all tools and equipment used to collect the sample will be wrapped in plastic until they can be decontaminated. All gloves and disposable towels will be placed in a plastic bag to be disposed of according to WMCO's procedure.

9.4 SUBSURFACE SOIL SAMPLING AND WELL DRILLING

As mentioned in the introduction, WMCO personal monitoring equipment and shower facilities will be used for entering and exiting Zone 1. In all other areas the person assigned to do the task monitoring, as described below, will also be responsible for personnel contamination monitoring.

In Zones 1 & 2 continuous monitoring will be done for organic vapors, combustible gases, and radioactive contamination. In areas where the potential for exposure to radioactive materials and hazardous chemicals is considered to be probable, the monitoring will be done by the SHSO or a designated technician. Other areas will be monitored by the geologist. Sound levels will be measured around drilling equipment or any other equipment that may cause hearing impairment to determine if hearing protection is needed.

In Zone 3 the monitoring will be done by the geologist at routine intervals and after completion of the drilling.

9.5 SURFACE WATER & SEDIMENT SAMPLING

As mentioned in the introduction, WMCO's monitoring equipment and shower facility, as a minimum, will be used in Zone 1. Additional monitoring requirements will be determined by the SHSO. In Zone 2 the task supervisor will be responsible to see that his workers monitor themselves with the equipment provided. Zone 3 should only require spot checking unless routine monitoring is deemed necessary by the SHSO.

9.6 BIOLOGICAL SAMPLING

Personnel radiation and contamination monitoring, as a minimum is required in Zone 1. Requirements for additional monitoring will be established by the SHSO. In zone 2, the task supervisor will be responsible to see that the workers monitor themselves with the equipment provided. Routine contamination monitoring for work in Zone 3 is not required.

10.0 DECONTAMINATION

Personnel working in Zone 1 are required to wear WMCO issued clothing and work boots. In addition, safety glasses, gloves, and hard hats may be required. Personnel leaving Zone 1 are required to shower and monitor themselves for radioactive contamination. Exclusion zones may be established within Zone 1 at drilling sites or at other sample locations if necessary. When exclusion zones are established and additional protective clothing is required, decon stations will be established at the exit points to these areas. It is important to remember that Zone 1 is considered a contamination area and that final personnel decontamination will occur at the exit point from this zone. Decontamination areas established at exclusion zone exits are designed to prevent the spread of gross chemical and radiological contamination from the exclusion zone and to reduce employee exposure to these materials. Materials and equipment used in Zone 1 will be decontaminated at an established FMPC decon area.

Decontamination stations for Zone 2 will be set up in areas where exclusion zones are established and protective clothing is used. These Decon areas will be designed to suit the specific need of each task. Persons involved in doing the actual decontamination will generally be dressed in protective clothing one level below what the exclusion zone workers are in. All decontamination materials (liquids and solids) must be contained and stored in drums with proper labels and all other pertinent information. Since this will require considerable space and money, all efforts will be made to keep the volume of these materials to a minimum. Further information on decontamination can be found in the Environmental Health and Safety Plan.

11.0 GENERAL SAFETY REQUIREMENTS

The following general safety requirements will be followed in order to minimize the occurrence and potential adverse effects of unsafe or hazardous conditions at the site:

Contaminated protective equipment, such as respirators, hoses, boots, etc., shall not be removed from the regulated area unless it is properly packaged and labeled.

Legible and understandable precautionary labels shall be affixed prominently to containers of contaminated scrap, waste, debris, and clothing.

Contaminated materials shall be stored in tightly closed containers in well-ventilated areas.

Removal of contaminated particulates from protective clothing or equipment by blowing, shaking, or any other means which disperses contaminants into the air is prohibited.

No food or beverages shall be present or consumed in Zones 1 and 2 except in designated break areas.

No tobacco products shall be present or used, and cosmetics shall not be applied in Zones 1 and 2 except in designated break areas.

Personnel on site shall use the "buddy" system. Buddies should prearrange hand signals for communication. Communication or visual contact shall be maintained between crew members at all times.

Team members must observe each other for signs of toxic exposure. Indications of adverse effects include, but are not limited to:

1. Changes in complexion and skin discoloration
2. Changes in coordination
3. Changes in demeanor (behavior)
4. Excessive salivation and pupillary response.
5. Changes in speech pattern.

Team members should inform each other of nonvisual effects of toxic exposure such as:

1. Headaches
2. Dizziness
3. Nausea
4. Blurred vision
5. Cramps
6. Irritation of eyes, skin, or respiratory tract.

All air cylinders placed on heavy equipment for use by the operator shall be well secured in a bracket which is bolted or welded to the unit.

