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OPERABLE UNIT 3 WORK PLAN ADDENDUM COMMENT RESPONSE PACKAGE

DOE-FN/EPA

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REPORT

4245

OPERABLE UNIT 3

REMEDIAL INVESTIGATION and FEASIBILITY STUDY

WORK PLAN ADDENDUM

COMMENT RESPONSE PACKAGE

MARCH 1993

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

U.S. DEPARTMENT OF ENERGY
FERNALD FIELD OFFICE

Introduction

This document has been prepared in response to USEPA and Ohio EPA (OEPA) comments provided for the December 18, 1992 submittal of the Draft Final revision of the Operable Unit 3 RI/FS Work Plan Addendum (WPA). Additional information requirements of the USEPA and the OEPA, based on the discussions of the February 18, 1993 Chicago meeting between DOE, USEPA, OEPA, and FERMCO have also been addressed, to facilitate obtaining approval for the document prior to a complete republication effort. In the interest of maintaining a continuity for all of the Operable Unit 3 project documents associated with the RI/FS and Proposed Plan for Interim Action, all comment responses and information summaries have been packaged within this single submittal. The submittal includes the following specific sections following the respective tabs:

Section 1	USEPA RI/FS Work Plan Addendum Comments and DOE Comment Responses
Section 2	OEPA RI/FS Work Plan Addendum Comments and DOE Comment Responses
Section 3	RI/FS Work Plan Addendum Major Changed Pages
Section 4	Revised Field Work Package (FWP) Example
Section 5	Impacts to the RI/FS WPA Resulting from the Proposed Plan for Interim Action
Section 6	OU3 RI/FS WPA Procedures

Each subject section includes background and summary information as an introduction to the subject matter.

Section 1 USEPA RI/FS WPA Comments and DOE Comment Responses

The following section includes a reiteration of the USEPA comments with corresponding comment responses proposed by DOE. Each comment response also includes a reference to the number of the revised pages from the December 18, 1992 submittal of the RI/FS WPA. The comment responses reflect the discussions held between USEPA, OEPA, USDOE, and FERMCO on February 18, 1993.

Responses to General USEPA Comments on the OU3 Remedial Investigation Work Plan Addendum

Comment #1

The discussion in Section 2.3.5 should be updated to reflect the current Department of Energy (DOE) understanding of the geology and hydrogeology of the glacial overburden.

Response #1 (see attached pages 2-38, 2-40, and 2-41)

Section 2.3.5 of the ***OU3 RI/FS Work Plan Addendum*** (WPA) will be updated to reflect the current DOE understanding based upon ongoing Operable Unit 5 investigations at the Fernald Environmental Management Project (FEMP). The text is borrowed from pages 3-46 through 3-49 in the draft ***Remedial Investigation Report for Operable Unit 4***, dated February, 1993.

Comment #2

Section 2.4.3.1 indicates that considerable discrepancies exist between the radiological survey data collected before 1992 and the data collected during 1992. For example, the pre-1992 data indicated that average total surface contamination in the Rust Engineering Building was 12,000 disintegrations per minute (dpm) per 100 square centimeters (cm^2). However, the 1992 data showed values of less than 5,000 dpm per 100 cm^2. The reasons for such significant discrepancies in the radiological survey data, where present, should be explained. Also, DOE should clearly explain how the various radiological survey data, including data not yet collected, will be used to classify components. The U.S. Environmental Protection Agency (EPA) strongly recommends that all components be classified based on the highest radiological survey data.

Response #2 (see attached pages 2-62, through A-103)

Comparing the radiological data that was submitted in the WPA may lead to some confusion if the summary of the data is taken at face value. For example, when the comparison between Tables A.4.0 and A.4.1 shows different levels of contamination, as in the case of the Rust Engineering Building (45A), this could reflect the result of ongoing cleaning and housekeeping activities. Also, the focus of a particular survey can be different from previous surveys (e.g., surveys of inventory and office space versus floors in process areas).

Responses to General USEPA Comments on the OU3 Remedial Investigation Work Plan Addendum

To address the potential for misinterpreting the summary of the radiological survey data, Section D.9.0.2 states: "In the component-specific sampling summaries provided in Sections D.9.1 through D.9.11, radiological data have been summarized for each process area of each component. Where discrepancies exist, the information presented in these sections supersedes information presented in the Appendix A tables, because data useability has been factored into data reported in these sections (e.g., radiological data reported without maps to substantiate location have not been used as hot spots in the following sections) and because data not representing major media have been filtered from the data set (e.g., contaminated equipment sitting on a shelf in the maintenance shop has not been included in hot spot determination)."

In order to avoid inappropriate comparison of data sets and to correct several discrepancies between the data sets, Tables A.4.0 and A.4.1 have been replaced with a new draft table which summarizes the FEMP radiological surveys conducted between 1989 and 1992. This draft table is not simply a combination of the previous summary tables, but summarizes the entire data set after correcting for several inconsistencies. For example, surveys that were represented in Table A.4.0 have been adjusted to reflect the current component list as shown in Table A.1.

The new replacement table, like the old tables, represent a summary of the data collected at the time of the WPA submittal. However, the radiological survey program is on-going with emphasis on filling data gaps such as surveys on components that have not yet been addressed. As new survey data are collected and the database expands, the classification of components will be reviewed, especially during the compilation of the Field Work Packages (FWPs) which will utilize all usable radiological data for the component since 1989. The radiological data for those components that do not require sampling, and thus will not have an FWP, will be reviewed before the completion of the field sampling program.

The average level of radiological contamination survey values are used as a basis for component classification because component classification is meant to de-list from sampling activities those facilities which will not contribute to a conservative risk assessment nor

present a major treatment driver. Data collected during the RI field activities will be used for characterization only, not for the final disposition of materials.

Comment #3

Surface contamination is referred to as "total surface contamination", "total in-place activity", and "total residual contamination", among other terms. The discussion should explain whether these terms apply to fixed (nonremovable) contamination or to total (fixed plus removable) contamination. If DOE means fixed contamination, then total surface contamination, total in-place activity, and total residual contamination should be referred to as fixed surface contamination only. This correction should be made throughout the work plan.

Response #3 (see attached page 2-59)

Throughout the WPA, "total surface contamination" refers to fixed plus removable contamination. The text before Tables A.4.0 and A.4.1 (page A-99) defines removable and total contamination terms. The term "total residual contamination" comes from DOE Order 5400.5, which is discussed in Section 2.4.3. Table 2.3, which was taken directly from DOE Order 5400.5, and the text that discusses it will be changed to reflect the "total surface contamination" terminology. Any references to "loose contamination" or "loose surface contamination" will be changed to "removable contamination". Also, any references to "total in-place activity" will be changed to "total surface contamination."

Comment #4

Numerous discrepancies exist between the RI work plan text and the contaminant-specific sampling plans (CSSP) presented in Section D.9. For instance, Table 2.6 states that the Plant 1 Storage Shelter (Component 1B) was classified based on 1992 data; however, Page D.9-49 states that no 1992 radiological data exist for this component. Additionally, Components 6B and 60 are discussed in the CSSP but are not listed in Table 2.6. Information presented in the work plan should be checked for accuracy against information provided in the CSSPs.

Responses to General USEPA Comments on the OU3 Remedial Investigation Work Plan Addendum

Response #4 (see attached pages A-101 through A-103)

In general, information in the WPA will be rechecked for accuracy against the component-specific sampling plans in Section D.9. Also, Section D.9 and the tables in Section 2.4.3 will be changed to reflect the data presented in the combined radiological survey data summary table, as discussed in the response to RI General Comment #2.

As stated in Section D.9.0.2, discrepancies exist between the information provided in the radiological summary tables and the CSSPs because data useability has been factored into data reported in the CSSPs (e.g., radiological data reported without maps to substantiate location have not been used as "hot spots") and because data in the radiological summary tables in Appendix A that do not represent major media have been filtered from the data set (e.g., contaminated equipment sitting on a shelf in a maintenance shop has not been included in the "hot spot" determination).

Comment #5

The objectives presented in the work plan are general and, in some instances, contradictory. For example, one of the objectives listed on Page 1-4 is to "characterize radiological and chemical contamination in OU3 as necessary to allow evaluation of remedial action alternatives." The phrase "as necessary" needs further explanation. In addition, one of the objectives presented on Page D.3-1 is to "collect data needed to support fundamental decision making with regard to the management and future disposition of OU3 in both the short and long term." In meetings between EPA and DOE, DOE has maintained that the amount of data needed to estimate the minimum and maximum volume of material (as is required to evaluate alternatives) is significantly less than that needed to determine the management and disposition of the waste during the remedial action. DOE should present clearly defined, specific objectives in a consistent manner.

Response #5 (see attached page 1-4)

The objective concerning support for fundamental decision making with regard to disposition in the short and long term is correct as stated. The selection of the treatment and disposition technologies will be based on the data collected during the RI field sampling program. The final decisions for waste disposition as the components are remediated will be based on data

collected in the field during the remedial action. The statements below will be added to Section 1.2, page 1-4, line 13:

"Characterization data will be used to support the decision-making process of the RI/FS and not for the final disposition of materials. All materials will be thoroughly surveyed during remediation, prior to disposition."

The objective of the field sampling program is to characterize the nature of radiological and chemical contamination in OU3. The phrase "as necessary" will be deleted.

Comment #6

Critical sample-specific handling criteria have not been included or referenced. For example, requirements for sample volume, sample containerization, sample preservation, sample holding times, quality control sampling frequency (by analytical method), and sample chain-of-custody should be referenced to the Site-Wide Characterization Quality Assurance Project Plan (SCQ) or summarized in the RI work plan.

Response #6 (see attached pages D.7-3 and D.7-4)

Section D.7 of the Sampling and Analysis Plan (SAP) currently has specific SCQ references in Section D.7.2.5, Sample Custody, which includes the chain-of-custody form, and Section D.7.2.8, Internal Quality Control Checks and Frequency. Section D.7 will be revised to include specific SCQ references for the other items listed in this comment.

The current tables in the SCQ that discuss sample containers, preservatives, etc., do not include all of the parameters that OU3 will be sampling for; therefore, a table has been developed for addition into the FWPs which lists sample volume, sample containers, specified preservatives, and holding times for each parameter required by OU3. This table is based on information obtained from current laboratories which are contracted to analyze FEMP samples. A request has been placed for SCQ revision to include all parameters currently analyzed at the FEMP.

Responses to General USEPA Comments on the OU3 Remedial Investigation Work Plan Addendum

Although the SCQ Table 2-2 does not currently include QA/QC frequencies for radiometric or conventional methods, the field QA sample frequencies were considered to be the same as for inorganic methods. The laboratory QC sample frequencies are listed in the SCQ methods/performance criteria.

Comment #7

The RI work plan should indicate how and at what stage of the RI removal action (RA) candidates will be identified. Furthermore, the existing reporting and notification process should be referenced in the RI work plan.

Response #7 (see attached pages 2-74 and 2-75)

The following statement will be inserted into line 7, page 2-75:

"... The three phase IV removal actions address the temporary nitrate tanks, fire training facility, and the Sewage Treatment Plant incinerator. Other potential removal actions will be evaluated throughout the performance of the RI field sampling phase of the project and FS activities. In the event a potential or actual release of hazardous substances is observed which threatens human health or the environment, a Removal Site Evaluation (RSE) will be prepared under requirements of 40 CFR 300.410. All RSEs will be submitted to U.S. EPA for review to determine the appropriate remedial response. If deemed necessary, a removal action (RA) will be conducted under requirements of 40 CFR 300.415. In accordance with section IX, Removal Actions, paragraphs H of the Amended Consent Agreement, DOE will notify the Agency in writing of all proposed RAs for review and comment."

Comment #8

The sampling and analysis plan (SAP) still uses terms throughout such as "reasonable", "where appropriate", "when possible", and so on. Nonspecific phrases do not provide EPA with sufficient information to approve the RI work plan. Although it is anticipated that some flexibility must be retained in the sampling program, a definite plan must be presented.

Responses to General USEPA Comments on the OU3 Remedial Investigation Work Plan Addendum

Response #8

Where the use of these terms is ambiguous, specific information will be used in place of "reasonable", "where appropriate", and "when possible." The SAP will be reviewed for these nonspecific phrases. Note that in many cases information concerning specific component conditions is unavailable until the sampling crews reach the field at the time of sampling. Due to continual maintenance and other site activities, component conditions will not remain static. Section D.9 of the SAP is an attempt to view the site at a single point in time, and therefore, some flexibility is required to allow the adaptation of the field sampling approach in the field to the specific component conditions.

Specific component conditions will be ascertained by detailed component inspections for final development of the FWP to minimize modifications or additions to the sampling approach in the field.

Comment #9

Several sampling and analytical procedures are either incomplete or yet to be submitted. DOE should present a specific schedule of procedure completion and submittal for incorporation into the SCQ.

Response #9 (see attached pages 4-22, D.5-16 to D.5-17, D.6-7 and D.I-66 to D.I-81)

Sampling procedures have been developed for all media to be sampled. A document change request form will be sent to the FERMCO environmental division to request an update of Appendix K of the SCQ to reflect sampling procedures not currently contained therein. Section 6 of this ***WPA Comment Response Package*** contains a proposed update of Appendix K.

Negotiations have recently taken place between DOE and EPA for replacing the analytical procedures of the SCQ with tables referencing standard EPA methods for the inorganic, organic, conventional parameters and performance based criteria for the radiological parameters. These tables and performance criteria are currently being developed by FEMP

personnel and are to be sent to the EPA for review.

Due to this change in the SCQ, no analytical procedures will be sent to the EPA for review and approval. Table D.6-3 in the WPA will be revised to reference the EPA methods on these newly developed tables. Tables D.6-4 and D.6-5 will be deleted.

Also, the performance based criteria for the radiological parameters as well as the quality control (QC) performance criteria for the inorganic, organic, and conventional parameters will replace the laboratory analytical procedures currently in Section D.I.3.

It must be understood that revised Table D.6-3 included in the ***WPA Comment Response Package*** is based on the first draft of SCQ performance criteria and is subject to change based on EPA review of this criteria. Approved SCQ revisions will take precedence.

Comment #10

X-ray fluorescence is a very matrix-dependent field analytical technique that requires extensive calibration. The SAP should show how the technique's limitations will be addressed.

Response #10 (see attached pages D.3-13, D.4-17, D.5-2, D.5-5 to D-5-6, and D.5-11 through D.5-13)

Laboratory-installed XRF has been in use at the FEMP for many years. We agree that XRF, whether a simple portable unit used in the field or a more sophisticated laboratory installation, is very matrix dependent and is potentially subject to errors caused by variations (chemical and physical) between samples. In response to this comment and SAP Specific Comment #17, revisions will be made to clarify the advantages and limitations of field portable XRF. This will result in revisions to Sections D.4.3.2, D.5.1.1, D.5.1.1.7, D.5.1.3.3, and Table D.3-2.

Responses to General USEPA Comments on the OU3 Remedial Investigation Work Plan Addendum

Comment #11

The review of existing data should present the data quality levels (DQLs) for the existing data and should discuss the effect these DQLs have on screening of components.

Response #11 (see attached page 4-7)

In the various instances in the WPA where the use of existing data is discussed, it is implicit in those discussions that this data will be used with other information such as process knowledge, simply to guide the RI sampling effort. This existing data is qualitative/semi-quantitative, providing, for example, levels of radiological contamination and, in some instances, radionuclide-specific data. Accordingly, if Analytical Support Levels (ASLs) were to be assigned to the existing data, it would be considered nothing more than ASL A/B. This data will not be used as a substitute for the subsequent intrusive samples which will be taken for ASL C/D analyses.

In an effort to clarify this in the WPA, the discussion at the end of Section 4.2.1 will be modified to reflect the above.

Comment #12

The number assigned to each type of sampling protocol does not match the one listed in Table D.12. This discrepancy should be reconciled.

Response #12 (see attached pages D.6-3 and D.6-4)

It is believed that the table referred to by the U.S. EPA is Table D.6-1, not Table D.12, as Table D.12 does not exist. Table D.6-1 will be changed by deleting the component category, which will no longer be used. Procedure numbers versus media type have been checked for correlation and corrected.

Responses to General USEPA Comments on the OU3 Remedial Investigation Work Plan Addendum

Comment #13

It is still unclear when continuous and noncontinuous high-volume air sampling will be used. DOE should clarify this sampling approach.

Response #13 (see attached page D.5-4)

All air sampling is continuous. Section D.5.1.1.4 will be corrected accordingly.

Responses to Specific USEPA Comments on the OU3 Remedial Investigation Work Plan Addendum

Comment #1

Section 1.2, Page 1-4, Paragraph O, Second Bullet. This bulleted item states that one of the general objectives of the RI is to "assess potential risks to human health and the environment that could result from exposure to contaminants for baseline conditions." This statement is confusing and should be rephrased. Specifically, DOE should indicate whether establishment of baseline conditions is an objective of the RI.

Response #1 (see attached page 1-4)

The objective, as stated, is confusing. The phrase "baseline conditions" was intended to represent the calculation of health and environmental risk under existing site conditions for the baseline risk assessment. This assessment would give a "baseline condition" for assessment of the risk performance of each individual alternative. The statement "baseline conditions" will be deleted from line 7 on page 1-4.

Comment #2

Section 2.4.3, Pages 2-58 through 2-62. This section presents the basis for relative contamination designation for classification of Fernald Environmental Management Project (FEMP) components. The current RI implications of the two-category classification scheme are not clear. The available data used for this classification scheme indicate that the media-process-component scheme proposed for RI investigations was not used in this initial screening. It appears that components are being screened from further investigation before specific media within specific process areas of the components have been characterized. This is a significant deficiency. DOE should provide specific sampling schemes at appropriate analytical levels to ensure that components are not screened from further characterization and that contaminated media will not be released.

Response #2 (see attached pages 2-62)

The radiological data that has been collected and presented in Appendix A was intended to identify potential problem areas of high contamination within components, regardless of media. This information is used for the simple screening of components into "significant contamination" or "no significant contamination" classification groupings. This data, in fact, is considered to represent a somewhat conservative estimate of the levels of contamination

over a variety of media because the radiation survey technicians bias the data by looking for areas of higher contamination, and therefore the survey readings tend to be higher than random surveys would produce.

The RI sampling program, however, is intended for a different purpose, the characterization of contamination within bulk media. This sampling will be media-specific, concentrating on "hot spots". The data received from the RI sampling activities will be used to support general characterization, not the final disposition of materials.

Components in the non-sampled category have not escaped characterization. In general, process knowledge was used as the categorization tool in the absence of recent radiological data. The radiological survey program is on-going with emphasis on filling data gaps such as surveys on components that have not yet been addressed. In addition, radiological surveys will be completed in all non-sampled components prior to completion of the RI field program. As new survey data are collected and the database expands, the classification of components will be reviewed. Components may be reclassified for intrusive sampling based on results of that information.

Comment #3

Section 2.4.3, Page 2-61, Table 2.4. This table and the corresponding text in Section 2.4.3 present the basis for relative contamination designation for the FEMP components. DOE proposes that media be classified as having "no significant contamination" or "significant contamination" based on average total surface contamination. The use of average total surface contamination implies that components may be classified as having "no significant contamination" even though isolated areas may have maximum surface contamination well above the maximum allowable levels for materials to be released for reuse without radiological restriction. One of dozens of examples of where this occurs is in the chemical warehouse (Component 30A). This component is classified as having no significant contamination; however, a maximum surface contamination of 49,200 dpm per 100 cm^2 was reported. The approach may allow release of significantly contaminated materials. EPA recommends that components be classified based on the maximum values for total observed surface contamination. The same comment applies to removable surface contamination.

Responses to Specific USEPA Comments on the OU3 Remedial Investigation Work Plan Addendum

Response #3

Initial classification of a component as "no significant contamination" or "significant contamination" by the criteria of Table 2.4 does not in any way support unrestricted release of material from that component from the site. All materials to be released from the site under DOE Order 5400.5 criteria are thoroughly surveyed and must demonstrate compliance with the requirements of that order and the requirements of the onsite implementing procedure prior to release.

The classification of the OU3 components based on average radiological contamination values from Tables A.4.0 and A.4.1 was deemed the most appropriate overall representation of a component for sampling, since: the effect of high values and the effect of multiple high values does correspondingly affect the average value reported; the current data represents values from the onsite health physics program, which generally focuses greater numbers of survey points on identification of the major contributors to dose (hot spots); and the absolute contamination of a component will in the final analysis determine the treatment it receives, since the same cleanup standards will be applied to all components and materials. The classification of the components determines only whether the component will be sampled as part of the field program.

Comment #4

Section 2.4.3.1, Page 2-62, Lines 24 through 26. The text states that the Rust Engineering Building had an average total surface contamination value of 12,000 dpm per 100 cm^2 during the 1992 survey. The maximum and minimum total surface contamination values for all components should be provided along with the average values for this discussion and all subsequent discussions.

Response #4

As stated on page 2-60, average values obtained from radiological surveys are listed in Tables A.4.0 and A.4.1. Section 2.4.3 discusses the use of these average values to determine the classification of the components and, therefore, only the average contamination

levels are provided here. For more complete information, as discussed in the response to RI General Comment #2, Tables A.4.0 and A.4.1 have been combined into one summary table that lists the average, maximum, and total number of radiological survey measurements taken in the OU3 components between 1989 and 1992. The minimum values are not listed because they are generally below the minimum detectable activities (MDAs) of the survey instruments.

Comment #5

Section 2.4.3.2, Page 2-63, Lines 4 through 23. This section discusses radiological survey data for warehouses and storage buildings. As written, it is difficult to determine whether removable or total surface contamination data are being discussed. The discussion should be rewritten for clarity. Also, refer to RI work plan General Comment #3 regarding the terminology used for total surface contamination.

Response #5 (see attached page 2-63)

This section discusses both removable and total surface contamination. Information is listed for components that have average removable surface contamination levels above 1000 dpm/100 cm^2 (as discussed in lines 8 through 13 on page 2-63). Information is listed for components that have average total surface contamination levels above 5000 dpm/100 cm^2 (as discussed in lines 14 through 18). The five thorium warehouses are discussed in the remainder of the section. To emphasize the distinction among the three topics, the single paragraph will be divided into three paragraphs with emphasis on clarity.

Comment #6

Section 2.4.3.2, Page 2-63, Lines 17 through 19. The text states that of the three previously listed components, two are classified on the basis of uranium. Actually, five components are previously listed. This discrepancy should be addressed.

Response #6 (see attached pages 2-63 and 2-64)

Table 2.6 and the text on page 2-63 will be changed to include reference to all five thorium warehouses.

Responses to Specific USEPA Comments on the OU3 Remedial Investigation Work Plan Addendum

Comment #7

Sections 2.4.3.1 through 2.4.3.11, Tables 2.5 through 2.11, Pages 2-62 through 2-71. The text and corresponding tables indicate that many components have been categorized as having "no significant contamination" even though the classification has been made with limited and incomplete data. For example, of the 14 components characterized as having "no significant contamination" in Table 2.6, nine have no data for total (fixed) surface contamination. Of these nine components, six are not currently planned for RI sampling. If the current classification system is to be retained, additional screening data should be collected to support or re-evaluate the conclusions presented in the RI work plan.

Response #7

The FEMP radiological survey program is on-going with emphasis on filling data gaps such as surveys on components that have not yet been addressed. As new survey data are collected and the database expands, the classification of components will be reviewed, especially during the compilation of the Field Work Packages (FWPs) which will utilize all usable radiological data for the component since 1989. The radiological data for those components that do not require sampling, and thus will not have an FWP, will be reviewed before the completion of the field sampling program.

In the event that a component which was believed to not contain "significant contamination" based on process knowledge is later found, based on survey results from the on-going radiological program, to contain "significant contamination", the component classification will be changed accordingly. However, components will not be down-graded from a "significant contamination" to a "no significant contamination" classification but will remain in the field sampling program.

Comment #8

Section 2.4.4, Page 2-71, Lines 9 and 10. The text states that the volume estimates for materials in OU3 account for soil in existing soil piles. However, Table 2.12 (Page 2-72) does not appear to account for soil in piles as stated. This discrepancy should be addressed.

Responses to Specific USEPA Comments on the OU3 Remedial Investigation Work Plan Addendum

Response #8 (see attached page 2-72)

Footnote "b" in Table 2.12 will be modified to correctly represent the items included under "Material Type, Soil/Rubble". The footnote will read: "Represents soil from soil piles and includes all types of rubble, including concrete."

Comment #9

Section 2.5.1, Pages 2-73 through 2-91. The work plan should include a discussion of additional removal actions that may have been identified since the submittal of the OU3 work plan addendum.

Response #9 (see attached pages 2-74, 2-75, and 2-91 through 2-93)

To include the phase IV removal actions, the following statement has been inserted into line 7, page 2-75:

"... The three phase IV removal actions address the temporary nitrate tanks, fire training facility, and the Sewage Treatment Plant incinerator. Other potential removal actions will be evaluated throughout the performance of the RI field sampling phase of the project and FS activities. In the event a potential or actual release of hazardous substances is observed which threatens human health or the environment, a Removal Site Evaluation (RSE) will be prepared under requirements of 40 CFR 300.410. All RSEs will be submitted to U.S. EPA for review to determine the appropriate remedial response. If deemed necessary, a removal action (RA) will be conducted under requirements of 40 CFR 300.415. In accordance with section IX, Removal Actions, paragraphs H of the Amended Consent Agreement, DOE will notify the Agency in writing of all proposed RAs for review and comment."

These three additional removal actions will be discussed in Sections 2.5.15 through 2.5.17.

Responses to Specific USEPA Comments on the OU3 Remedial Investigation Work Plan Addendum

Comment #10

Section 2.5.1, Page 2-74, Lines 9 through 11. The text states that "most of the interim activities are directly supportive of the objectives for continued safe and environmentally protective maintenance of the facility during the CERCLA remediation process." DOE should discuss which of the interim activities do not meet the objectives and why.

Response #10 (see attached page 2-74)

All interim activities are believed to support safety and environmental protection. Therefore, the sentence has been deleted from the discussion on page 2-74.

Comment #11

Section 4.2.2.7, Page 4-11, Lines 20 and 21. The text lists three considerations that have a major influence on the RI sampling design. The second consideration is the assumption that all major areas of radiological contamination in OU3 have been identified. The term "major areas of radiological contamination" should be defined. Also, as indicated in previous comments, it is unlikely that all areas of radiological contamination have been identified. The level of uncertainty associated with the statement and the potential problems associated with the data gaps should be fully discussed.

Response #11 (see attached page 4-11)

In response to this concern by EPA, the referenced text will be revised to further define the terms in the context of the assumptions and to discuss the limitations of the assertion.

Due to the extensive volume of radiological survey data available from the existing worker protection program, it is reasonable to state that the "major areas of radiological contamination" have been identified within the OU3 structures. Major areas would constitute those areas which were physically large enough or exhibited high enough radiation to be identified by the efforts of the ongoing health protection program. These areas may include contaminated zones, plants, warehouses and other larger facilities. This assumption is not intended to obviate the need for further data collection from within the components and process areas, but is intended to indicate confidence that the existing data is a good summary

of the existing radiological contamination conditions. Additional assessment is underway for production area components and process areas without recent radiological survey data. The overwhelming majority of these areas have been surveyed since the submittal of the WPA to support a more specific sampling plan development in the respective FWPs.

See attached page 4-11 for revisions.

Comment #12

Section 4.2.2.7, Page 4-11, Lines 26 through 30. The text states that regions of components with "expected contamination" will be surveyed to locate areas of contamination. DOE should define the term "expected contamination." Also, review of the SAP reveals that specific details regarding the survey are not provided. The methods used to determine specific sampling locations, density, and frequency should be provided. Details of how screening data will be recorded and reported should also be provided.

Response #12 (see attached pages 4-11 and 4-12)

Regions of components with expected contamination will be surveyed with nonintrusive instruments (e.g., screening will be done) to identify the location of highest radiological and/or chemical contamination on surfaces of major sampling media. Locations with "expected contamination" are defined as areas which have been identified as radiologically and/or chemically contaminated based on process knowledge, radiological survey data, and visual inspections. See Sections D.3.4.2, D.3.4.3 and D.5 of the SAP and responses to RI Specific Comments #11 and #13 for additional information. These locations are geographically smaller units than "major areas of radiological contamination" as discussed in the previous comment and may include process areas, areas with visible chemical contamination, etc.

Two health and safety screening Standard Operating Procedures (SOPs) have been developed from the radiological assessment department, Radiological Contamination Surveys and Radiation Surveys. The procedures discuss the methods used to determine locations, density and frequency of performing surveys and data recording and reporting procedures.

A detailed map will be produced for each process area within a component. The surveying technician will document the location of the radiological and/or chemical hot spot on the map and document all radiological survey data on the radiological survey report form. The technician will physically mark the location of contamination with a chalk/crayon substance. The radiologically and/or chemically contaminated surface will be marked with a chalk/crayon substance and the survey data will be entered into the radiological specific database and the sitewide environmental database.

Comment #13

Section 4.2.2.7, Page 4-12, Lines 1 through 6. This section discusses collection of intrusive samples for chemical analysis. It is not clear how specific areas will be targeted for intrusive sampling. The procedures used to determine intrusive sampling locations should be discussed.

Response #13 (see attached pages 4-12)

Two sections of the SAP describe how areas are targeted for intrusive sampling and the intrusive sampling procedures. Section D.5.1, Protocol 1: Nonintrusive Sampling, discusses methods for selecting field screening locations, frequencies and chemical screening procedures. Section D.5.2, Protocol 2: Determining Final Intrusive Sampling Locations, provides guidance for selecting the final locations for chemical intrusive sampling following evaluation of the nonintrusive screening results. In general, these sections state that chemical field screening shall be performed where there is evidence or suspicion of chemical contamination. The evidence leading to the identification of the locations includes process knowledge, visual inspection and natural collection points such as the collection points for runoff, areas that are pathways to the environment or human receptors, areas near electrical transformers, and bulk liquid and solids of uncertain identity. One intrusive sample will be collected at the location of highest known chemical contamination per major medium, per process area. In the case where chemical screening results are ambiguous, intrusive samples for chemical determinations will be taken at the same location as the radiological intrusive sample, see Section D.5.2. Conversely, more than one intrusive sample may be taken if there are distinct areas of chemical and radiological contamination. Intrusive samples will be sent

for laboratory analyses to establish the types and levels of chemical and/or radiological contamination.

Comment #14

Section 4.2.2.7, Page 4-12, Lines 23 through 29. The text states that 10 percent of the samples collected for laboratory analysis will be analyzed under analytical support level (ASL) D. It is proposed that this will serve as a quality check on laboratory performance and data validation for the remaining 90 percent of the samples submitted for ASL C analysis. However, DOE will not be able to compare the data generated under ASL D with corresponding ASL C data. Therefore the objectives, particularly those regarding the quality check on laboratory performance, cannot be met. It would be more appropriate to collect split samples for 10 percent of the samples and submit one aliquot each for ASL D and ASL C analyses. This issue should be addressed.

Response #14 (see attached pages 4-12 and 4-13)

Section 2.3.3 of the SCQ, which discusses ASL C, states: "The analytical methods are identical to ASL D for QA/QC sample analysis and method performance criteria." The difference between ASL C and ASL D is the level of data validation that is possible on the data package. The data package that is received from an ASL C analysis does include the same QA/QC sample results that the ASL D data package would, and the data validation for the ASL C data package is extensive. The only difference between ASL C and ASL D is the fact that the raw data is not included in the ASL C data package and therefore would not be included in the validation.

Section 11.2 of the SCQ, which discusses data validation, states: "Data used to calculate upper confidence limits (UCLs) for risk assessment by any new method requires full validation to ASL D criteria until completeness requirements for the initial stage or phase of use have been met. Continued use of the method in generating data for quantitative risk assessment requires a minimum of ten percent of the data to be validated to ASL D."

It has been determined that completeness requirements have been met for the inorganic, organic, and conventional methods to be used by OU3. Therefore, ASL C will be performed

with 10 percent of the samples meeting ASL D. The radiological analysis has not yet met these completeness requirements and will therefore be analyzed at ASL D until these requirements can be met.

This paragraph in Section 4.2.2.7 of the WPA will be rewritten to reference Section 11.2 of the SCQ and to add the above paragraph.

Comment #15

Section 4.3.2, Page 4-23, Table 4.4. This table provides a conservative list of radiological parameters that will be used for analysis of all intrusive samples. Unlike other FEMP OU RIs, total uranium and total thorium are not proposed as parameters for analysis. The reasons for omitting these parameters should be discussed.

Response #15

Total uranium and total thorium analysis by the laboratory was determined to be unnecessary because they can be calculated from the isotopic uranium and isotopic thorium results. By not having the laboratories calculate these results, a significant cost savings of $15-40 per sample can be realized.

Comment #16

Section 4.3.2, Page 4-24, Lines 3 through 6. The text states that all swipe samples collected within a component whose contaminant levels exceed by an order of magnitude the DOE surface contamination guidelines will be composited for analysis for individual radionuclides. Any component whose contaminant levels exceed DOE guidelines for unrestricted release of materials should be characterized for individual radionuclides. DOE should provide the rationale for selecting the "one order of magnitude higher" action level. DOE should also combine swipe samples from a single component whose screening analysis indicates the same order of magnitude of contamination for analysis. For example, by compositing swipe samples that exceed the action level by one order of magnitude, those that exceed the action level by one to two orders of magnitude and so on will result in a more focused characterization of contaminant levels.

Responses to Specific USEPA Comments on the OU3 Remedial Investigation Work Plan Addendum

Response #16 (see attached page 4-24)

The selection of the one order of magnitude above the DOE unrestricted release criteria as a screening level for swipe compositing was chosen to avoid adding swipes of low or undetectable radiological contamination levels to the composite sample, thereby resulting in a conservative (high) value for the composite representing a given component.

Since the RI concentrates on examining the nature of contamination rather than fully defining the extent, the compositing of the swipe samples does not adversely affect the value of the data. Further segregation of the swipes by orders of magnitude of survey readings would result in significantly less sample material from which to determine the radionuclide content. The additional samples would not contribute significantly to the overall understanding of the contamination within the operable unit and might adversely affect ability to report on lower concentration elements. The text on page 4-24 will be modified to reflect these statements.

Comment #17

Section 4.5, Page 4-38, Lines 24 through 27. The text states that health and safety screening will be conducted as part of the RI field characterization activities. DOE should provide more information regarding these activities. The discussion should specify ASLs, methods and time frames of data reporting, and how new data will be used to modify proposed sampling activities (if applicable).

Response #17 (see attached pages 4-38 and 4-39)

As stated in the response to RI Specific Comment #12, two health and safety screening Standard Operating Procedures (SOPs), Radiological Surveys and Radiological Contamination Surveys, have been developed which describe screening activities. The revised text in Section 4.5, page 4-38, of this ***WPA Comment Response Package*** discusses health and safety screening procedures. As indicated in Table D.3-1, health and safety radiological surveys are ASL A and B.

Data will be reported as part of the RI report. New survey data may be used for trending

analysis (see Section 4.3.5 of the WPA), reassessment of components for classification (see page 2-62, Section 3, of this ***WPA Comment Response Package***), location of "hot spots", modification of personal protective equipment and/or Component Specific Health & Safety Plan, and to assist in developing the risk assessment.

Responses to General USEPA Comments on the OU3 Sampling and Analysis Plan (SAP)

Comment #1

The SAP (Page D.1-1) states that all required sampling and analytical procedures have been or will be incorporated into the SCQ. The SAP (Table D.6-5) indicates that about 150 analytical and corresponding sampling procedures must still be submitted for review and approval. The implications, particularly regarding the schedule, are significant. DOE should provide the schedule under which these additions to the SCQ will be submitted. Also, the work plan should indicate that EPA must approve these sampling and analytical procedures before the field activities can begin, and the impact on the proposed schedule should be discussed.

Response #1 (see attached pages 4-22,D.5-16, D.5-17, D.6-7 and D.I-66 and D.I-81)

Negotiations have recently taken place between DOE and EPA for replacing the analytical procedures of the SCQ with tables referencing standard EPA methods for the inorganic, organic, conventional parameters and performance based criteria for the radiological parameters. Also, a request will be placed for SCQ revision to include abstracts of the sampling procedures in Appendix K of the SCQ. These tables and performance criteria are currently being developed by FEMP personnel and are to be sent to the EPA for review.

Due to this change in the SCQ, no analytical procedures will be sent to the EPA for review and approval. Table D.6-3 in the WPA will be revised to reference the EPA methods on these newly developed tables. Tables D.6-4 and D.6-5 will be deleted.

Also, the performance based criteria for the radiological parameters as well as the quality control (QC) performance criteria for the inorganic, organic, and conventional parameters will replace the laboratory analytical procedures currently in Section D.I.3.

It must be understood that the revised table included in the ***WPA Comment Response Package*** is based on the first draft of SCQ performance criteria and is subject to change based on EPA review of this criteria. Approved SCQ revisions will take precedence.

Responses to General USEPA Comments on the OU3 Sampling and Analysis Plan (SAP)

Comment #2

The SAP (Page D.3-16, Lines 23 through 25) states: "All materials in OU3 will be thoroughly surveyed during remediation. Therefore, actual disposition of materials will not be affected by the assumptions concerning contamination in nonsampled components." This statement serves to clarify much of DOE's RI sampling approach. Unfortunately, this is the only section where this discussion is presented. This discussion should be included where the work plan presents the RI objectives. In addition, DOE should present details of the proposed surveying and characterization that will be undertaken as part of the remedial action.

Response #2 (see attached page 1-4)

A brief synopsis of this information will be presented in the document objectives (Section 1.2). In contrast, the Remedial Action work plan will supply all the necessary information concerning the proposed surveying to be performed for release of materials off-site during the Remedial Action.

In the objectives section, the statement will be added: "Characterization data will be used to support the decision-making process of the RI/FS and not for the final disposition of materials. All materials will be thoroughly surveyed during remediation, prior to disposition". This is also discussed in Section 4, page 4-1.