Prompt remedial action shall be taken whenever an inadvertent release of a hazardous material occurs.

Appropriate action to provide secure footing shall be taken at all location where personnel will be working.

Change rooms and shower facilities will be provided for the use of employees working in Zone 1.

As appropriate, equipment on site shall be bonded and grounded, spark proof, and explosion resistant.

A sufficient number of fire extinguishers, with a minimum rating of 10B:C, shall be strategically located throughout the areas where active work is progressing. Fire extinguishers shall be available on all vehicles used on site or for sample collection (e.g., boats, drill rigs, etc.)

All personnel shall avoid contact with potentially contaminated substances. Walking through puddles or mud, kneeling on the ground, or leaning against drums should be avoided whenever possible.

Monitoring equipment shall not be placed on potentially contaminated surfaces.

In addition to the above, health and safety requirements of the FMPC must be followed. These requirements are found in Appendix 1.

12.0 HAZARD COMMUNICATION & MATERIAL SAFETY DATA SHEETS

A hazard communication program will be in place for the duration of the project that will be in compliance with Federal and State regulations. The purpose of this program is to provide information and training to the workers who either work with or around hazardous materials. This includes such information as types of materials and their hazards. If any employee has a question about a hazardous substance that is associated with their task, they can request a Material Safety Data Sheet (MSDS) for that substance which will describe all of the hazards and physical characteristics of the substance and precautions for safe handling and use.

To make a request for a MSDS an employee must fill out an Employee Request for MSDS and either bring it to the SHSO or the PHSO, or they can mail it to the Project Health and Safety Office.

For this project a properly completed MSDS will be required for all substances before they can be brought on site. These sheets will be kept on file at the Site Health and Safety Office.

13.0 EMERGENCY RESPONSE

In the event of an emergency or an accident, such as an injury/illness or fire, the following procedures will be followed:

Emergency procedures must be initiated by the first person recognizing the emergency situation.

Telephones or radios must be located in the area of each team.

The WMCO Communication Center must be notified immediately at (513) 738-6511. If a telephone is not available in the area, the SHSO, his designee, or the team leader must be notified and he will in turn notify the WMCO Communication Center.

The person reporting the emergency should provide the following information to the Communications Center

- (1) Location
- (2) Nature of emergency
- (3) Action already taken.

After the emergency team has been dispatched the SHSO or other team member will then contact:

- (1) Steve Wentzel, "WMCO Emergency Preparedness"
(513) 738-6802
- (2) Rick Greene, "Project Health & Safety Officer"
(615) 482-9707
- (3) Dick Wilde, "Project Manager, ASI"
(513) 738-3100 or (615) 483-1274
- (4) Bob Lenyk, "Site Manager, ASI"
(513) 738-3100

In case of accident or injury, the supervisor must fill out a "Supervisors Employee Injury Report" and give it to the SHSO.

Appendix 2 contains a listing of all FMPC Plant Emergency Alarm System coded alarms and their respective designations.

TABLE 1
OCCUPATIONAL RADIATION EXPOSURE STANDARDS (a)

<u>Type of Exposure</u>	<u>Exposure Period</u>	<u>Dose Equivalent (Dose or Dose Commitment^(b) in rem)</u>
Whole body, head and trunk, gonads, lens of the eye (c), red bone marrow, active blood-forming organs	Year	5
	Calendar Quarter	3
Unlimited areas of the skin (except hands and forearms). Other organs, tissues, and organ systems (except bone).	Year	15
	Calendar Quarter	5
Bone	Year	30
	Calendar Quarter	10
Forearms	Year	30
	Calendar Quarter	10
Hands	Year	75
	Calendar Quarter	25