Comment #3

Neither the work plan, SAP nor the CSSPs identify the metals, organic compounds, or radionuclides that will be analyzed for in each intrusive sample. This is a major omission. All three of these documents, as applicable, need to be revised to include for each sample (1) the specific analyses to be performed and (2) the rationale for including (and excluding) particular analytes.

Response #3 (see attached pages D.4-15, D.4-18, through D.4-20)

Table D.4-7 has been revised to identify the groups of analytes (inorganics, radiological, etc.) that will be analyzed for each media to be sampled. The groups of analytes are further defined in Table D.4-6 which lists each specific analyte belonging to that group. For example,

"inorganics" from Table D.4-7 refers to the list of TAL inorganics on Table D.4-6. Each sample that is analyzed for "inorganics" will be analyzed for the entire list of TAL inorganics from Table D.4-6. There will not be any analytes excluded or added to the list.

The rationale for including (and excluding) analytes in developing Table D.4-6 can be found in the WPA in Sections 2.4 and especially 4.3.1.2 and in more detail in the SAP in Sections D.4.2 (radiological) and D.4.3 (chemical). The following analyte groups have been added to the explanations of exclusions listed in D.4.3.3:

- Anions and others (ammonia, sulfide, oil and grease, and phenols) are being excluded from the OU3 analyte lists because it is information required for final transfer of water to the on-site Water Treatment Plant (WTP) for treatment and disposal and will not be required until final disposition of each building. Sampling will be done at that time to provide the WTP with the most current information.

- Asbestos is being excluded from OU3 RI/FS sampling because this sampling is being conducted by another organization at the FEMP.

- Cyanide is only requested in process areas with known cyanide usage.

- Petroleum, Oil, and Lubricants (POLs) are being excluded from the OU3 analyte list because it is felt that these analyses are adequately covered under TCL VOCs and SVOCs.

Due to the fact that the parameters to be analyzed are media dependent, not component dependent, this information is not included in the CSSPs. The CSSPs do list the number of samples to be taken per media type. Based on this information and using Table D.4-7 the analytes to be requested can be obtained.

Responses to General USEPA Comments on the OU3 Sampling and Analysis Plan (SAP)

Comment #4

Section D.4.2.1 through D.4.3.3 discuss chemicals and radionuclides of interest, of potential interest, known to be present, and that are potentially significant. Table D.1-3 lists potential contaminants of concern, and Table D.4-6 gives the RI analyte list. This is redundant and confusing, particularly considering that the work plan and SAP do not specify what will actually be analyzed for (see General SAP Comment #3). These sections and tables should be revised to more clearly and concisely describe which contaminants will be analyzed during the RI. The rationale for selecting and rejecting various contaminants for analysis should also be presented in the work plan.

Response #4 (see attached pages D.4-1, D.4-18 and D.4-19)

Sections D.4.2.1 and D.4.3.3 will be revised to clarify the relationship between Table D.4-3 and Table D.4-6, which is the analyte list that OU3 will be analyzing for during the RI sampling activities.

See the response to General SAP Comment #3 for more information.

Comment #5

The SAP should indicate which proposed analytical and screening methods will be used for Protocol 1 sampling. The current discussion simply lists various instruments and analytical methods available. Additionally, DOE should indicate which Protocol 1 analytical and screening methods must still be submitted to EPA for review and approval.

Response #5 (see attached page D.5-2)

Although Section D.5.1.1 discusses the proposed methods to be used for Protocol 1 sampling, Section D.5.1.2 discusses how the instrument will be used in Protocol 1. Analytical and screening methodologies will augment methods currently utilized in the SCQ. See Section 6 of the ***WPA Comment Response Package***. A reference will be added to Section D.5.1.1 referencing the listing of radiological, chemical, and physical field instrument procedures to be used in the characterization program. The reference will be inserted on page D.5-2, line 12:

"Field instruments for collection of radiological, chemical, and physical information are illustrated in Section D.6.2. Section D.6.2 lists the field instruments that have been identified as applicable for OU3 activities."

Comment #6

Individual CSSPs should have a section detailing the data quality objectives (DQOs). This section should provide the required ASL for all proposed analytical methods, including screening. Additionally, the CSSP should include a section that identifies specific data needs or gaps for each component. This information is required for evaluation of the proposed sampling activities to ensure that RI objectives are met.

Response #6 (see attached page D.9-1)

Detailed information concerning data quality objectives is presented in Section 4.2 of the WPA. Based on the data quality objectives developed, Table 4.2 presents the data needs, data uses, data objectives, data collection approach to meet those objectives, and the required ASL. Since these data quality objectives and the data collection approach are media-specific, it is not necessary to develop component-specific DQOs. The reference below will be added to Section D.9.0.1:

"The sampling approach applies the data needs and data uses as presented in Table 4.2 (Section 4.2.3) and the Analytical Support Levels as presented in Table 4.1 (Section 4.2.1) to implement a data collection approach to meet OU3 objectives. The DQOs, as developed to support the OU3 field program, are media-specific rather than component-specific."

Comment #7

Many CSSPs are incomplete. For instance, the CSSPs for Component 1B (Section D.9.2.1) and Component 4B (Section D.9.2.2) do not indicate whether sampling will be conducted. All CSSPs should be reviewed for completeness, and missing information should be provided.

Responses to General USEPA Comments on the OU3 Sampling and Analysis Plan (SAP)

Response #7

Table D.9.0-2 on page D.9-5 lists the 16 components that will undergo "confirmatory sampling." Buildings 1B and 4B are among the components in this list. Section D.9.0.3 discusses the approach to confirmatory sampling and explains the differences between this approach and that of the intrusively sampled components. To reiterate the confirmatory sampling approach, a summary of this approach will be included in the CSSPs under the subsection titled Summary of Sampling for Component XX.

The following subsection will be added to the component-specific write-ups for these components:

"Summary of Sampling for Building/Component XX

"Component/Building XX will undergo confirmatory sampling as discussed in section D.9.0.3. One airborne particulate sample will be collected in the component and analyzed for radiological and inorganic contaminants, as well as asbestos, on the basis of Protocol 1. Nonintrusive screening, which entails radiological surveys and swipes, XRF surveys, PID measurements, and PCB field test kit measurements will be systematically performed on major media throughout the component as detailed by section D.9.0.3. Intrusive sampling will be performed only if resultant nonintrusive survey levels exceed the criteria for sampling provided in section D.9.0.3. In all cases, intrusive samples within confirmatory sampled components will be implemented in a manner parallel to the approach used for sampled components."

Comment #8

Many CSSPs summarize radiological data that is not present in the data summary tables (Tables A-4.0 and A-4.1). Conversely, many CSSPs do not discuss data that is presented in the summary tables. These discrepancies should be addressed.

Response #8 (see attached pages A-101 through A-103)

The radiological data presented in Table A.4.0 were assigned to components under an earlier component numbering system than that used for Table A.1. The current Table A.1 reflects breaking up larger facilities, such as Plants 5 and 6, into several smaller components. This breakdown was intended to segregate components by large differences in levels of radiological contamination and to simplify RI sampling activities. For example, radiological data associated with the Plant 6 Sump Building (6G) has been removed from the Metals Fabrication Building (6A) data set because Building 6G is a new structure that has never been used and, thus, the levels of radiological contamination are several orders of magnitude lower than Building 6A.

The discrepancies between the summary tables and the CSSPs are largely due to the fact that Table A.4.0 had not been updated as of the December, 1992 WPA draft to reflect the current component list. The CSSPs contain a summary of the radiological data using the current Table A.1 component list and therefore provide a more accurate representation of the data. To correct the discrepancies, Tables A.4.0 and A.4.1 have been combined into a single table as discussed in the response to RI General Comment #2. The CSSPs will be updated to reflect the information provided in this combined table, which will be provided in Appendix A in place of Tables A.4.0 and A.4.1. The combined table, along with any new data, will be compiled before finalizing the component-specific FWPs.

Comment #9

Many components are identified in the work plan as having "no significant contamination," although the corresponding CSSPs discuss hot spots with contaminant levels well above the DOE action level guidelines (Component 30A is one of many examples). These discrepancies should be clarified.

Responses to General USEPA Comments on the OU3 Sampling and Analysis Plan (SAP)

Response #9

See the response to General RI Comment #3.

Comment #10

Section D.4.6.1 discussed the preparation and contents for the field work packages (FWPs). It is EPA's understanding that the FWPs will be a stand-alone document that will enable the field technician to complete all sampling activities from on-site arrival through sample delivery to the laboratory. However, the proposed FWP outline lacks specific detail. Specific analytical parameters are not identified. Details regarding quality assurance and quality control (QA/QC) sampling and sample filtration, preservation, packing, shipping, and chain of custody are not addressed DOE should modify the FWP outline to ensure that the resulting FWPs provide all appropriate information.

Response #10 (see attached pages D.4-23 through D.4-25)

The FWP will be considered a stand-alone document in that it will present all pertinent information needed for the field sampling team to sample a specific component. It should be realized, however, that the data needs, sampling approach, etc., are based on the general approach presented in the SAP.

The FWP outline has been updated from that previously submitted to incorporate pertinent information for the field sampling crews. In particular, the FWP contains three attachments which detail the sampling, including QA/QC samples, analytical parameters with chain of custody codes, preservatives, sampling containers, and filtration (if applicable).

With respect to the comments pertaining to packing and shipping, the field technicians are not responsible for the packing and shipping of samples to off-site laboratories. The sample technicians collect the samples, apply the required tamper proof tape and labels, complete a chain of custody form, place the samples into a cooler and deliver them to the shipping and receiving department of the FEMP lab. The shipping and receiving department takes possession of the samples by signing the chain of custody form, and prepares the samples

for shipment to the proper off-site lab for analysis according to established internal procedures.

The outline for the revised FWP has been changed as reflected in the revision to pages D.4-23 through D.4-25. In addition, the FWP previously submitted for Building 39A has been revised and is included in Section 4 of the ***WPA Comment Response Package***.

Responses to Specific USEPA Comments on the OU3 Sampling and Analysis Plan (SAP)

Comment #1

Section D.3.1, Page D.3-1, Lines 3 through 5. The text states that the objective of the OU3 RI is to collect data needed to support fundamental decisions regarding the management and future disposition of OU3. However, the work plan (Page 1-4) lists additional RI objectives, including objectives dealing with risk assessment and remedial action alternatives (RAA). The specific objectives of the OU3 RI should be clearly and consistently reported in the work plan and SAP.

Response #1

The RI objectives, evaluation of remedial action alternatives and development of baseline risk assessment, as detailed in Section 1.2 are facets of the fundamental decision-making process called the Remedial Investigation / Feasibility Study.

The objective concerning support for fundamental decision-making with regard to material disposition in the short and long term is correct as stated. The consideration and evaluation of the treatment and disposition technologies will be based on the data collected during the RI field sampling program. The final decisions for waste disposition as the components are remediated will be based on data collected in the field during the remedial action.

Comment #2

Section D.3.2.2, Page D.3-5, Lines 22 through 24. The text states that air samples will be collected and analyzed for airborne radioactivity if there is a "significant presence" of radium-226 or thorium-232 in a component. DOE should define the term "significant presence" and should include specific action levels indicating when radon sampling will be performed. Additionally, DOE does not propose air sample collection and analyses for other airborne particulates that may be contaminated. Justification for this omission should be provided.

Response #2 (see attached pages D.3-5 and D.4-19)

For determining where air samples are to be taken for radon (Ra-222) and/or thoron (Ra-220), the term "significant presence" is defined as: any component in which Ra-226 or Th-232 has been handled or stored, or any component where the concern is any other than the uranium

isotopes. There are currently no numeric action levels which indicate when and where radon sampling will be performed.

OU3 will be sampling for longer half-lived airborne radionuclide particulate contamination. This air sampling will be done using continuous general area samplers set for 24 hours. At least one air filter sample will be taken per component and will be analyzed at the laboratory for all radionuclides listed in Table D.4-6.

Section D.3.2.2 will be revised to distinguish between the two types of air sampling that will be done for the OU3 RI:

- Passive collector air sampling for radon and thoron, and
- Radiological air sampling for laboratory analysis of longer half-lived radionuclide particulate contamination.

The grab samples for radon discussed in the current WPA are for the determination of personal protective equipment and industrial hygiene. Because this data will not be used in the final RI or for risk assessment, all discussion of grab samples are to be removed from the WPA and included in the Health & Safety Plans.

Comment #3

Section D.3.2.2, Page D.3-6, Lines 5 through 9. The text discusses sampling of surface water and sediments in ponds and basins within OU3, but no other information is provided. A thorough discussion of pond and basin sampling and surface water and sediment analysis should be provided. Additionally, these activities should be discussed in terms of their relationship with OU5 RI activities.

Response #3 (see attached page D.3-6)

The following statement will be added to Section D.3.2.2:

"Identification and preliminary characterization of potential sources and pathways is the

principal goal of the surface water and sediment sampling of ponds and basins. The collection of surface water and sediment samples is designed to identify and characterize radiological and chemical contamination in ponds and basins. To ensure that the characteristics of the pond/basin are accurately portrayed, grab surface water and sediment samples will be collected at one point in time, in various locations to be uniformly distributed over the impoundment. Samples will be representative of the basins (though not statistically stated), with locations based on process knowledge, existing data, instrument surveys, and observations. Grab/intrusive samples will be collected and composited for submittal for laboratory analysis. Grab and composite sampling strategies are based on protocol specified in the SCQ, Section K.4.3."

The surface water and sediment samples will be analyzed for the full radiological list, TCL/TAL list of analytes and also analytes listed in Table D.4-6. OU3 will also share information and data which may impact OU5 media.

Comment #4

Section D.3.3.1, Page D.3-7, Lines 11 through 13. The text states that the maximum surface level or depth of contamination represents the entire extent of the medium within the process area for treatment purposes. Although EPA agrees with this approach, the proposed sampling methods do not ensure that the depth of contamination will be entirely and routinely characterized. It is likely that the initial rounds of cores, chips, or scrapings collected will indicate that contamination remains below the depth of sampling penetration. DOE has not provided contingency plans to address the data gaps that may result. This issue should be addressed.

Response #4

The sampling approach has been designed to support the characterization of the media in OU3. Through process knowledge and production history the process areas of each component have been separated into "wet" and "dry" categories. This separation is the basis for the concrete sampling approach. Activities that have been categorized as "dry" processes, such as warehousing, are not anticipated to have resulted in migration of contamination into the concrete. By collecting the sample from the surface material, the anticipated maximum

contamination will be sampled without the diluting affect of the full depth of the media. During characterization, the surface area exposed after a surface sample is collected will be surveyed according to Protocol 1: Nonintrusive Sampling in Section D.5.1. Whether surface contamination is measured below the extent of surface sampling or not, the results from the surface sample will be assumed to represent the concrete volume for the entire process area. Additional samples at greater depth will not be collected. During treatability studies it will be determined whether cost-effective decontamination of the media is practical and warranted.

Activities that have been categorized as "wet" processes, such as wastewater treatment, may have resulted in the migration of contamination into the concrete. The data obtained from concrete core samples will be assumed to represent the concrete volume for the "wet" process areas. The information concerning the sampling procedure for concrete samples is presented in Section D.5.3.2.1 on page 5-17.

Comment #5

Section D.3.3.1, Page D.3-7, Lines 30 through 33. The text states that a single intrusive sample for each class of chemical contaminants will be taken from each medium. It is not clear whether a single intrusive sample will be collected and split for various analyses (for volatile organic compounds [VOC], semivolatile organic compounds [SVOC], metals, and so on) or whether individual intrusive samples will be collected for each class of contaminants. This matter should be clarified, and the rationale should be presented for either approach.

Response #5 (see attached page D.3-7)

In order to clarify this sentence, the text on page D.3-7, lines 30-32 will be changed to read:

"A single intrusive sample will be collected from each major medium in each defined process area at the location of highest expected surface levels of chemical contamination. These single intrusive samples will be of sufficient quantity to meet the requirements for analysis and will be split for each chemical analyte class of potential concern. However, multiple intrusions may be required to collect sufficient sample volume. This approach is based upon the assumption that a single, split sample collected at one specific location will be more truly

representative of the actual contamination at that location than a series of individual intrusive samples collected at/or adjacent to a hot spot location."

Comment #6

Section D.3.3.3, Page D.3-13, Table D.3-2. The method detection limits for total beta-gamma are unreasonably high and vague (less than 15,000 dpm per 100 cm^2). The method detection limits should be clearly specified, and a unit capable of expressing much lower detection limits should be used. Additionally, information regarding toxicity characteristic leaching procedure (TCLP) analyses should be added to the table.

Response #6 (see attached pages D.3-12 and D.3-13)

The radiological method detection limits (MDLs) listed in Table D.3-2 are also the NRC allowable contamination levels listed in Table 2.3 (Guidelines for Surface Contamination) in Section 2.4.3 of the WPA. The only techniques that these values may apply to as a method detection limit are for the low-background counting instruments utilized to detect removable alpha and beta-gamma (20 dpm and 1,000 dpm, respectively). The MDLs are met by adjusting the count time of the instrument. The remaining radiological surveys will be performed using the listed field detectors (i.e., Geiger-Mueller). An MDL cannot be effectively determined for field detectors as the operational efficiency for each is instrument specific. It should also be noted that the lowest detectable level for a field instrument is not the MDL. It is the point of the range at which the instrument circuitry will not be capable of registering radioactivity.

The following changes have been made to Table D.3-2:

- The total alpha, total beta-gamma, low-level gamma, and gamma exposure rate entries have been isolated from the rest of the table and indicated that the associated values are not MDLs, but are the NRC allowable contamination levels.
- The values for the radiological entries of the table were changed to "dpm/100 cm^2".

Table D.3-2 will also be revised to include the TCLP parameters.

Responses to Specific USEPA Comments on the OU3 Sampling and Analysis Plan (SAP)

			Method Detection Limits	
Parameter	**Technique**	**Protocol/Method**	**Solids(ug/kg)**	**Liquids(ug/L)**
TCLP	ICP and GC/MS	SW-846/SCQ	(See Note 1)	

Basis for Method Selection

Solids	**Liquids**
Soil PRGs	ARARs

Note 1: MDLs for TCLP should be equal to MDLs for total analyses in water matrices, unless there are matrix interferences.

General Note: For listing by analyte of required quantitation limits for water and soil, see Table 2-4 in the SCQ.

Comment #7

Section D.3.4.1, Page D.3-15, Lines 13 through 15. This section states that components were placed in the "to be sampled" category if average removable contamination was above 1,000 dpm per 100 cm^2. The numbers represent the maximum allowable contamination levels for release of materials for reuse based on uranium isotopes. The allowable levels for thorium-related contamination are five times lower. DOE acknowledges that various factors, including process knowledge, were sometimes used to classify components as "to be sampled" even though the uranium limits were not exceeded. However, the thorium limit (200 dpm per 100 cm^2 for removable contamination and 1,000 dpm per 100 cm^2 for fixed contamination) should be used for any components known to have handled thorium. These decision-making strategies and action levels should be used for any components known or suspected to be contaminated with thorium.

Response #7 (see attached pages 2-63 and 2-64)

The components known to have contained or processed thorium were placed into the "significant contamination" classification grouping in Section 2.4.3. In Section D.3.4, the thorium buildings were then categorized as requiring sampling. This was the first level screening done for all components. After this, the remaining components were screened against limits for uranium contamination.

Responses to Specific USEPA Comments on the OU3 Sampling and Analysis Plan (SAP)

Comment #8

Section D.3.4.3.4, Page D.3-21, Line 22 through 26. The text states that transite samples will be collected from locations with the greatest potential for chemical contamination. DOE should discuss the criteria used to determine which locations have the greatest potential for chemical contamination.

Response #8 (see attached page D.3-21)

The sentence on page D.3-21 in Section D.3.4.3.4 will be modified to read "...and therefore limit disposal options, ten samples will be taken from transite at site locations with the greatest potential for chemical contamination based on process knowledge and visual inspection. Ten components have been selected and are identified as the: Preparation Plant (1A); Ore Refinery Plant (2A); Hot Raffinate Building (3E); Green Salt Plant (4A); Metals Production Plant (5A); Metals Fabrication Plant (6A); Plant 7 (7A); Recovery Plant (8A); Special Products Plant (9A); and the Incinerator Building (39A). These components were selected for transite sampling due to the process activities that occurred within them. Within each component, the sampling location will be determined by the concentrations and types of chemicals involved with the process area and visual stains on transite surfaces."

Comment #9

Section D.4.3.4, Pages D.4-20 and D.4-21. This section states that characterization of physical properties of contaminants or contaminated matrices (particle size, porosity, density, and so on) is required to establish and assess potential remedial actions. However, no further information regarding sampling and analysis for physical properties is provided. These omissions should be addressed.

Response #9 (see attached page D.4-21)

The following sentence will be added to page D.4-21: "Characterization of physical properties would be obtained during treatability studies, if necessary to support detailed evaluation of a potential remedial alternative."

Responses to Specific USEPA Comments on the OU3 Sampling and Analysis Plan (SAP)

Comment #10

Section D.5.1.1, Page D.5-2, Lines 1 through 3. This section indicates that air will be sampled and analyzed for short-lived (radon, thoron, and their daughters) and long-lived radionuclide contamination. This appears to contradict Sections D.3.2.2 and D.5.1.1.4, which state that only air sampling and analysis for radon will be performed. These discrepancies should be addressed, and the work plan and SAP should be revised to include air sampling and analysis for longer-lived radionuclide particulate contamination (see SAP Specific Comment #2).

Response #10 (see attached pages D.5-2 and D.3-5)

There will be two types of air sampling performed for the OU3 RI:

- Radon (Rn-222) and thoron (Rn-220) air sampling, and
- Radiological air sampling for laboratory analysis of longer-lived radionuclide particulate contamination.

The WPA will be revised at several points to reflect the different types of air sampling.

Comment #11

Section D.5.1.1, Page D.5-2, Line 4. This line states that continuous air monitoring will be employed if "significant levels" are observed. The term "significant levels" is vague. The action level for implementing continuous air monitoring should be clearly defined.

Response #11 (see attached pages D.5-2)

The grab air sampling program for radon (Rn-222) and thoron (Rn-220) described in Section D.5.1.1 is for the purpose of determining personal protective equipment and assisting in industrial hygiene evaluations.

The continuous air sampling program for radon and thoron is not related to the results obtained from the grab samples. Alpha track etch cups, used for continuous sampling, are placed routinely in components that have a history of handling or storing radium-226 and thorium-232. These samplers are changed quarterly and analyzed by a specialty contractor.

Section D.5.1.1 will be revised to remove all references to an "action level" for continuous air sampling for radon and thoron.

Comment #12

Section D.5.1.1.4, Page D.5-4, Lines 15 and 16. The text states that "where possible continuous air sampling will be used for representativeness." This statement appears to contradict Section D.5.1.1, which states that continuous air sampling will be imposed once action levels are triggered (see SAP Specific Comment #11). This discrepancy should be resolved.

Response #12 (see attached pages D.5-4)

The paragraph in section D.5.1.1.4 that discusses using continuous air sampling for representativeness is describing the continuous general area sampling that will be done in each component for analysis of longer half-lived radionuclide airborne particulate contamination. There is no action level for this sampling, it will be done for each component.

Section D.5.1.1, which states that continuous monitoring will be done if significant levels are observed, was written for the radon air sampling. This has also changed. In all components where radium and/or thorium was previously handled or stored is currently being monitored quarterly for radon and thoron.

These sections will be revised to better distinguish between these types of air sampling and to provide more detailed information.

Comment #13

Section D.5.1.1.6, Page D.5-5, Lines 1 through 15. This section presents the advantages and disadvantages of the two proposed methods for polychlorinated biphenyl (PCB) analyses. For the reasons presented by DOE, EPA recommends that the on-site gas chromatograph (GC) be used for PCB analyses.

Responses to Specific USEPA Comments on the OU3 Sampling and Analysis Plan (SAP)

Response #13 (see attached page D.5-5 and D.5-11)

Unfortunately, the use of an on-site gas chromatograph for the use of screening PCBs will not be possible due to the limited ability of the FEMP organic laboratory. Test kits will be used to screen for the presence of PCBs and determine where intrusive samples will be taken. These intrusive samples will be analyzed for PCBs by ASL C with 10% analyzed for ASL D.

Section D.5.1.1.6 of the WPA will be revised to delete the on-site screening of PCBs by GC.

Comment #14

Section D.5.1.2.1, Page D.5-6, Lines 25 through 29. This section indicates that final sampling locations will be selected on the basis of highest beta-gamma activity. It further states that removable alpha and removable beta-gamma measurements will be used to supplement total beta-gamma measurements. The type of radiological surface contamination surveys (fixed, removable, or total) to be conducted is not clear. Refer to RI work plan General Comment #3 regarding the terminology used for radiological surface contamination. If fixed surface contamination sampling will be performed, the logical sampling procedure would involve "cleaning" the surface of removable contamination with a swipe sample, thereby providing equal numbers of both sample types. Even if the swipe sample is not retained for analysis, the surface should still be cleaned of removable contamination before the fixed contamination readings are taken. This issue needs further clarification, and more detailed sampling procedures should be provided.

Response #14

As discussed in the response to RI General Comment #3, total contamination throughout the WPA refers to fixed plus removable. Using this terminology, the text in Section D.5.1.2.1 is correct in stating that the locations of field sampling will be selected on the basis of highest total beta-gamma activity, with supplemental data obtained from removable alpha and removable beta-gamma swipes. The WPA will be checked for consistency in this terminology.

Fixed surface contamination sampling will not be performed. Protocol 1: Nonintrusive Sampling discusses that the radiological screening consists of a series of total survey measurements that are used to pinpoint the "hot spot". At this location, a swipe sample is

conducted to determine removable levels at the "hot spot".

Comment #15

Section D.5.1.2.1, Page D.5-7, Lines 6 through 37. This section describes the procedures that will be used to conduct radiological surveys of major media. However, the discussion does not provide any information regarding how the precise locations of survey points (particularly hot spots) will be accurately identified and recorded. Given the small scale of the existing maps and the large size of many components, it is unlikely that this will be accomplished with the precision required without the use of surveying techniques and equipment. This issue should be addressed.

Response #15

The Building 39A FWP (see Section 4 of the ***WPA Comment Response Package***) provides an example of the prototype for detailed maps which will be used to record the location of highest contamination. A detailed map will be produced for each process area within a component, thereby increasing the precision in which the contaminated location or "hot spot" is recorded. The location is identified relative to specific details on the maps. The surveying technician will document the location on the map and record information on a radiological survey report form. The technician will physically mark the location of contamination with a chalk/crayon substance. Once the location has been documented on the maps/report forms and the contaminated surface marked, the survey data will be entered into the radiological specific database and the sitewide environmental database.

Comment #16

Section D.5.1.3.2, Page D.5-11, Lines 14 through 16. This sentence states that the areal extent of PCB contamination exceeding the regulatory limit of 100 micrograms (µg) per 100 cm^2 may be determined through further swipe sampling and analysis at ASL B. Use of ASL B is not appropriate to establish the extent of PCB contamination; GC analysis at ASL C should be used instead. This issue should be addressed.

Responses to Specific USEPA Comments on the OU3 Sampling and Analysis Plan (SAP)

Response #16 (see attached pages D.3-10 and D.5-11)

The use of an on-site gas chromatograph for the use of screening PCBs will not be possible due to the limited ability of the FEMP organic laboratory. Test kits will be used to screen for the presence of PCBs and determine where intrusive samples will be taken. These intrusive samples will be analyzed for PCBs by ASL C with 10% analyzed for ASL D.

This section of the WPA will be revised to delete the on-site screening of PCBs by GC.

Comment #17

Section D.5.1.3.3, Page D.5-11, Lines 27 through 30. The text states that the suite of x-ray fluorescence analytes will be determined at a later time. The work plan and SAP should present the specific analytes proposed. This information should also be included in the CSSPs.

Response #17 (see attached pages D.4-17, D.5-2, D.5-5 to D.5-6, D.5-11 through D.5-13)

A portable XRF will be used in the field for the purpose of determining the spot for intrusive sampling based on metals content. The XRF is capable of screening for all metals on the TAL inorganics list that have an atomic number between 16 and 92. This excludes aluminum, beryllium, magnesium, and sodium.

The choice of what metals will be screened for each component will be based on Table A.3, which lists specific metals that are known from process knowledge to be contaminants for each component. This information will not be added to the CSSPs because it is readily available in Table A.3

Comment #18

Section D.7.2.3, Page D.7-2, Lines 22 and 23. These lines state that the FWPs will specify the appropriate number and types of blanks. EPA notes that the frequency of collection of QA samples is not specified in the SCQ. This information should be included in the revised

SCQ for review and approval. Also, because most components will require fewer than 10 investigative samples, it will be difficult for reviewers and sample technicians using the FWPs alone to ensure that the appropriate number of QA samples are identified and collected. Both the SAP and SCQ should include all appropriate discussion and table specifying the required number of QA samples.

Response #18 (see attached page D.7-3 to D.7-4)

The SCQ references to the types and frequencies of field QA/QC samples are Section 4 and Table 2-2. OU3 has further refined these definitions to be specific to our situation. These definitions will be added to Section D.7.2.8, Internal Quality Control Checks and Frequencies.

To ensure that the appropriate number of field QA samples are being collected the following procedure will be followed: the sampling schedules will be used to develop a tentative schedule for field QA sample collection, then the actual QA sample collection will be tracked internally, and the FWPs will be revised within the week prior to sample collection to reflect any changes in the QA sample schedule.

Comment #19

Section D.7.2.3, Page D.7-2, Lines 23 through 27. The text states that one duplicate sample will be taken for each significant matrix to represent the first sample from each group of 20 samples. The collection frequency of other QA samples (blanks and spikes) is not specified. EPA Region 5 quality assurance project plan guidance requires that field blanks, equipment blanks, and duplicate samples be collected at a frequency of 1 for every 10 investigative samples (per matrix) collected. Matrix spike/matrix spike duplicate samples are to be collected for every twentieth sample. The SAP, SCQ, and FWPs should be revised accordingly.

Response #19 (see attached page D.7-3 to D.7-4)

The collection frequency for field QA samples is in Section D.7.2.8, Internal Quality Control Checks and Frequency, and references SCQ Table 2-2. This section is to be revised to include OU3 specific definitions for field QA samples. In these definitions, the frequency will remain as specified in the SCQ (1 per 20) but will further define the term "sampling event".

Responses to Specific USEPA Comments on the OU3 Sampling and Analysis Plan (SAP)

On August 28, 1992 the U.S. EPA approved the SCQ pending incorporation of comments covering sample custody and data validation. Since that time, the comment responses have also been accepted by the EPA. The definition of field QA samples was included in the version that was approved in August, 1992.

The WPA and SAP are required to follow the SCQ and the SCQ definition for frequency of field QA/QC samples.

Comment #20

Section D.9.0.2, Page D.9-3, Lines 4 through 8. The text states that the radiological survey data have been deemed acceptable for RI decision-making. DOE should indicate that this determination has not yet been made by EPA.

Response #20 (see attached page D.9-3)

The text of the affected section will be revised to better define the limited uses of the data for decision-making. The original statement was intended to portray the data as useable for determination of intrusive sampling locations and for overall gauging of contamination levels in the component, not to extend the data use to other more intensive uses requiring higher quality levels. See attached page D.9-3 for revisions.

Section 2 OEPA RI/FS WPA Comments and DOE Comment Responses

The following section includes a reiteration of the OEPA comments with corresponding comment responses proposed by DOE. Each comment response also includes a reference to the number of the revised pages from the December 18, 1992 submittal of the RI/FS WPA. The comment responses reflect the discussions held between USEPA, OEPA, USDOE, and FERMCO on February 18, 1993.

Responses to General OEPA Comments on the OU3 RI/FS Work Plan Addendum

Comment #1

Flexibility must be built into any useful work plan. Actual conditions always vary to some extent from anticipated conditions. However, the use of non-specific terms such as significant volume, representative samples, significant presence, and the like should be avoided as much as possible in work plans and in preparing the Field Work Packages (FWPs).

Response #1

It is agreed that non-specific terms should be avoided. Where it is possible to provide specific information in place of these terms, information will be detailed. The ***OU3 RI/FS Work Plan Addendum*** (WPA) will be reviewed for these nonspecific phrases. Note that in many cases information concerning specific component conditions is unavailable until the sampling crews reach the field at the time of sampling. Due to continual maintenance and other site activities, component conditions will not remain static. Section D.9 of the Sampling and Analysis Plan (SAP) is an attempt to view the site at a single point in time, and therefore, some flexibility is required to allow the adaptation of the field sampling approach in the field to the specific component conditions.

Specific component conditions will be ascertained by detailed component inspections for final development of the Field Work Packages (FWPs) to minimize modifications or additions to the sampling approach in the field.

Comment #2

In Section 2.4.2, page 2-58, line 14, of the work plan addendum, it is stated "Sampling during the RI/FS field activities will provide the primary source of information on chemical contamination of OU3." However, very little discussion on chemical sampling is presented in either document, especially Section D.9. Added discussion of chemical sampling should be considered for inclusion in possible OU3 Work Plan Addendum revisions and in the Field Work Packages.

Response #2 (see attached page D.4-20)

Chemical sampling is discussed throughout the WPA. It is included in the discussion of data

needs in Section 3 (e.g., in Table 3.3, Summary of Data Needs for Baseline Risk Assessment), and in the discussion in Section 4 relative to the data collection approach (e.g., Table 4.2 and Section 4.3). In fact, in Section 4.3.1.2, pages 4-22 and 4-23, it is stated that all intrusive samples will be analyzed for the TAL list of inorganics and the TCL lists of semivolatile and volatile organics, as well as the TCL list of PCBs to the extent practical for the media being sampled. The sampling approach, including chemical samples is further defined in Sections D.3, D.4 and D.5 of the SAP, with Table D.4.7, page D.4-20, being revised to reflect the specific group of analyses to be performed on specific media. Section D.9 simply indicates the media samples to be taken, with the resultant analyses being consistent across all samples of that media in accordance with these previously stated data needs, the general sampling approach, and Table D.4.7.

Responses to Specific OEPA Comments on the OU3 RI/FS Work Plan Addendum

Comment #1

Section 2, Page 63, Line 17. The reference to the three buildings does not correspond to the information provided.

Response #1 (see attached pages 2-63 and 2-64)

The WPA text in Section 2.4.3.2 will be changed to include reference to all five thorium warehouses. Revised WPA text is included in Section 3 of the ***WPA Comment Response Package***.

Comment #2

Appendix A, Page 133, Line 8. DOE indicates that newer buildings will not be surveyed for asbestos if they were built after the asbestos ban went into effect. Regulations allow buildings constructed after the ban to be either certified by the architect as being "asbestos free" or an asbestos survey is required, regardless of the construction date, prior to demolition.

Response #2 (see attached page A-133)

DOE concurs with EPA and the text will be revised to indicate this concurrence.

Comment #3

Section D.3, Page 21, Line 22. Define "a small number" of samples.

Response #3 (see attached page D.3-21)

The definition of "a small number" in this case is ten. As referenced in Table D.8-3 and Section D.9.0.8, ten transite samples will be collected. The referenced sentence will be changed to read: "...and therefore limit disposal options, ten samples will be taken from transite at site locations with the greatest potential for chemical contamination based on process knowledge and visual inspection. Ten components have been selected and are identified as the: Preparation Plant (1A); Ore Refinery Plant (2A); Hot Raffinate Building (3E);

Green Salt Plant (4A); Metals Production Plant (5A); Metals Fabrication Plant (6A); Plant 7 (7A); Recovery Plant (8A); Special Products Plant (9A); and the Incinerator Building (39A). These components were selected for transite sampling due to the process activities that occurred within them. Within each component, the sampling location will be determined by the concentrations and types of chemicals involved with the process area and visual stains on transite surfaces."

Comment #4

Section D.5, Page 4, Line 30. The field data obtained by the PID can be enhanced using a Flame-Ionization (FID) in conjunction with the PID. An FID provides reliable field data which may improve the quality of the field data. It is not as susceptible to environmental conditions and is responsive to a large detection spectrum.

Response #4 (see attached pages D.5-4 and D.5-5)

Both PID's and FID's are planned to be utilized during field survey activities. The instruments may be used in conjunction with each other or separately. The determination of instrument utilization will be based upon the suspect contamination of the specific area to be surveyed, and the detection capability of each instrument for the contaminant . The daily weather conditions will also contribute to the determination do to each instruments' sensitivity to meteorological conditions. Specific information concerning the PID and FID is provided in procedures EP-CRU3-027 and EP-CRU3-012, respectively.

Comment #5

Section D.5, Page 18, Line 4. Rephrase sentence or explain the need to remove "surface contamination" from the steel structure prior to sampling.

Response #5 (see attached page D.5-18)

This sentence is referring to the actual taking of the structural steel sample and will be changed to: "Structural steel in wet process areas is likely to be corroded and will require

vigorous abrasive action to remove the sample."

Comment #6

Section D.9, Page 107, Line 16. The protection of personnel from unnecessary exposure to any contaminant is a very good work practice. The sentence, however, needs to justify the fact that the thorium will eventually be moved and sampling will occur at that point in time.

Response #6

The component-specific sampling plans for the components that currently store thorium will contain the statement: "To prevent technician exposure to unnecessary doses of radiation, component sampling will occur only after the thorium material has been removed from the component." As discussed in Section 2.4.3.2, thorium is currently stored in Buildings 60, 64, 65, 67, and 68.

In addition, a statement in Section D.9.0.4 reiterates the position that sampling locations, such as the thorium warehouses, may be considered inaccessible if high radiation levels violate the as-low-as-reasonably-achievable (ALARA) principles. In these cases, an alternative sampling schedule will be identified to maintain the intent of the sampling program.

Comment #7

Section D.I, Page 10, Lines 4-5. The description given for the FID's use and calibration is poor. Provide further detail into this instrument's use.