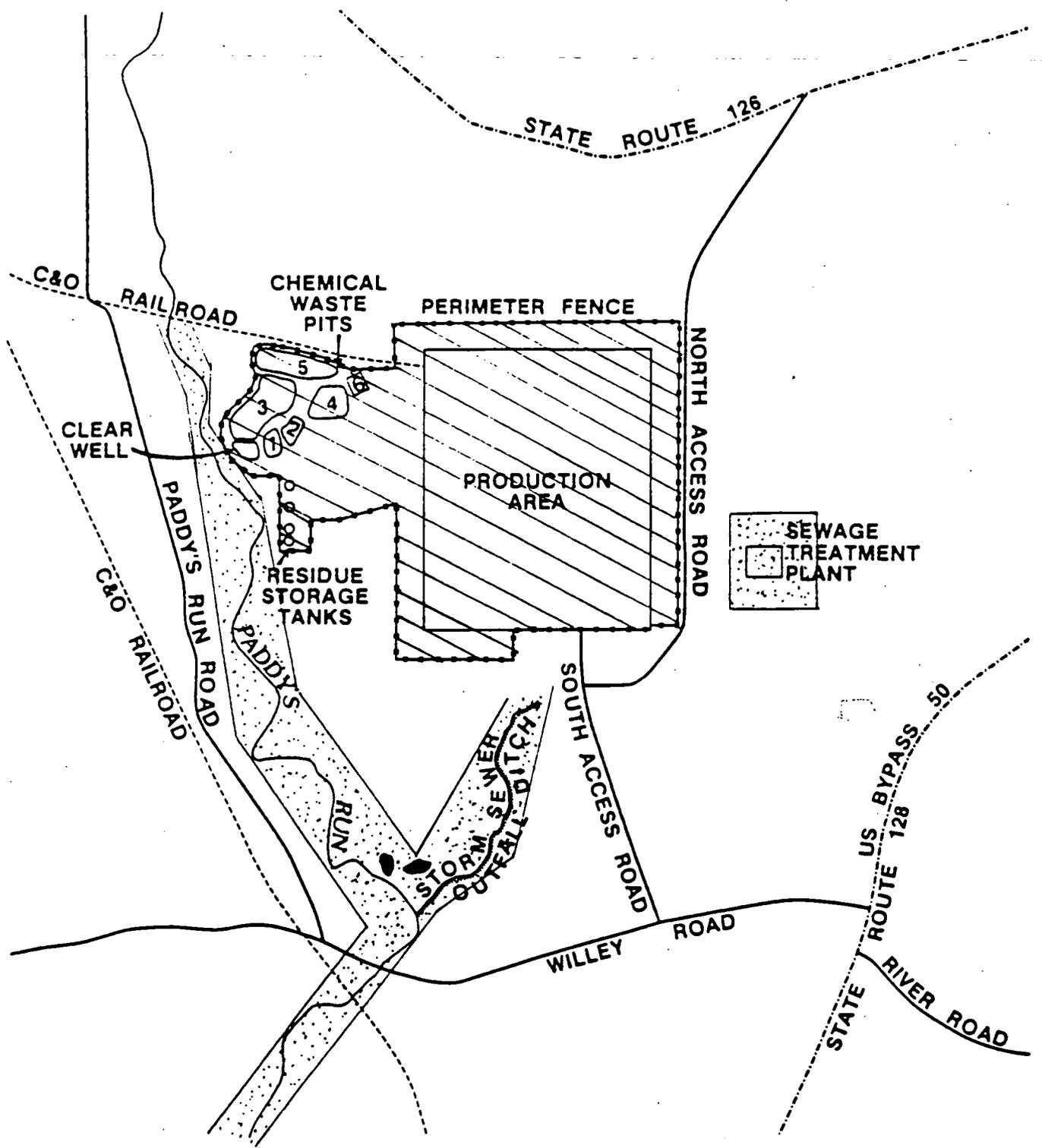
- (a) From DOE Order 5480.1A
- (b) To meet the above dose commitment standards, operations must be conducted in such a manner that it would be unlikely that an individual would assimilate in a critical organ by inhalation, ingestion, or absorption, a quantity of radionuclide or mixture of radionuclides that would commit the individual to an organ dose that exceeds the limits specified in the above table. Dose commitment is defined as the dose equivalent (rem) received by specific organs during a period of one calendar year, that was the result of radionuclide uptakes by a person occupationally exposed.
- (c) A beta exposure below a maximum energy of 700 KeV will not penetrate to the lens of the eye; therefore, the applicable limit for these energies would be that for the skin (15 rem/yr).

TABLE 2
 EXPOSURE OF INDIVIDUALS AND POPULATION
 GROUPS IN UNCONTROLLED AREAS (a)

Type of Exposure	Annual Dose Equivalent or Dose Commitment (b)	
	Based on dose to individuals at points of maximum probable exposure (rem)	Based on Average Dose to a suitable sample of the exposed population (rem)
Whole body, gonads, or bone marrow	0.5	0.17
Other organs	1.5	0.5

(a) From DOE Order 5480.1A

(b) In keeping with DOE policy on lowest practicable exposures, exposure to the public shall be limited to as small a fraction of the respective annual dose limits as is reasonably achievable. Dose commitment is defined as the dose equivalent (rem) received by specific organs during a period of one calendar year, that was the result of radionuclide uptakes by a person.