Response #7 (see attached page D.I-10)

WPA text has been revised to state, "This method describes taking field measurements through the calibration and use of the Sensidyne Portable Flame Ionization Detector (FID). Refer to Appendix I of the SCQ for more information concerning the calibration of the FID. Appendix K of the SCQ discusses the use of the FID for field measurements."

Responses to Specific OEPA Comments on the OU3 RI/FS Work Plan Addendum

Comment #8

Section D.I, Page 19. The description given for the portable gas chromatograph use and calibration is poor. Provide further detail into this instrument's use.

Response #8 (see attached page D.I-19)

WPA text has been revised to state, "Procedure EP-CRU3-026, currently in development, will provide instructions for the operation and utilization of a Photovac 10-S Plus Portable Gas Chromatograph. The procedure will provide specific calibration and operational information and will be attached to this document. Appendix I of the SCQ will be revised for Portable GC calibration requirements".

Comment #9

Section D.8, Page 11. Assuming all 32 technicians will be involved 8 hours a day for the 2075 days projected to procure 829 samples, total man-hours involved in the sampling event equals 531,200. That breaks down to 640 man-hours per sample. Procedures should be evaluated to increase productivity of sample collection at OU3.

Response #9 (see attached pages D.8-2, D.8-3, D.8-5 and D.8-6 through D.8-11)

The assumptions of the question are erroneous. The text below provides a revised estimate of the total program duration and hours. Table D.8-3 has been updated to exhibit revised duration estimates. As described in Table D.8-2, an eight day float time is incorporated for each component. These eight days represent presampling activities. Presampling activities consist of all actions required before the sampling crews initiate the sampling tasks (eg., particulate air sampling, nonintrusive surveys, radiological survey assessment, etc.). OU3 will utilize a total of 32 sampling technicians working in four teams consisting of eight people per team. The four teams will work simultaneously on different components, starting in June of 1993. Each team is assigned an average of 186 work days in the total program. The eight technicians per team will be involved ten hours per day, four days per week for the 186 days which computes to 14,880 man-hours per team. The four teams are scheduled to collectively work 59,520 total man-hours. The total number of samples indicated in

Table D.8-3 is 832. Productivity is represented as 72 man-hours per sample.

The chronological, physical steps for collecting samples were analyzed. Man-hours were assigned to each step of the collection process to determine a media-specific, total man-hour estimate required to collect each sample. Teams were assigned components so that all work will be completed in the same area of the site and the same process area within the component before moving on to the next component. This method accomplishes the following time saving activities: equipment can be stored in the facility until the component is complete, thereby decreasing the number of travel times required to the equipment warehouse to pick up and drop off sampling equipment, one decontamination line may be set-up and reused for multiple times, and this method minimizes technician briefings, such as identifying locations of eye washes, showers and other component specific information. Other activities include: matrixing field sampling and radiological technicians are matrixed specifically to OU3, simplifying the FWP, and utilizing the on-site laboratory to supply pre-made container labels and the QC department to supply pre-made trip blanks. SAP Tables D.8-1, D.8-2 and D.8-3, along with Section D.8.3 have been revised.

Comment #10

Comments and Responses, Page 23. If vessel leakage of contents that are unknown or known to be of potential concern is identified by FWP inspection or by field sampling crews, ASL C analysis should be the minimum analytical level.

Response #10

DOE is uncertain of the reference for this comment (i.e., page 23), although it appears to be related to the discussion on page D.3-5 of the SAP relative to container leakage. If there is no potential or actual release of hazardous substances, and the liquid within the vessel is unknown/uncharacterized, a supplemental sample will be scheduled in the FWP for this liquid. The sampling approach in the WPA calls for any unknown/uncharacterized liquids to be analyzed at a minimum ASL C.

Responses to Specific OEPA Comments on the OU3 RI/FS Work Plan Addendum

Comment #11

Section D.3.2.2, Page D.3-6, Line 2. The use of the non-specific term "significant volume" should be quantified or put in context of what is anticipated to be encountered (i.e., greater than one quart, five gallons, etc.) in the Field Work Packages. See General Comment #1.

Response #11 (see attached page D.3-6)

The sentence in Section D.3.2.2 which contains the non-specific phrase "significant volume" will be clarified to read, "To meet these objectives, container dimensions will be measured and potential leak rates postulated, and composition of unknown liquids will be determined from grab samples where volume is sufficient to provide for desired analysis."

Comment #12

Section D.3.2.2, Page D.3-6, Line 7. Quantify or elaborate by what "representative samples" in this case means. What grab and composite sampling strategies will be used? These issues should be addressed in the Field Work Packages for pond and basin sampling. See General Comment #1.

Response #12 (see attached page D.3-6)

The text in Section D.3.2.2 has been modified to state, "Identification and preliminary characterization of potential sources and pathways is the principal goal of the surface water and sediment sampling of ponds and basins. The collection of surface water and sediment samples is designed to identify and characterize radiological and chemical contamination in ponds and basins. To ensure that the characteristics of the pond/basin are accurately portrayed, grab surface water and sediment samples will be collected at one point in time, in various locations to be uniformly distributed over the impoundment. Samples will be representative of the basins (though not statistically stated), with locations based on process knowledge, existing data, instrument surveys, and observations. Grab/intrusive samples will be collected and composited for submittal for laboratory analysis. Grab and composite sampling strategies are based on protocol specified in the SCQ, Section K.4.3."

Responses to Specific OEPA Comments on the OU3 RI/FS Work Plan Addendum

Comment #13

Section D.3.3, Page D.3-7, Line 30. Variability in sampling media, especially soil, is inherent. If the contaminant levels in sample results from an area investigated are considerably less than anticipated (i.e., by an order of magnitude less) from an area of known or suspected contamination, consideration should be given to collecting additional samples for analysis. Likewise, if the sample results from an area investigated are considerably higher than anticipated from known or suspected "clean" areas, then consideration should be given to additional sample collection and analysis. This is a major consideration in the sampling effort as noted on page D.3-17, lines 7-10.

Response #13 (see attached page D.3-17)

The text has been modified to state, "DOE agrees that unusual situations which are encountered in the field may require modifications or additions to the sampling approach. A logistics inspection is performed as part of the presampling activities. The inspection is designed to identify any anomalies which may be present, may affect the sampling process, and can be pre-identified. An amendment or modification of the FWP may be generated based on the results of the logistics inspection or any irregularities noted during other presampling or sampling activities. If sample data is returned to DOE with higher or lower contaminant levels than anticipated, resampling may be initiated and an amended version of the FWP describing resampling conditions and locations shall be produced.

Comment #14

Section D.5.1.3.2, Page D.5-11, Line 10. For potentially contaminated surfaces and loose media, surface swipes using a glass fiber filter wetted with hexane is proposed. Due to the hazards associated with hexane, can a substitute agent with less hazardous properties be used?

Response #14 (see attached page D.5-11)

The on-site laboratory GC will not be used for the purpose of screening PCBs due to limited on-site capability. Field test kits will be used instead. At this time, no surface swipe samples for PCB screening will be taken.

Responses to Specific OEPA Comments on the OU3 RI/FS Work Plan Addendum

Comment #15

Section D.9, Page D.9-1. Great detail is provided for the number, location, type, and analytical history of radiological samples, however, little information is provided for chemical sample number, suspected location, type, or analytical history. Can information on chemical analysis be included in the Field Work Packages?

Response #15 (see attached page D.9-9)

The FWPs will present any chemical analytical history available in Section 3.0, Sample Location. Chemical analysis results or an analytical history are not, however, usually present for OU3's facilities and/or media. Extensive chemical contamination (inorganic, VOC, SVOC) at levels of concern is not anticipated in most of OU3's components. Hazardous chemicals which were used in small amounts and mobile or volatile contaminants are not expected to adhere to, or remain on, surfaces. If process knowledge or data results are present; however, DOE will utilize this information to direct screening and intrusive sampling locations, numbers and types.

Two sections of the SAP describe how areas are targeted for intrusive sampling and the intrusive sampling procedures. Section D.5.1, Protocol 1: Nonintrusive Sampling, discusses methods for selecting field screening locations, screening frequencies and chemical screening procedures. Section D.5.2, Protocol 2: Determining Final Intrusive Sampling Locations, provides guidance for selecting the final locations for chemical intrusive sampling following evaluation of the nonintrusive screening results. In general, these sections state that chemical field screening shall be performed where there is evidence or suspicion of chemical contamination. These locations are determined primarily on process knowledge, visual inspection and natural collection points and include: collection points for runoff, areas that are pathways to the environment or human receptors, areas from process knowledge which are suspected contaminated or near electrical transformers, and bulk liquid and solids of uncertain identity. One intrusive sample will be collected at the location of highest identified chemical contamination per major medium, per process area. In the case where chemical screening results are ambiguous, intrusive samples for chemical determinations will be taken at the same location as the radiological intrusive sample. Conversely, if there are more than

one distinct areas of chemical and radiological contamination, more than one intrusive sample may be taken, see Section D.5.2. Intrusive samples will be sent for laboratory analysis to establish the types and levels of chemical and/or radiological contamination. The text in Section 4.2.2.7 has been modified to respond to this comment.

Section 3 RI/FS Work Plan Addendum Major Changed Pages

The following section includes:

- A cross reference of the changes to the OU3 RI/FS WPA resulting from the resolution of USEPA and OEPA comments.
- A draft copy of each significantly changed page in the OU3 RI/FS WPA resulting from comment resolution.

The basis for inclusion of the changed pages from the RI/FS WPA document is the anticipation of USEPA Conditional Approval of the document, pending formal issue of the revised Final document.

It should be noted that not all changes to the RI/FS WPA are complete at this time. The following are examples of changes not yet complete:

- Global changes affecting each of the Component-Specific Sampling Plans (CSSPs) have been addressed in specific comment responses, but each affected page has not yet been changed.
- Changes to the document as a result of adopting the Proposed Plan approach for an Interim ROD have not yet resulted in change pages. Section 5 of this transmittal contains a discussion of adjustments required to each section of the RI/FS WPA as a result of the Proposed Plan.

Changes to RI/FS WPA pages include ~~strikeout~~ graphics for deleted text and redline graphics for inserted text. Change pages are provided on yellow paper, intended to support use as inserts to show revisions to the original December 18, 1992 WPA submittal.

USEPA Comment Responses / WPA Affected Pages Cross-Reference Table

USEPA Comment Response	Section/Table	Affected Page(s)
RI General Comment #1	Section 2.3.5	2-38, 2-40, and 2-41
RI General Comment #2	Section 2.4.3 and Table A.4.0	2-62, A-99, and A-101 through A-103
RI General Comment #3	Section 2.3	2-59
RI General Comment #4	Table A.4.0	A-99, and A-101 through A-103
RI General Comment #5	Section 1.2	1-4
RI General Comment #6	Sections D.7.2.5 and D.7.2.9	D.7-3 and D.7-4
RI General Comment #7	Section 2.5.1	2-75
RI General Comment #9	Sections 4.3.1.2, D.5.3.2, and D.I.3 Table D.6-3	4-22, D.5-16, D.5-17, D.6-7, and D.I-66 through D.I-81
RI General Comment #10	Sections D.4.3.2, D.5.1.1, D.5.1.1.7, and D.5.1.3.3 Table D.3-2	D.3-13, D.4-17, D.5-2, D.5-5, D.5-6, and D.5-11 through D.5-13
RI General Comment #11	Section 4.2.1	4-7
RI General Comment #12	Table D.6-1	D.6-3 and D.6-4
RI General Comment #13	Section D.5.1.1.4	D.5-4
RI Specific Comment #1	Section 1.2	1-4
RI Specific Comment #2	Section 2.4.3	2-62
RI Specific Comment #5	Section 2.4.3.2	2-63
RI Specific Comment #6	Section 2.4.3.2	2-63 and 2-64
RI Specific Comment #8	Section 2.4.4	2-72
RI Specific Comment #9	Section 2.5.1	2-74, 2-75, 2-91 through 2-93
RI Specific Comment #10	Section 2.5.1	2-74
RI Specific Comment #11	Section 4.2.2.7	4-11
RI Specific Comment #12	Section 4.2.2.7	4-11 and 4-12
RI Specific Comment #13	Section 4.2.2.7	4-12
RI Specific Comment #14	Section 4.2.2.7	4-12 and 4-13
RI Specific Comment #16	Section 4.3.2	4-24
RI Specific Comment #17	Section 4.5	4-38 and 4-39
SAP General Comment #1	Sections 4.3.1.2 and D.I.3 Tables D.5-1 and D.6-3	4-22, D.5-16, D.5-17, D.6-7, and D.I-66 through D.I-81
SAP General Comment #2	Section 1.2	1-4
SAP General Comment #3	Sections D.4.3.3 and D.4.3.4 Tables D.4-4, D.4-6 and D.4-7	4-23, D.4-15 and D.4-18 through D.4-20
SAP General Comment #4	Sections D.4.2.1 and D.4.3.3	D.4-1, D.4-18, and D.4-19
SAP General Comment #5	Section D.5.1.1	D.5-2
SAP General Comment #6	Section D.9.0.1	D.9-1
SAP General Comment #8	Table A.4.0	A-99, and A-101 through A-103,
SAP General Comment #10	Section D.4.6.1	D.4-23 through D.4-25
SAP Specific Comment #2	Table D.4-6 and Section D.3.2.2	D.3-5, D.4-19, D.5-9, and D.5-10

USEPA Comment Responses / WPA Affected Pages Cross-Reference Table

USEPA Comment Response	Section/Table	Affected Page(s)
SAP Specific Comment #3	Section D.3.2.2	D.3-6
SAP Specific Comment #5	Section D.3.3.1	D.3-7
SAP Specific Comment #6	Table D.3-2	D.3-12 and D.3-13
SAP Specific Comment #7	Table 2.6 and Section 2.4.3.2	2-63 and 2-64
SAP Specific Comment #8	Section D.3.4.3.4	D.3-21
SAP Specific Comment #9	Section D.4.3.4	D.4-21
SAP Specific Comment #10	Sections D.3.2.2 and D.5.1.1	D.3-5, D.5-2, D.5-9, and D.5-10
SAP Specific Comment #11	Section D.5.1.1	D.5-2 and D.5-10
SAP Specific Comment #12	Section D.5.1.1.4	D.5-4, D.5-9
SAP Specific Comment #13	Section D.5.1.1.6 and D.5.1.3.2	D.5-5 and D.5-11
SAP Specific Comment #16	Table D.3-1 and Section D.5.1.3.2	D.3-10 and D.5-1
SAP Specific Comment #17	Sections D.4.3.2, D.5.1.1, and D.5.1.3.3	D.4-17, D.5-2, D.5-5, D.5-6, and D.5-11 through D.5-13
SAP Specific Comment #18	Section D.7.2.9	D.7-3 and D.7-4
SAP Specific Comment #19	Section D.7.2.9	D.7-3 and D.7-4
SAP Specific Comment #20	Section D.9.0.2	D.9-3

OEPA Comment Responses / WPA Affected Pages Cross-Reference Table

OEPA Comment Response	Section/Table	Affected Page(s)
General Comment #2	Section D.4.3.3, Table D.4-7	D.4-20
Specific Comment #1	Section 2.4.3.2	2-63 and 2-64
Specific Comment #2	Appendix A, Table A.4.5	A-133
Specific Comment #3	Section D.3.4.3.4	D.3-21
Specific Comment #4	Section 5.1.1.5	D.5-4 and D.5-5
Specific Comment #5	Section D.5.3.2.2	D.5-18
Specific Comment #7	Section D.I.1.1	D.I-10
Specific Comment #8	Section D.I.1.7	D.I-19
Specific Comment #9	Section D.8.3 and Tables D.8-1, D.8-2, and D.8-3	D.8-2, D.8-3, D.8-5 through D.8-11
Specific Comment #11	Section D.3.2.2	D.3-6
Specific Comment #12	Section D.3.2.2	D.3-6
Specific Comment #13	Section D.3.4.2	D.3-17
Specific Comment #14	Section D.5.1.3.2	D.5-11
Specific Comment #15	Section D.9.0.9	D.9-9

risks to public health and the environment. The general objectives of the RI/FS process for OU3 are as follows:

- Characterize radiological and chemical contamination in OU3 ~~as necessary~~ to allow evaluation of remedial action alternatives and to support the needs of the baseline risk assessment,
- Assess potential risks to human health and the environment that could result from exposure to contaminants ~~for baseline conditions~~,
- Identify and mitigate any immediate hazards resulting from existing conditions in OU3, and
- Evaluate potential remedial action alternatives and select and implement the most effective remedy.

Specific objectives are discussed in Sections 3 and 4 when data needs and data collection approach are considered. Characterization data will be used to support the decision-making process of the RI/FS and not for the final disposition of materials. All materials will be thoroughly surveyed during remediation, prior to disposition.

Any remedial action activities for OU3 will be conducted in accordance with all applicable or relevant and appropriate requirements (ARARs) to the extent required by CERCLA.

1.3 PURPOSE AND ORGANIZATION OF THIS WORK PLAN ADDENDUM

The purpose of this Work Plan Addendum is to document the approach developed for RI/FS activities for OU3. The work plan includes an evaluation of available information; an identification of data needed to evaluate risks and alternatives, as well as for other purposes; and an approach for collecting missing data. Also included are discussions of the various RI/FS tasks, the schedule for these activities, and project management.

The following subsections in this introduction provide an overview of environmental compliance issues for OU3 and summarize the overall approach presented in this work plan for addressing data gaps. The role of other agencies and the public in RI/FS activities is also discussed.

Section 2 summarizes historical and existing conditions for OU3. First, the history of the site and the various processes that have been used in the Production Area are discussed, and a detailed description of the Production Area is presented. Next, the environmental setting for OU3 is summarized,

River, except during dry periods, when the gradient is reversed. Intermittent recharge to the aquifer also occurs along Paddys Run.

The groundwater in the regional aquifer enters the FEMP study area from the buried valleys on the west, north, and east. Natural gradients cause the groundwater to exit the FEMP study area by either flowing east to the Great Miami River upstream from New Baltimore, or by flowing south through the branch of the bedrock channel west of New Baltimore. In either case, the Great Miami River is the ultimate receptor of all groundwater in the study area (Figure 2.10).

The large pumping wells of the Southwest Ohio Water Company (SOWC) in the Big Bend meander of the Great Miami River east of the FEMP produce a pronounced and persistent cone of depression in the potentiometric surface centered on the pumping wells. Groundwater elevation maps indicate that the cone of depression from the SOWC wells influences groundwater flow patterns beneath the FEMP. In particular, a groundwater flow divide is created such that groundwater underlying the northern portion of the FEMP, including those areas underlying the Waste Storage Area and the Production Area, flows to the east toward the SOWC wells and the Great Miami River. Groundwater from the southern and southwestern portion of the FEMP continues to flow along the natural gradient to the south-southwest through the buried valley. Near the southwestern corner of the FEMP, a groundwater component from the west is also present because of the western leg of the buried channel (Figure 2.10). This situation causes the recharge from certain reaches of Paddys Run to flow east-southeast until the regional southern component of flow is encountered.

2.3.5 Glacial Overburden Geology and Hydrogeology

The ~~major~~ hydrogeologic unit immediately beneath the Production Area is the glacial overburden that was deposited during a series of advances and retreats by a small lobe of ice that was part of the leading edge of the Wisconsin glacier. This lobe was approximately 1½-2 mi wide and advanced over the entire FEMP. The leading edge of the ice sheet probably advanced and retreated many times across the site. Each advance would have scraped and mixed the

retreat deposits, as well as carried new till into the area. ~~The net result of the successive advances and retreats was creation of the heterogeneous mix of sand and silt lenses in clays that make up the glacial overburden on top of the Great Miami Aquifer.~~ The glacial overburden, which rests on top of the Great Miami Aquifer, is composed primarily of till: a dense, silty clay that contains discontinuous and isolated lenses of poorly sorted fine- to medium-grained sand and gravel, silty sand, and silt. Lacustrine deposits lie upon till in places. The lacustrine deposits have at least one, and possibly more, laterally extensive permeable sand/silt strata. The glacial overburden exposed at the surface has relatively low permeability, so most of the precipitation that falls on it is lost to evaporation and surface water runoff. Limited infiltration occurs along the upper weathered portion of the overburden and in isolated areas where more permeable deposits of silt, sand, and gravel are the primary overburden constituents.

~~The glacial overburden ranges from about 20 to 50 ft thick across the Production Area, thickening to the west. Discontinuous sand lenses are scattered throughout the glacial overburden. These lenses are more prevalent and thicker under the western half of the Production Area than under the eastern half, where almost no sand lenses are found.~~

The thickness of the glacial overburden ranges from 5 to 50 feet within the FEMP study area, but most commonly averages between 20 and 30 feet under the Production Area. Except for some scattered deposits, this overburden does not exist along the floodplain of the Great Miami River to the east and south of the FEMP. The only on-property areas that lack overburden are certain reaches of Paddy's Run and the Storm Sewer Outfall Ditch, where this material has been eroded away. These streams are in direct contact with the upper portion of the Great Miami Aquifer along these reaches, allowing surface water leakage directly to the aquifer.

Erratically distributed pockets of sand and gravel within the glacial overburden contain zones of perched ground water. Perched groundwater is separated from the underlying aquifer by the surrounding relatively impermeable clay and silt components of the overburden. These low-permeability units behave as an aquitard that can store groundwater but transmit it slowly downward from one more porous saturated zone to another.

The clay units within the glacial overburden vary in color, generally appearing either gray or yellow-brown. These color differences are due to weathering of the unit rather than depositional differences. In general, the gray color is caused by iron present in the soils in the FeO state and is indicative of unweathered material. The color change to yellow-brown is the result of iron being oxidized to the Fe_2O_3 state, which is rust. Weathering occurs as oxygen and weak acids are carried into the

subsurface by the infiltration of surface water. The oxygen and weak acids in the infiltrating water react with the sediments and chemically alter or weather the materials in the soil. Because of the presence of joints, fractures, root tubes, and insect burrows, the weathered zone typically has an enhanced bulk hydraulic conductivity relative to the unweathered zone.

Beneath the Production Area, the depth of weathering in the glacial overburden is variable, typically ~~ranging from 7 to 14~~ less than 20 ft. Overall, there is no systematic variation; however, the depth of weathering may be relatively constant over wide areas. Weathered glacial overburden is missing entirely in a few locations where the surface is protected from infiltration. This is evident in borings in the Plant 1 area and under Plant 6. The most consistent depth of weathering is found in the northeastern portion of the Production Area, where the glacial overburden is composed primarily of clay with relatively few sand or silt beds. The depth of weathering is 9-12 ft over most of the northeastern quadrant.

~~The presence of yellow-brown clay below gray clay is direct evidence that perched groundwater is moving laterally within the glacial overburden.~~ Groundwater flow within the clays is controlled by joints and fractures. Large blocks of clay can remain unweathered because of the lack of fractures, while weathering is occurring around and below the block in a more fractured portion of the clay. This occurrence of flow and contaminant transport along fracture systems makes the prediction of flow paths within the dominantly clay-bearing zones much more difficult than when flow occurs in more uniformly permeable sand beds.

The depth to perched groundwater at the FEMP ranges from 1 to 15 feet below the land surface. This measurement can fluctuate seasonally by up to 10 feet at a single location, with the highest water levels occurring during the early spring and the lowest during the late fall.

Perched groundwater underlying the FEMP property generally flows laterally toward surface drains and potentially at a lower rate vertically downward. There is uncertainty, however, regarding horizontal movement of perched groundwater, since the perched zones may not be interconnected across the property and the materials comprising the overburden vary considerably in their ability to confine or transport water. Other influences on flow patterns within perched zones include seasonal variations in rainfall and recharge and the presence of features such as leaky storm sewers and agricultural drain tiles that were installed before the construction of the FEMP. Consequently, groundwater flow within the glacial overburden is discontinuous and nonuniform across the FEMP.

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TABLE 2.3 Guidelines for Surface Contamination

Radionuclide[b]	Allowable ~~Total Residual~~ Surface Contamination[a] (dpm/100 cm²)		
	Average[c,d] Total Contamination	Maximum[d,e] Total Contamination	Removable[d,f] Contamination
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129[g]	100	300	20
Th-natural, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000	3,000	200
U-natural, U-235, U-238, and associated decay products	5,000 α	15,000 α	1,000 α
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above[h]	5,000 β-γ	15,000 β-γ	1,000 β-γ

[a] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[b] Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should apply independently.

[c] Measurements of average contamination should not be averaged over an area of more than 1 m². For objects of less surface area, the average should be derived for each such object.

[d] The average and maximum dose rates associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h and 1.0 mrad/h, respectively, at a depth of 1 cm.

[e] The maximum contamination level applies to an area of not more than 100 cm².

[f] The amount of removable radioactive material per 100 cm² of surface area should be determined by wiping an area of that size with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm² is determined, the activity per unit area should be based on the actual area, and the entire surface should be wiped. It is not necessary to use wiping techniques to measure removable contamination levels if direct scan surveys indicate that ~~total residual~~ surface contamination levels are within the limits for removable contamination.

[g] Guidelines for these radionuclides are not given in DOE Order 5400.5. Levels provided are from the Nuclear Regulatory Commission, *Termination of Operating Licenses for Nuclear Reactors*, Regulatory Guide 1.86 (June 1974).

[h] This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 that has been separated from the other fission products or mixtures where the Sr-90 has been enriched.

Source: U.S. Department of Energy, DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, Office of Environment, Safety and Health (February 1990), ~~except as noted~~ modified to maintain consistent terminology (e.g., "surface contamination" vs. "total residual surface contamination" etc.).

the classes presented in Table 2.4 to determine the relative levels of contamination in OU3 components. Therefore, as indicated in Table 2.4, comparison is made with both measured alpha and measured beta-gamma values when classifying components. The results of this classification are summarized in the following subsections. Values reported below are for beta-gamma radiation, unless noted. Components for which no data are available have not been classified. Components with incomplete data (e.g., no total surface contamination) are included in the classification. However, the nature of missing data is noted, and the classification of such components developed in this section will not be used in identifying components that require no sampling. Based on new data collected from the ongoing Radiological Assessment program, components with new radiological survey data will be reassessed for classification. All components will be radiologically surveyed by the end of field sampling and evaluated for classification.

The classification used does not address the extent of contamination in a component. Therefore, a component with only localized contamination might still be placed in the "significant contamination" class. Use of maximum values would aggravate this problem. However, the use of average values means that areas of higher levels of contamination may be present in components placed in the "no significant contamination" class. Average values cannot be representative of all areas of large components.

The following subsections present the classification of components by category on the basis of the approach presented above.

2.4.3.1 Administration Buildings

Radiological survey data are available for 10 of the 13 administration building components. Data gathered before 1992 are available for all 10 of these components, and 7 of the 10 components also have data available from 1992. On the basis of data gathered before 1992 (Table A.4.0), all 10 of the components except for the Rust Engineering Building (45A) have average total surface contamination values below 5,000 dpm/100 cm^2, with a maximum of 4,700 dpm/100 cm^2 for accessible areas in the NAR control house (3C). The Rust Engineering Building has an average total surface contamination value of 12,000 dpm/100 cm^2 for floors on the basis of pre-1992 data. The results for 1992 (Table A.4.1) show no components with average total surface contamination levels above 5,000 dpm/100 cm^2, including 45A. Average removable surface contamination levels are well below 1,000 dpm/100 cm^2 for all components for both sets of data. Therefore, among the administration building components for

Building (45A) is in the significant contamination category. Component contamination classification is shown in Table 2.5.

2.4.3.2 Warehouse and Storage Buildings

Radiological survey data are available for 25 of the 34 warehouse and storage buildings. ~~Data gathered before 1992 are available for 10 components, and 25 components have data from 1992. Nine components have data for both years. On the basis of data gathered before 1992, only Plant 7 (7A) has average removable surface contamination above 1,000 dpm/100 cm^2, namely 2,500 dpm/100 cm^2 for accessible areas. Surveys performed in 1992 show f~~Five components are identified with average removable surface contamination greater than 1,000 dpm/100 cm^2 (Plant 5 ingot storage shelter [5G], Plant 7 [7A], quonset hut #2 [61], [old] Plant 5 warehouse [65], and the Plant 1 thorium warehouse [67]). The Plant 5 warehouse and the Plant 1 thorium warehouse are thorium storage buildings and are discussed below. The ingot storage shelter has the highest removable average of the five, with a value of 4,300 dpm/100 cm^2.

~~On the basis of total surface contamination results obtained before 1992, Plant 6 warehouse (79) has an average value of 8,000 dpm/100 cm^2; 1992 data show two more components with~~ Three components show average total surface contamination values greater than 5,000 dpm/100 cm^2: the Building 32 covered loading dock (32B), ~~and the~~ general in-process warehouse (71), and Plant 6 Warehouse (79). Only nine components have data available on total surface contamination.

Components 60, 64, 65, 67, and 68 are thorium warehouses. ~~Of these three, Components 65 and 67 are classified as having significant contamination of the basis of the classification system for uranium. Therefore, these components are placed in the significant contamination category. The same classification system applied to Components 60, 64, and 68 suggests no significant contamination. However, the components are not classified here because of possible thorium contamination. Component classification is shown in Table 2.6~~ These five thorium warehouses are assumed to have significant contamination, regardless of radiological data presented in Appendix A or as discussed above. Based on the radiological nature of thorium, these components have been placed in the significant contamination category, as shown in Table 2.6.

2.4.3.3 Process Buildings

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TABLE 2.5 Contamination Classification for Administration Buildings[a]

Significant Contamination	No Significant Contamination
Rust Engineering Building (45A)[b]	NAR Control House (3C) Service Building (11) Administration Building (14A) Security Building (28A) Human Resources Building (28B) Health & Safety Building (53A)[b,c] In-Vivo Building (53B) Process Trailers (G-006)[d] Nonprocess Trailers (G-007)[c]

[a] See Table 2.4 for ranking criteria.

[b] Classification based on total contamination criteria.

[c] Incomplete data for removable contamination.

[d] No data for total contamination for some trailers.

TABLE 2.6 Contamination Classification for Warehouses and Storage Buildings[a]

Significant Contamination	No Significant Contamination
Plant 5 Ingot Storage Shelter (5G)[d,e]	Plant 1 Storage Shelter (1B)[c,e]
Plant 7 (7A)[c,d]	Plant 4 Warehouse (4B)[c]
Building 32 Covered Loading Dock (32B)[b,e]	Plant 5 Covered Storage Pad (5F)[c,e]
Quonset Hut #1 (60)[f]	Cylinder Storage Building (12B)[e]
Quonset Hut #2 (61)[c,d,e]	Lumber Storage Building (12C)[e]
Thorium Warehouse (64)[f]	Chemical Warehouse (30A)
(Old) Plant 5 Warehouse (65)[c,d,e,f]	Drum Storage Warehouse (30B)[c]
Plant 1 Thorium Warehouse (67)[c,d,e,f]	Pilot Plant Shelter (54B)[c,e]
Pilot Plant Warehouse (68)[f]	CP Storage Warehouse (56A)[c]
General In-Process Warehouse (71)[b,e]	Quonset Hut #3 (62)[c,e]
Plant 6 Warehouse (79)[b]	KC-2 Warehouse (63)[c]
	Finished Products Warehouse(4A) (77)[c]
	Plant 8 Warehouse (80)[c,e]
	Plant 9 Warehouse (81)

[a] See Table 2.4 for ranking criteria.

[b] Classification based on total contamination criteria.

[c] No data available for total contamination.

[d] Classification based on removable contamination criteria.

[e] Classification based on 1992 data; no pre-1992 data available.

[f] Thorium warehouse.

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TABLE 2.12 Volumes of Potentially Contaminated Materials in OU3[a]

Component Category	Volume (1,000 ft³) by Material Type								
	Concrete	Cement Block	Steel	Transite	Other Metal	Soil/Rubble[b]	Asphalt	Other/Misc.[c]	Total
Buildings									
Structural materials	1,700	300	31	40	0	0	0	39[d]	2,100
Contents[e]	0	0	0	0	0	0	0	2,700[e]	2,700
Containers, etc.	130	0	7	0	0	0	0	4[f]	140
Bulk material	0	0	2	0	550[g]	980	0	190[h]	1,700
Pads, etc.	440	0	2	0	0	0	450	34[i]	920
Piping, etc.	56	0	12	0	0	0	0	20[j]	88
Ponds and basins	5	0	0	0	0	0	0	13[k]	19
Miscellaneous materials	41	0	4	0	0	0	0	9[i]	53
Totals	2,400	300	58	40	550	980	450	3,000	7,700

[a] Source: Table A.7; estimates are preliminary and are for in-place volumes. Columns may not add to totals due to independent rounding. Zeros in the table mean either that no material of the type indicated is present in that category or that the quantity is small compared with that in other major categories for which estimates are provided. Note, however, that the "other" category may include materials that could be placed in one or more of the other categories if more information were available.

[b] Represents soil from soil piles and includes all types of rubble, including concrete. ~~No soil surrounding any structures, piping, etc., is included.~~

[c] Includes material that may be a combination of materials listed in other columns.

[d] Includes various materials such as wood, fabric, and roofing.

[e] Estimated on the assumption that the volume of contents generally equals 10% of the interior volumes of buildings. Includes all contents of buildings.

[f] Tiles and bricks.

[g] Various scrap metals, uncompacted.

[h] Coal.

[i] Wood.

[j] Wood and electrical equipment.

[k] Crushed limestone.

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example, information gathered by field characterization of wastes (debris) generated during demolition of a component as part of an interim action will be used as input to decisions concerning treatment or disposal of the generated waste (if processing of that waste is included as part of OU3 remedial action). ~~Most of the interim activities are directly supportive of the objectives for continued safe and environmentally protective maintenance of the facility during the CERCLA remediation process.~~

This section describes specific work scopes and schedules for these ongoing and future activities at the FEMP to facilitate the integration of those activities into the RI/FS and remedial action process.

The DOE will develop and perform CERCLA removal actions in accordance with the provisions of Section IX of the Consent Agreement to abate, minimize, stabilize, mitigate, or eliminate the release or threat of release of hazardous substances, pollutants, contaminants, or hazardous constituents at or from the FEMP. The Consent Agreement also stipulates that the DOE is to notify the EPA in writing of proposed removal actions (i.e., through submittal of removal action work plans) and allow EPA an adequate opportunity for timely review and comment (with the exception of emergency removal actions). The submitted work plans include milestone schedules that become enforceable under the Consent Agreement.

Several CERCLA removal actions are in various stages of development within OU3. These actions can be categorized as (1) CERCLA removal actions that were in progress before the renegotiated Amended Consent Agreement of September 1991 (referred to as phase I removal actions), (2) CERCLA removal actions identified in the Amended Consent Agreement of September 1991 (referred to as phase II removal actions) and (3) new removal actions that have been identified by DOE in correspondence (January 1992) to the EPA subsequent to the signed Consent Agreement. The initial set of new removal actions is referred to as phase III removal actions in the Amended Consent Agreement. The existing removal actions, as well as the need for additional removal actions, are to be reviewed annually by DOE.

~~Thirteen~~ Sixteen removal actions that can affect the implementation of the RI/FS for OU3 have been identified and are described below. Included are one phase I action (Section 2.5.2), six phase II actions (Sections 2.5.3 and 2.5.5 through 2.5.9), five phase III actions (Sections 2.5.10 through 2.5.14), three phase IV actions (Sections 2.5.15 through 2.5.17), and one emergency action (Section 2.5.4).

The five ~~new~~ phase III removal actions identified at this time address Plant 7 dismantling, the Pilot Plant sump, the nitric acid tank car/area, management of contaminated structures, and the ongoing

asbestos-abatement program. The three phase IV removal actions address the temporary nitrate tanks, fire training facility, and the Sewage Treatment Plant incinerator. Other potential removal actions may be identified throughout the performance of the RI field sampling phase of the project and FS activities. In the event a potential or actual release of hazardous substances is observed which threatens human health or the environment, a Removal Site Evaluation (RSE) will be prepared under requirements of 40 CFR 300.410. All RSEs will be submitted to U.S. EPA for review to determine the appropriate remedial response. If deemed necessary, a removal action (RA) will be conducted under requirements of 40 CFR 300.415. In accordance with section IX, Removal Actions, paragraph H of the Amended Consent Agreement, DOE will notify the Agency in writing of all proposed RAs for review and comment. ~~Potential new removal actions are evaluated through the removal site eevaluation (RSE) process on a case-by case basis at the FEMP. The RSE process evaluates whether a removal action is warranted under the criteria of the National Contingency Plan (NCP).~~ The Amended Consent Agreement of September 1991 allows for development of a phased approach for CERCLA removal actions to facilitate and expedite the identification and implementation of removal actions at the FEMP. As response actions at the site progress, DOE has agreed to review the existing removal actions and the need for additional removal actions on or before January 15, 1993, and every year thereafter through the record of decision (ROD) for OU3.

The one emergency removal action currently identified within OU3 addresses the disposition of approximately 226,000 gal of uranyl nitrate (UNH) solution in the refinery area. Small UNH piping leaks were discovered on September 17, 1991; therefore, this project was designated as an emergency removal action on September 30, 1991.

The scope of work and the data obtained for future removal actions are to be compatible with the ongoing RI/FS process at the FEMP. Therefore, data collected for phase III and future removal actions, in order to be useable in the OU3 RI/FS, must be consistent with the data quality objectives of this document. The schedule information provided in the following sections depends on reasonable review and approval cycles and receipt of all necessary requested funding.

2.5.2 Plant 1 Pad Continuing Release Removal Action

Plant 1 was the sampling plant for the FEMP and was, therefore, the location of large amounts of uranium metal process residues and waste materials. The concrete storage pad associated with Plant 1 (74T), which has been designated as a hazardous waste management unit (HWMU), has been used for

abatement of large volumes of pipe insulation. Several major asbestos-removal projects anticipated at the FEMP during 1992 and 1993 are as follows:

1. West end of the extraction area in Plant 2/3 (2A) (transite panels),
2. Scrap pickling area in Plant 6 (6A) (transite panels),
3. Digestion area in Plant 2/3 (2A) (transite panels),
4. Metal dissolver building (2A) (transite panels),
5. Two areas in the hot raffinate building, and
6. Asbestos removal in Plant 7 prior to building demolition (see Section 2.5.1.9).