-  Zone 1
-  Zone 2
-  Zone 3

Site Control Zones

PREPARED IN 1961

APPENDIX 1

PRECONSTRUCTION CONFERENCE
SUBCONTRACTOR HEALTH & SAFETY REQUIREMENTS

Conference Date: 6-17-87

SUBCONTRACTOR: ASI
CONTRACT(S):
LOCATION(S): FMPC
OPERATION(S): Sampling and characterization of Environment

TENTATIVE START DATE: 7-1-87 ENDING: 9-30-88
NUMBER OF EMPLOYEES: 4-16
WMCO PROJECT ENGINEER: D. J. Carr
SUBCONTRACTOR SITE MANAGER: B. Lenyk

This information is provided as a convenience to the subcontractor in highlighting the health and safety requirements at the FMPC. All work at the FMPC shall be performed in accordance with the safety health requirements and programs of the U. S. Department of Energy (DOE), the U. S. Department of Labor (OSHA), the National Fire Protection Association (NFPA), and Westinghouse Materials Company of Ohio (WMCO).

SAFETY AND FIRE PROTECTION REQUIREMENTS

Prior to the commencement of any construction activity, the subcontractor shall submit an accident prevention program for the specific contracted work, implementing in detail the pertinent requirements of the safety standards referenced herein.

All subcontractors' equipment and tools will be inspected by WMCO Fire & Safety personnel prior to entry into the FMPC and throughout the course of the work activities. Equipment which fails to meet the safety requirements herein referenced, will not be permitted on the site.

All injuries shall be reported to the WMCO Medical facility as soon as is practical following the injury.

Safety glasses, hard hats, and leather safety shoes are required to be worn by all persons engaged in the construction activity.

Safety glasses, hard hats, and a complete clothing change-out, including company issued safety shoes, are required for all work within the process area. A shower is required prior to leaving the process area.

Safety glasses, hard hats, shoe covers, and smocks are to be worn by all non-manual personnel within the process area, provided they do not actively engage in any manual work activity. Otherwise a complete clothing change-out with shower is required.

All pockets are to be emptied prior to discarding soiled process area clothing. Used razor blades or other sharp objects shall be deposited in the containers provided in the change rooms.

Subcontractors shall not move any plant materials or equipment without the prior permission of the local production supervisor and/or the WMC0 Project Engineer.

All employes are to immediately leave the building upon activation of localized evacuation alarms.

INDUSTRIAL HYGIENE REQUIREMENTS

1. Hearing Conservation Program:

Purpose - to prevent hearing loss from prolonged loud noise exposure.

Hearing protection (muff or plug type) must be worn by employes exposed to noise levels exceeding 90 dba; e.g., grinding wheels, jackhammers, air compressors, sandblasting, etc.

2. Respiratory Protection Program:

Purpose - to prevent acute and chronic adverse health effects from excessive inhalation of chemical and radioactive airborne contaminants.

Respirators shall be used in accordance with a minimally acceptable respiratory protection program according to OSHA standards, 29CFR1910.134, including medical evaluations, training, and fit-testing of employes who will use respirators.

Only NIOSH-approved respirators will be used.

Airline respirators will be supplied with air from a breathing air quality compressor or by FMPC instrument air. Unknown subcontractor compressors will be checked for air quality.

Approved respirators are required for welding, spray painting, or dusty operations which exceed the OSHA limits for airborne contaminants. Approved respirators are required for certain spraying and cleaning operations.

3. Confined Spaces:

Purpose - to prevent accidents and injuries resulting from working in confined spaces, where dangerous atmospheres or insufficient oxygen may be present.

A completed Access Permit, listing the appropriate work requirements, is required prior to all work in a confined space.

A safety attendant is to be stationed at the opening of any manhole while a worker is in the manhole.

Safety glasses with side shields or cover goggles are required during any operation, manual or with powered equipment, which produces dust or possible flying particles, e.g. chipping, grinding, sawing, etc.

Cover goggles or full face shield and acid resistant gloves are required when handling or working around acids or caustic solutions.

All safety belts and harnesses must conform to DOE/OSHA 29CFR1926.104 including having an inspection and the attachment of a current certification tag.

A completed Access Permit, listing the appropriate work requirements, is required prior to beginning any work in a confined space.

The transporting of personnel in the beds of pick-up trucks or other motor vehicles is prohibited unless such vehicles is provided with fixed seating as required by DOE/OSHA.

All ladders, scaffolds, man lifts, and other elevated work platforms shall be used in accordance with DOE/OSHA 29CFR1926, Subparts L and N.