The disposition of the asbestos/ACM generated by these six actions, as well as of the previously mentioned 1,500 containers stored at the site, is to be determined later.

The activities of the asbestos program are expected to continue up to, and possibly beyond, the ROD for OU3. Action on all asbestos/ACM not posing an immediate threat will be deferred to be addressed by the RI/FS process. Therefore, the activities of the RI/FS process and the asbestos program at the FEMP will require close coordination. The procedures and documentation for the asbestos-abatement activities at the FEMP were submitted to the EPA on May 19, 1992.

2.5.15 Temporary Nitrate Tanks

The temporary nitrate tanks (2) were installed to serve as temporary treatment units for nitrate wastewaters while the biodenitrification surge lagoon was being built. The wastewaters were treated by mixing waters from the low nitrate tank with those from the high nitrate tank. These tanks were constructed of a polymer liner with temporary steel sides approximately 4 feet high.

These tanks are located on the north and south sides of the pit area access road between the Bio-Surge lagoon and the process area of the facility. They are no longer in service, and may contain several inches of rainwater and sludges contaminated with uranium and possible 1,1,1 trichloroethane.

The facility is considered a threat due to the presence of hazardous substances in drums, barrels, tanks or other bulk containers that may pose a threat of release of uranium, nitrates and 111 trichloroethane. This removal action proposes to empty and thoroughly cleanse the interior of the tank followed by disposition of the materials. The water will be characterized, transferred and treated through the existing water treatment facilities. the sludges will be characterized, drummed, and dispositioned

appropriately. The liners will be cleaned and containerized, and the support walls will be monitored, decontaminated as required, and free released.

The removal action work plan for this work plan for this project is to be submitted to the EPA by May 14, 1993.

2.5.16 Fire Training Facility

The Fire Training Facility equipment, tanks, buildings and structures are in Operable Unit 3, residual soils and groundwater are in Operable Unit 5. The Fire Training Facility has been determined to be a Hazardous Waste Management Unit (HWMU) under the requirements of the Resource Conservation Recovery Act (RCRA). Boundaries for the HWMU are the old North Access Road, North Construction Gravel Road, and the North Boundary fence.

This facility is considered a threat due to elevated concentrations of hazardous substances in the soils at or near the surface that may migrate.

The proposed scope of work to be conducted for the removal action includes removal, decontamination and disposal, treatment or storage of all structures, tanks, equipment soil and perched water contamination. the removal action work plan for this project is to be submitted to EPA by June 30, 1993.

2.5.17 Sewage Treatment Plant Incinerator

This is an outdoor incinerator situated on a 16 ft x 20 ft pad. It was in operation from 1954-1979, during which time it was used to incinerate a variety of site wastes. These wastes included motor oils, hydraulic oils, and possible 1,1,1-trichloroethane or other spent solvents or oils including uranium contaminated materials.

This unit is located on the northwest corner of the sewage treatment plant area which is on the eastern edge of the FEMP. The facility is considered a threat due to potential contaminants such as uranium, hydraulic and lubricating oils, spent solvent by-products, heavy metals, and residues typical of incineration processes such as furans and dioxin. Sampling will be conducted as required.

The proposed removal action will involve field activities to decontaminate and dismantle the incinerator and associated equipment. This work includes characterization and disposition of the wastes,

containerization of equipment for shipment to NTS, removal and packaging of the transite for on-site storage, dismantling and monitoring of steel for free release, decontamination of removable contamination from the remaining slab, and containment of the work area.

The removal action work plan for this project is to be submitted to EPA by July 30, 1993.

The overall strategy for data collection reflects the above needs and considerations and uses existing data and process knowledge to guide screening efforts, which then support sampling for analysis at higher ASLs. A considerable amount of this existing data, for example, is available on radiological surface contamination, readily available in Table A.4.0, and data which continues to be generated. The data is qualitative/semi-quantitative and would be comparable to ASL level A/B. ~~Specifically, e~~ Each component is first evaluated to determine the need to sample on the basis of past use and available data and to specify preliminary locations of intrusive samples. On the basis of this evaluation, nonintrusive sampling (i.e., screening) will be performed to locate areas for prospective intrusive sampling. ~~Considerable information on radiological surface contamination is available (Tables A.4.0 and A.4.1) and continues to be generated. These data will be evaluated in the field for adequacy before any additional data are collected from the specific components from which the existing data were obtained.~~ This screening will be followed by the systematic collection and analysis (at higher ASLs) of intrusive samples from contaminated major media (i.e., major construction materials such as concrete, masonry, and structural steel) in OU3 and by supplemental intrusive sampling to address other specific data needs. This overall strategy will reduce the amount of sampling and analysis that is of limited usefulness, but also will provide for any follow-up sampling and analysis that may be required to collect data needed to support adequate RI/FS decision making.

4.2.2 Development of Data Quality Objectives

Data quality objectives are developed in this document to ensure that all data collected as part of the RI/FS program are appropriate to meet the needs identified in Section 3. The level of detail and data quality needed, by necessity, vary depending on the intended use of the data.

All investigative activities for OU3 must be conducted and documented in a manner that ensures (1) that sufficient data of known quality are collected to support sound decisions concerning selection of a remedial alternative and (2) that the uncertainty concerning the decisions is maintained within specified limits. To this end, DQOs are specified for each of the types of media to be sampled. As target values for data quality, the DQOs specified are not necessarily criteria for acceptance or rejection of data collected.

The SCQ presents a structured eight-step process for the development of DQOs. This structured process provides the rationale for deciding what data are necessary, what quality and type of data are required, how the data will be technically defensible, and how risk is comprehended and minimized to

If contamination levels are thought to be higher than they actually are, this may result in certain technologies and/or disposal options being dropped from consideration because of the capability of the treatment technology to treat these higher levels and/or eliminating certain disposal options because the levels of contamination are seemingly above what is acceptable for that disposal option. False positive errors could also indicate that certain contaminants are present that actually are not. This situation could result in certain treatment/disposal options being needlessly dropped because they are not appropriate for a contaminant that is purportedly present in the media, or could result in a treatment/disposal option being needlessly retained because it is thought to be necessary to treat a contaminant that is purportedly present in the media. The more false positive errors there are, the greater the potential for the screening process to be ineffective.

For false negative errors, if contamination levels are thought to be lower than they actually are, or if certain contaminants are not found during the sampling but actually do exist, this may also result in the improper screening of alternatives. As with the false positive errors, the more errors there are, the greater the consequences of this improper/ineffective screening.

4.2.2.7 Development of a Cost-Effective Design for Obtaining Data (Step 7)

Three considerations have a major influence on the design for data collection. First, it is assumed that the type of contaminants present are the same throughout a given material within a process area. Second, it is assumed that all major* areas of radiological contamination in OU3 have been identified. Third, samples will generally be collected to provide an estimate of the maximum level of contamination within a material in a process area in order to provide conservative results.

The following summarizes the sampling plan approach developed to cost-effectively meet the identified data needs and uncertainty constraints for the OU3 RI/FS:

- ~~Regions of components with expected contamination will be surveyed with nonintrusive instruments (i.e., screening will be done) to locate areas of contamination, particularly the locations of highest radiological contamination on surfaces of major sampling media (e.g., concrete, masonry, structural steel);~~ Regions of components with expected contamination will be surveyed with

* Major areas would constitute those areas which were physically large enough or exhibited high enough radiation to be identified by the efforts of the ongoing health protection program. These areas may include contaminated zones, plants, warehouses and other larger facilities.

nonintrusive instruments (e.g., screening will be done) to identify the location of highest radiological and/or chemical contamination, on surfaces of major sampling media. Locations with "expected contamination" are defined as areas which have been identified as radiologically and/or chemically contaminated based on process knowledge, radiological survey data, and visual inspections.

- One intrusive sample ~~(more if there are distinct areas of chemical and radiological contamination, in which case separate samples will be collected for analysis for radionuclides, metals, and PCBs, as necessary)~~ will be collected at the location of highest known radiological and/or chemical contamination per major medium, per process area. In the case where chemical screening results are ambiguous, intrusive samples for chemical determinations will be taken at the same location as the radiological intrusive sample. Conversely, more than one intrusive sample will be taken if there are distinct areas of chemical and radiological contamination. Intrusive samples will be sent for laboratory analysis to establish the types and levels of radiological and/or chemical contamination;
- For porous major media, the depth of contamination will also be determined;
- Supplemental sampling will be used in a variety of cases, including sampling of loose solids, liquids, bulk materials, sediments, and media at runoff or collection points, to assess types and levels of contamination, contaminant mobility, and release mechanisms;
- Regions and levels of maximum gamma exposure rates will be determined for components to assess direct exposure hazards; and
- Air sampling will be carried out in buildings to determine the levels of airborne contaminants.

The approach to data collection is discussed in more detail in Section 4.3 and in the Sampling and Analysis Plan.

Laboratory analyses of samples will be done with a level of QA/QC corresponding to sample ASLs, and data will be fully validated by the participating laboratories. ~~Therefore, complete in-house data validation is not necessary. Accordingly, it is proposed that the samples generally be submitted for ASL C analysis/data package. As a quality check on laboratory performance and data validation,~~

~~however, it is proposed that 10% of the samples undergo complete in-house validation, requiring a complete ASL D raw data package from the laboratories.~~ Due to the fact that most of the results of these samples will be used for Risk Assessment, section 11.2 of the SCQ requires that samples be analyzed at ASL D until completeness requirements have been met. After that point a minimum of ten percent of the data is to be analyzed at ASL D. The radiological methods have not met the completeness requirements and will therefore be analyzed at ASL D until it can be determined that these requirements have been met. These requirements have been met for inorganic, organic, and conventional methods and therefore can be analyzed at ASL C with 10 % ASL D. It is proposed that approximately 5% of such samples be randomly chosen (e.g., every 20th sample submitted for analysis) for ASL D analysis/data package. An additional 5% of such samples will be selected for ASL D analysis/data package in a biased manner (e.g., to meet specific requests or to ensure proper coverage of all laboratories and/or analyses).

Precision will be assessed through the establishment of a routine program of duplicate and replicate analyses, as directed by the SCQ. Accuracy will be evaluated through the establishment of a routine program involving the assessment of analytical results for method blanks, matrix spike/matrix spike duplicates, field blanks, and container blanks, as directed by the SCQ. Sensitivity will be monitored by ascertaining the achievement of specified method detection limits and quantitation limits. Completeness will be assessed based on the percentage of usable data points from the total set of data points collected, analyzed, and available. Pursuant to the SCQ, completeness is expected to be at least 90% for the FEMP. If sufficient valid data points are not obtained to meet project objectives, the valid data obtained will be used, and additional sampling and analysis may be considered to meet project objectives. Comparability will also be assessed through the establishment of a routine program of duplicate and replicate analyses.

4.2.2.8 Summary (Step 8)

To support the above approach, ASLs A-D will be required, with screening expected to be ASL A/B, since it will consist of field measurements (which generally provide qualitative data). The major media and supplemental samples will require data generated with QA/QC checks corresponding to those indicated in the SCQ for ASL C. As indicated above, however, 10% of the samples will require a complete raw data package as provided for ASL D in order to allow confirmation of laboratory validation. All media will be analyzed for a standard group of radionuclides and chemicals, intended to address a conservative group of potential contaminants, independent of location. The analytes to be used are discussed in Section 4.3.1.2 and in Sections D.4.2 and D.4.3 of the SAP.

Table 4.4 provides the conservative list of radiological parameters (which consists of all radiological contaminants of potential concern as identified through process knowledge) and chemical parameters (TAL/TCL except for pesticides) that will be used for analysis of all intrusive samples, regardless of location, to ensure data sufficiency. The list will be invoked to the maximum extent afforded by the existence of an analytical procedure for a matrix. ~~Analytical procedures exist, or will be written, for all parameters that are reasonable for a given matrix. They are listed in Tables D.6-3 and D.6-4.~~

4.3.1.3 Preliminary Specification of Intrusive Samples

Two types of intrusive sampling will be conducted in components during the field program: (1) sampling of major media by process area, and (2) supplemental sampling of loose media, bulk material, sediment, etc. A preliminary inspection of designated components has been carried out to support this effort, and results are included in Section D.9 of the SAP.

Locations on major media with elevated levels of radiological contamination have been identified in components on the basis of data from past radiological surveys. The preliminary location designated for sampling a given major medium is the location with the highest survey reading. If survey data are unavailable for a given medium, a sample is designated for the medium without specifying the location. The medium will be surveyed before sampling to determine the sample location. Potential locations for collecting supplemental samples have been determined from a review of conditions within components.

4.3.2 Nonintrusive Sampling

Nonintrusive sampling will fulfill various specific data needs, as well as support the intrusive sampling discussed in the following subsection. In particular, nonintrusive sampling will involve determining radiation exposure rates, measuring levels of airborne contaminants in buildings, collecting swipe samples, and carrying out a variety of chemical monitoring. Nonintrusive sampling will also provide a basis for finalizing the selection of locations to be used for intrusive sampling.

Swipe samples will be the primary means of characterizing removable contamination on surfaces, a major identified data need. A specified area of each appropriate media will be

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TABLE 4.4 Analytes for OU3

Radionuclides

Isotopic uranium
Isotopic thorium
Isotopic plutonium and 241
Radium-226 and 228
Neptunium-237
Americium-241
Cesium-137
Strontium-90
Lead-210
Polonium-210
Technetium-99
Alpha/Beta Screening

TAL Inorganics

Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Magnesium
Manganese
Mercury
Nickel
Potassium
Selenium
Silver
Sodium
Thallium
Vanadium
Zinc
Cyanide[9]

TCL Semi-Volatile Organics

1,2-Dichlorobenzene
1,2,4-Trichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
2-Chloronaphthalene
2-Chlorophenol
2-Methylnaphthalene
2-Methylphenol
2-Nitroanilene
2-Nitrophenol
2,2-Oxybis-(1-chlororpropane)
2,4-Dichlorophenol
2,4-Dimethylphenol
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
2,6-Dinitrotoluene
3-Nitroaniline
3,3-Dichlorobenzidine
4-Bromophenyl-phenyl ether
4-Chloro-3-methylphenol
4-Chloroaniline
4-Chlorophenyl-phenyl ether
4-Methylphenol
4-Nitroaniline
4-Nitrophenol
4,6-Dinitro-2-methylphenol
Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
bis(2-Chloroethyl) ether
bis(2-Chloroethoxy) methane
bis(2-Ethylhexyl)phthalate
Butylbenzylphthalate
Carbazole
Chryzene
Dibenzofuran
Dibenzo(a,h)anthracene
Diethylphthalate
Dimethylphthalate
Di-n-butylphthalate
Di-n-octylphthalate
Fluoranthene
Fluorene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Ideno(1,2,3-cd)pyrene
Isophorone
Napthalene
Nitrobenzene
N-Nitroso-di-n-dipropylamine
N-Nitrosodiphenylamine
Pentachlorophenol
Phenanthrene
Phenol
Pyrene

TCL PCBs

Arochlor-1016
Arochlor-1221
Arochlor-1232
Arochlor-1242
Arochlor-1248
Arochlor-1254
Arochlor-1260

TCL Volatile Organics

1,1-Dichloroethane
1,1-Dichloroethene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
1,1,2,2-Tetrachloroethane
1,2-Dichloroethane
1,2-Dichloroethene (total)
1,2-Dichloropropane
2-Butanone
2-Hexanone
4-Methyl-2-pentanone
Acetone
Benzene
Bromodichloromethane
Bromoform
Bromomethane
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Chloromethane
cis-1,3-Dichloropropene
Dibromochloromethane
Ethylbenzene
Methylene chloride
Styrene
Tetrachloroethene
Toluene
Total Xylenes
trans-1,3-Dichloropropene
Trichloroethene
Vinyl Chloride

TCLP Metals

Arsenic
Barium
Cadmium
Chromium
Lead
Mercury
Selenium
Silver

TCLP Semi-Volatile Organics

1,4-Dichlorobenzene
2,4-Dinitrotoluene
Hexachlorobenzene
Hexachloroethane
Hexachloro-1,3-butadiene
Nitrobenzene
Pentachlorophenol
Pyridine
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
o-Cresol
m-Cresol
p-Cresol

TCLP Volatile Organics

Benzene
Carbon tetrachloride
Chlorobenzene
Chloroform
2-Butanone
1,2-Dichloroethane
1,1-Dichloroethylene
Tetrachloroethylene
Trichloroethylene
Vinyl chloride

[9] Requested only in components with history of cyanide usage.

swiped with a suitable material, which will be surveyed in the field for gross radioactivity with appropriate instruments. The swipes will also be analyzed with a low-background laboratory counter in order to obtain best results. All swipes from within a component whose levels exceed by an order of magnitude the surface contamination guidelines in DOE Order 5400.5, will be composited as a single sample for laboratory analysis of individual radionuclides content. This will result in a conservative (high) representation for the component average as well. Where no swipes for a component yeild a result higher than an order of magnitude over the guideline, then all swipes from that component will be composited.

4.3.3 Intrusive Sampling — Major Media

Intrusive sampling will be used to determine the types and concentrations of contaminants present in materials in OU3. In general, samples will be taken for laboratory analysis at locations of elevated contamination (selected on the basis of surveys and inspections, historical knowledge, and the availability of media for sampling) for major construction materials in each process area of each component sampled. Corings will also be taken at selected locations to determine the depth of contaminant migration. Such sampling, combined with the supplemental sampling discussed in Section 4.3.4, will fulfill the data requirements to be addressed by the site characterization phase of the RI.

Little or no intrusive sampling is anticipated on a site-wide basis for a number of construction materials found in OU3. These materials are transite, metals other than structural steel, asphalt, and selected other construction materials. The reasons for limiting sampling of these other materials are the following:

- All transite is assumed to be radiologically contaminated. It is expected that the transite will not be treated before disposal. For this reason, the only intrusive sampling that will be carried out for transite will be on a limited scale for OU3 as a whole, as supplemental sampling, rather than for each component that contains transite. (See additional discussion in Section 4.3.4.)

- Metals other than structural steel have only limited options for treatment or recycle and reuse. In addition, such options may be difficult to carry out. For these

- General sampling and measurement protocols that address a comprehensive set of sampling contexts for OU3 and employ specified approaches to field measurement and sampling activities,
- Descriptions of appropriate field instruments and measurement procedures,
- Descriptions of expected sample media and specific sampling procedures for various media;
- Identification of analytical methods and procedures for each contaminant/media, and
- Specification of sample numbers, types, and approximate locations for each component.

The condition of some components within OU3 will change during the RI as a result of scheduled interim actions (which include removal actions for major quantities of product, feed inventory, contaminants, and wastes). So as to minimize premature field data collection, characterization of the components will be scheduled after completion of the interim actions, if possible. Some affected components may require at least partial characterization before completion of interim actions in order to meet the committed schedule of the RI for OU3.