Ground Fault Circuit Interrupters (GFCI's) are required on all 15 and 20 amp electrical equipment used outside of buildings or in damp places.

The work area shall be completely roped off from other plant areas. The use of yellow "CAUTION" tape is permitted. All markings and/or barricades shall be maintained at an appropriate height to provide adequate warning of hazards.

Open fires are prohibited at the FMPC.

Flammable or combustible liquids with a flash point of 140° F. or less (i.e., gasoline, diesel fuel, solvents, etc.) shall be handled in approved safety cans with operable flame arrestor. All safety cans shall be properly marked with the name of the liquid contents.

All areas where flammable liquids are stored or paints are mixed shall have "NO SMOKING" signs posted and no one is to smoke in the posted areas.

Liquified Petroleum Gas (i.e., propane, butane, MAPP, etc.) shall not be stored inside any FMPC building.

All compressed gas cylinders are to be stored and transported in an approved rack or otherwise securely supported in an upright position.

Subcontractors shall provide suitable approved portable fire extinguishers for all work and storage areas which are not considered a part of the permanent facility.

A completed FMPC flame permit is required for all cutting, welding, and burning operations.

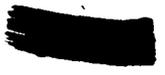
The storage of combustible materials shall be kept at least 50 feet from any building or structure.

4. Hazard Communication:

Purpose - to ensure that employe awareness of any physical or chemical hazards associated with chemicals or chemical mixtures, which they may use or potentially be exposed to in a foreseeable emergency, and that the proper protection form exposure is utilized. This includes materials such as paints, solvents, cleaners, adhesives, etc.

All materials considered hazardous under 29 CFR 1910.1200 ("Hazard Communication Standard") must be properly labelled. This includes all containers into which a hazardous material has been transferred.

Material Safety Data Sheets (MSDS) for all materials used by the subcontractor and considered to be hazardous shall be submitted to the IH Department for at least one week prior to the materials' arrival at the FMPC.



APPENDIX 2



<u>Code</u>	<u>Designation</u>	<u>Description</u>
4-4-4	Supervisory Alert Signal	This signal is used when important information not of a disaster nature (e.g., notice to evacuate plants in the event of an emergency other than air attack, important weather information, and notice of practice drills) is to be transmitted over the emergency message system.
4-1-1	CO Alert	This signal will be sounded when an alarm is received in the Communications Office that there is an elevated amount of carbon monoxide (CO) in the instrument air supply system. Air line respirator usage should be discontinued at once. This signal will be sounded at 4 hour intervals and at the beginning of each shift until the all clear is sounded.
3-3-3	All Clear Signal	This signal is used to indicate that a state of emergency has been terminated. It will also be used after a CO alert and after practice drills to indicate it is safe to return to the work area.
2-2-2	Test Signal	This signal is used to indicate that a test is being performed on the fire alarm system. It is routinely sounded at 0200, 1400, and 2100 hours each Monday.
1-1-1	Ambulance Alarm Signal	This signal is used in conjunction with the local ambulance alarm to indicate that there has been a request for emergency medical services. The Emergency Response Team Leader and/or the Fire and Safety Inspector will be notified by radio of the location.

Coded Alarm Designations

<u>Code</u>	<u>Designation</u>	<u>Description</u>
9-9-9	Disaster Signal	<p>This signal is used under the following circumstances and will be followed by an announcement over the emergency message system:</p> <ol style="list-style-type: none"> 1) A report is received that any emergency condition of disaster proportions exists in the plant (e.g., fire out of control, major fume release). 2) A radiation detector in the radiation detection alarm (RDA) system is activated.
8-8-8	Take Cover Signal	<p>This signal will be sounded only when an enemy air attack is imminent and there is not sufficient time to evacuate personnel. It will be accompanied by a <u>series of intermittent, five-second blasts</u> from the Boiler Plant steam whistle.</p>
7-7-7	Tornado	<p>This signal will be sounded on the sighting of a funnel cloud in the immediate vicinity of the FMPC. Personnel should take immediate cover.</p>
6-6-6	General Plant Evacuation Signal	<p>This signal will be sounded <u>only</u> upon authorization of the Emergency Duty Officer (EDO) when personnel are to evacuate the plant. When the Emergency Duty Officer is not present, this function will be performed by the Emergency Response Team Leader. It will be accompanied by a <u>steady continuous blast</u> from the Boiler Plant steam whistle.</p>
5-5-5	Fire Alarm Signal	<p>This signal is used to indicate that a fire alarm has been received in the Communications Office. The Emergency Response Team or other necessary personnel will be notified of the location via radio.</p>