~~A health and safety screening of general contamination levels will be conducted for worker protection on all OU3 components as part of the RI field characterization activities. The health and safety screening results will be used to assist in the FWP development for components for which little or no specific knowledge exists on contaminant levels.~~ A health and safety screening of general contamination levels will be conducted for worker protection on all OU3 components as part of the RI field characterization activities. For components for which little or no specific knowledge exists on contaminant levels, these health and safety results will also be used to assist in the determination of RI intrusive sampling locations as specified in the FWPs. Standard Operating Procedures (SOPs) have been developed which assign surveying responsibilities, establishes the procedures for performing radiological contamination surveys and defines the method by which radiation surveys are performed. Component radiological surveys are generally not conducted on a sampling grid, but rather are performed to identify and define anomalies exhibiting activity or "hot-spots" that will obtain a conservative representation of the health risks to workers. The following criteria are typical drivers for the placement of swipes and

surveys: horizontal vs. vertical surfaces, stained areas, seams, cracks, and corners, process equipment areas, and storage areas, etc.

Most survey instrumentation perform real time measurements which allow for immediate documentation and interpretation of results. These procedures are defined as ASL A and B. Data will be reported as part of the Remedial Investigation. New survey data may be used for trending analysis, reassessment of components for classification, location of "hot-spots", modification of personal protective equipment and/or Component Specific Health & Safety Plan, and to assist in developing to the risk assessment.

Table 4.7 summarizes the number of samples anticipated for all of OU3 on the basis of component-specific estimates provided in Section D.9 of the SAP. Those estimates were developed through the approach to data collection outlined in Section 4.3. Table 4.7 provides an overview for the entire operable unit in terms of numbers of samples by type of medium sampled and by component category.

The samples summarized in Table 4.7 generally represent locations with elevated levels of contamination for each medium in each process area of each component. (The exceptions are for liquids and airborne particulates, for which samples will represent average conditions.) Therefore, when viewed together, the results from these samples will provide a conservative upper bound on conditions in contaminated materials in the operable unit. In addition, given the substantial number of samples by media type, the results will also provide considerable detail by type of material within the operable unit as well. The major decisions to be made for OU3 involve how to manage the expected large quantities of waste materials that will result from remedial activities. These decisions will generally be made by material type, rather than by individual component. When viewed on this basis, the summary of samples provided in Table 4.7 illustrates that a substantial number of samples will be collected for major materials to support conservative operable-unit-wide decisions.

Table 4.7 also shows that a substantial number of samples will be taken for those component categories with large volumes of construction materials, diverse uses, and diverse populations of potential contaminants (i.e., warehouse/storage buildings, process buildings, and process support buildings). A significant number (more than half) of all supplemental samples identified in component inspections will be taken in the process and process support buildings. Table 4.7 also shows that component categories with smaller components, smaller numbers of components, and less diversity will have fewer samples.

TABLES A.4.0 ~~and A.4.1~~

OPERABLE UNIT 3 STRUCTURES/EQUIPMENT RADIOLOGICAL SURVEYS

~~These tables detail~~ This table details, by component, results obtained from on-site radiological surveys. Survey results are reported for alpha and combined beta and gamma detection. Two types of contamination are measured:

- Removable: Loose contamination that readily transfers to a smear with moderate pressure, and
- Total: A combination of removable and fixed contamination.

Up to four reported values are provided for every survey report: alpha removable, alpha total, beta-gamma removable, and beta-gamma total. All removable contamination is collected by swipe samples on a 100-cm^2 area after total contamination levels are measured by a direct frisk of the area with an alpha or beta-gamma instrument. Total contamination values have background subtracted and are normalized to a 100-cm^2 area. Components are surveyed at different frequencies, and not all on-site facilities are monitored, depending on their level of contamination. (See Section 2.4.1 for further discussion.) For each category of reported data, the average of all values, the maximum value, and the sample size are provided. "NA" means that no data of that type are available for the component.

~~All of the data presented in Table 4.0 were collected throughout 1991. Four categories have been established within each component to differentiate between the sample locations:~~

- ~~*Accessible* represents any accessible surface (i.e. equipment, walls, desks, etc.);~~

  ~~*Floors* represent drain grates, metal platforms, concrete, etc.;~~

- ~~*Sumps* represent dikes and sumps; and~~

- ~~*Unaccessible* represents overhead structures or any unaccessible areas.~~

~~Data gathered from the last quarter of 1991 through July 1992 are presented in Table A.4.1.~~ All information from the survey reports has been entered into the site-wide database, and values for each component are summarized here. ~~Samples can be from any of the sample locations discussed for Table A.4.0.~~ New data are continually gathered and are processed as they become available.

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TABLE A.4.0 Operable Unit 3 Component Radiological Surveys (Combined Table DRAFT)

Component	Component Designation	Alpha Removable (dpm/100 sq. cm)			Alpha Total (dpm/100 sq. cm)			Beta-Gamma Removable (dpm/100 sq. cm)			Beta-Gamma Total (dpm/100 sq. cm)		
		Average Value	Maximum Value	Sample Size	Average Value	Maximum Value	Sample Size	Average Value	Maximum Value	Sample Size	Average Value	Maximum Value	Sample Size
Preparation Plant	1 A	454	31,000	1,356	5,376	200,000	1,094	1,113	490,000	1,419	42,314	1,400,000	1,096
Plant 1 Storage Shelter	1 B	42	54	10	N/A	N/A	N/A	72	138	10	N/A	N/A	N/A
Plant 1 Ore Silos	1 C	3,143	23,100	191	100,000	140,000	6	1,599	14,400	192	N/A	N/A	N/A
Ore Refinery Plant	2 A	261	42,200	1,013	8,090	100,000	822	660	115,000	1,024	114,772	1,599,000	867
General/Refinery Sump Control Building	2 B	112	433	208	651	7,000	124	171	1,390	227	15,470	220,000	137
Bulk Lime Handling Building	2 C	142	1,249	149	175	400	13	319	6,958	149	5,000	52,000	26
Metal Dissolver Building	2 D	220	1,890	229	7,538	70,000	65	445	6,430	229	62,000	399,000	64
NFS Storage & Pump House	2 E	441	1,594	10	N/A	N/A	N/A	881	5,151	10	N/A	N/A	N/A
Hot Side Ore Conveyor	2 G	52	77	27	N/A	N/A	N/A	45	126	27	N/A	N/A	N/A
Maintenance Building	3 A	188	2,597	209	16,571	1,800,000	133	349	8,043	211	39,367	3,000,000	150
Ozone Building	3 B	204	501	132	1,375	16,000	40	344	1,039	132	17,375	200,000	40
NAR Control House	3 C	52	273	107	293	1,000	30	93	402	119	2,869	47,000	115
NAR Towers	3 D	225	3,896	163	N/A	N/A	N/A	354	7,400	163	5,458	15,000	48
Hot Raffinate Building	3 E	190	2,409	137	7,231	31,000	117	370	5,161	137	62,692	379,000	117
Harshaw Digestion Fume Recovery	3 F	219	241	24	794	1,000	21	303	673	26	13,240	70,000	25
Refrigeration Building	3 G	167	2,300	162	1,000	4,000	17	270	1,200	162	8,467	29,000	15
Refinery Sump	3 H	45	593	60	N/A	N/A	N/A	75	1,177	60	N/A	N/A	N/A
Combined Raffinate Tanks	3 J	245	2,400	70	N/A	N/A	N/A	615	7,521	67	N/A	N/A	N/A
Old Cooling Water Tower	3 K	62	125	59	N/A	N/A	N/A	50	304	59	N/A	N/A	N/A
Electrical Power Center Building	3 L	63	1,065	162	N/A	N/A	N/A	86	2,089	162	N/A	N/A	N/A
Green Salt Plant	4 A	1,049	31,900	1,321	N/A	N/A	N/A	4,069	176,000	1,323	N/A	N/A	N/A
Plant 4 Warehouse	4 B	268	1,680	72	N/A	N/A	N/A	801	3,360	73	N/A	N/A	N/A
Plant 4 Maintenance Building	4 C	50	54	55	N/A	N/A	N/A	40	77	56	N/A	N/A	N/A
Metals Production Plant	5 A	396	10,400	3,974	4,429	200,000	3,480	2,825	187,000	4,063	153,131	4,000,000	3,327
West Derby Breakout/ Slag Milling	5 D	52	52	30	N/A	N/A	N/A	64	84	30	N/A	N/A	N/A
Plant 5 Covered Storage Pad	5 F	52	52	16	N/A	N/A	N/A	63	70	16	N/A	N/A	N/A
Plant 5 Ingot Storage Shelter	5 G	405	3,389	31	N/A	N/A	N/A	4,263	52,541	46	1,000	1,000	14
Metals Fabrication Plant	6 A	759	34,100	3,621	N/A	N/A	N/A	11,134	808,000	3,950	165,216	2,600,000	2,078
Plant 7	7 A	367	26,300	413	N/A	N/A	N/A	1,261	31,714	413	N/A	N/A	N/A
Recovery Plant	8 A	383	26,000	2,680	2,693	250,000	2,632	813	60,000	2,745	49,646	1,400,000	2,711
Plant 8 Maintenance Building	8 B	72	146	53	268	1,000	10	100	440	53	4,600	9,000	10
Rotary Kiln/Drum Reconditioning	8 C	45	213	100	N/A	N/A	N/A	54	303	100	N/A	N/A	N/A
Special Products Plant	9 A	1,608	46,300	1,279	N/A	N/A	N/A	16,911	706,000	1,489	432,093	8,570,000	1,115
Plant 9 Dust Collector	9 C	52	52	9	N/A	N/A	N/A	69	139	9	N/A	N/A	N/A
Boiler Plant	10 A	50	200	263	200	200	8	112	2,866	267	3,458	11,000	12
Boiler Plant Maintenance Bldg.	10 B	43	392	110	N/A	N/A	N/A	90	2,350	110	N/A	N/A	N/A
Service Building	11	29	235	646	180	2,000	439	98	1,000	760	974	100,000	1,305
Main Maintenance Building	12 A	61	5,510	1,515	548	20,000	1,480	97	18,000	1,548	4,741	319,000	1,855
Cylinder Storage Building	12 B	10	50	113	N/A	N/A	N/A	19	86	113	2,757	10,000	113
Lumber Storage Building	12 C	8	24	67	N/A	N/A	N/A	14	156	67	3,246	12,000	67
Pilot Plant Wet Side	13 A	1,024	17,400	247	46,201	699,000	176	1,324	23,000	263	158,276	1,600,000	161
Pilot Plant Maintenance Bldg.	13 B	130	408	18	N/A	N/A	N/A	261	931	18	N/A	N/A	N/A
Sump Pump House	13 C	615	4,640	46	169,063	1,000,000	32	1,126	11,236	46	169,433	500,000	30
Pilot Plant Thorium Tank Farm	13 D	103	1,106	91	N/A	N/A	N/A	131	1,660	91	N/A	N/A	N/A

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TABLE A.4.0 Operable Unit 3 Component Radiological Surveys (Combined Table DRAFT)

Component	Component Designation	Alpha Removable (dpm/100 sq. cm) Average Value	Alpha Removable Maximum Value	Alpha Removable Sample Size	Alpha Total (dpm/100 sq. cm) Average Value	Alpha Total Maximum Value	Alpha Total Sample Size	Beta-Gamma Removable (dpm/100 sq. cm) Average Value	Beta-Gamma Removable Maximum Value	Beta-Gamma Removable Sample Size	Beta-Gamma Total (dpm/100 sq. cm) Average Value	Beta-Gamma Total Maximum Value	Beta-Gamma Total Sample Size
Administration Building	14 A	21	58	233	134	3,000	224	22	162	236	438	25,000	725
Laboratory	15	88	30,400	3,650	1,907	80,000	312	163	23,700	3,842	10,533	1,000,000	1,741
General Sump	18 B	206	3,784	200	NA	NA	NA	361	7,757	200	NA	NA	NA
Biodenitrification Towers	18 D	56	169	140	NA	NA	NA	65	905	214	2,835	89,000	94
BDN Effluent Treatment Facility	18 H	27	27	20	NA	NA	NA	31	31	20	NA	NA	NA
Main Metal Tank Farm	19 A	20	20	10	NA	NA	NA	15	15	10	NA	NA	NA
Tank Farm Control House	19 C	5	5	1	NA	NA	NA	21	21	1	NA	NA	NA
Pump Station & Power Center	20 A	225	230	20	207	500	88	360	360	88	1,338	7,500	88
Water Plant	20 B	43	200	115	NA	NA	NA	64	400	116	400	400	1
Cooling Towers	20 C	42	42	20	NA	NA	NA	43	82	21	NA	NA	NA
Elevated Potable Storage Tank	20 D	232	240	4	NA	NA	NA	407	429	10	1,225	2,400	8
Well House #1	20 E	25	36	21	NA	NA	NA	25	74	21	1,000	1,000	21
Well House #2	20 F	22	36	21	NA	NA	NA	103	385	113	1,147	4,000	113
Well House #3	20 G	23	102	34	NA	NA	NA	38	177	34	4,235	80,000	34
Process Water Storage Tank	20 H	42	42	10	NA	NA	NA	36	36	10	NA	NA	NA
Gas Meter Building	22 A	14	20	46	NA	NA	NA	21	68	46	1,435	8,000	46
Storm Sewer Lift Station	22 B	43	63	30	NA	NA	NA	56	242	30	NA	NA	NA
Scale House & Weigh Scale	22 D	250	250	11	NA	NA	NA	402	402	60	1,180	2,800	60
Railroad Scale House	24 A	32	403	21	NA	NA	NA	99	1,365	21	7,667	100,000	21
Railroad Engine House	24 B	19	67	117	NA	NA	NA	40	220	117	3,647	30,000	92
M.H.#175/Eff. Line/Sampling Bldg.	25 B	NA	NA	NA	NA	NA	NA	400	400	10	1,000	1,000	2
Sewage Lift Station Building	25 C	24	86	32	NA	NA	NA	68	831	32	2,938	30,000	32
U.V. Disinfection Building	25 D	173	173	1	NA	NA	NA	388	400	19	1,875	9,000	8
Digester & Control Building	25 E	22	57	25	NA	NA	NA	38	190	25	3,440	25,000	25
Sludge Drying Beds	25 F	NA	NA	NA	NA	NA	NA	NA	NA	NA	18,000	26,000	6
Pump House-HP Fire Protection	26 A	225	225	4	NA	NA	NA	385	385	114	2,467	160,000	114
Elevated Water Storage Tank	26 B	NA	NA	NA	NA	NA	NA	385	385	145	1,015	2,000	145
Security Building	28 A	39	40	47	165	1,000	46	42	47	47	1,000	8,000	71
Human Resources Building	28 B	20	49	196	156	1,000	40	18	78	196	346	2,000	94
Chemical Warehouse	30 A	138	279	797	213	900	304	188	712	798	3,838	49,200	304
Drum Storage Warehouse	30 B	61	172	64	NA	NA	NA	80	500	64	NA	NA	NA
Engine House/Garage	31 A	126	200	182	NA	NA	NA	230	400	182	10,978	150,000	91
Building 32 Covered Loading Dock	32 B	247	259	50	343	5,900	81	422	652	148	22,754	1,500,000	148
Pilot Plant Annex	37	134	5,194	282	1,488	10,000	41	399	31,400	285	92,383	1,000,000	41
Propane Storage	38 A	28	119	97	NA	NA	NA	60	389	97	2,284	30,000	97
Incinerator Building	39 A	187	482	105	1,828	25,000	29	282	584	106	38,743	800,000	35
Incinerator Sprinkler Riser House	39 C	62	128	27	400	400	1	71	233	28	11,000	11,000	1
Sewage Treatment Plant Incinerator	39 D	NA	NA	NA	NA	NA	NA	NA	NA	NA	228,500	1,000,000	16
Rust Engineering Building	45 A	52	250	651	1,000	1,000	2	80	2,307	941	2,830	250,000	528
Heavy Equipment Building	46	74	200	321	NA	NA	NA	82	400	321	7,391	100,000	289
Six to Four Reduction Facility #2	51	19	20	127	NA	NA	NA	16	17	128	1,000	1,000	34
Health & Safety Building	53 A	49	523	89	209	2,000	520	68	751	87	894	4,000	658
In-Vivo Building	53 B	19	19	43	NA	NA	NA	17	17	43	1,000	1,000	43
Six to Four Reduction Facility #1	54 A	311	12,000	928	1,193	28,000	893	885	73,000	1,106	22,853	1,100,000	895

TABLE A.4.0 Operable Unit 3 Component Radiological Surveys (Combined Table DRAFT)

Component	Component Designation	Alpha Removable (dpm/100 sq. cm)			Alpha Total (dpm/100 sq. cm)			Beta-Gamma Removable (dpm/100 sq. cm)			Beta-Gamma Total (dpm/100 sq. cm)		
		Average Value	Maximum Value	Sample Size	Average Value	Maximum Value	Sample Size	Average Value	Maximum Value	Sample Size	Average Value	Maximum Value	Sample Size
Pilot Plant Shelter	54 B	42	42	10	NA	NA	NA	39	68	10	NA	NA	NA
Slag Recycling Building	55 A	137	662	98	NA	NA	NA	1,055	10,400	98	71,647	700,000	68
Slag Recycling Pit/Elevator	55 B	216	3,120	86	NA	NA	NA	1,760	26,900	86	22,714	950,000	56
CP Storage Warehouse	56 A	40	41	70	NA	NA	NA	41	206	70	NA	NA	NA
Quonset Hut #1	60	49	49	20	NA	NA	NA	40	40	20	NA	NA	NA
Quonset Hut #2	61	1,093	32,168	34	NA	NA	NA	735	21,547	34	NA	NA	NA
Quonset Hut #3	62	39	39	25	NA	NA	NA	43	155	25	NA	NA	NA
KC-2 Warehouse	63	42	115	83	NA	NA	NA	48	521	85	986	1,000	22
Thorium Warehouse	64	122	2,376	87	NA	NA	NA	484	9,927	87	NA	NA	NA
(Old) Plant 5 Warehouse	65	383	7,370	100	NA	NA	NA	3,110	81,976	100	NA	NA	NA
Drum Reconditioning Building	66	145	2,146	115	NA	NA	NA	527	7,100	115	NA	NA	NA
Plant 1 Thorium Warehouse	67	1,531	31,506	45	NA	NA	NA	1,582	28,882	45	NA	NA	NA
Pilot Plant Warehouse	68	203	1,100	46	NA	NA	NA	281	922	46	NA	NA	NA
Decontamination Building	69	170	1,700	101	1,654	110,000	87	283	1,400	127	16,143	280,000	87
General In-Process Warehouse	71	276	17,900	590	1,429	140,000	528	399	21,000	627	16,766	799,000	528
Plant 2 East Pad	74 A	202	1,558	484	370	4,500	45	348	15,400	485	7,200	30,800	51
Plant 2 West Pad	74 B	129	843	227	1,237	25,000	118	195	1,300	247	19,448	196,000	116
Plant 8 East Pad	74 C	96	3,220	135	NA	NA	NA	306	15,495	156	1,150	3,500	20
Plant 8 West Pad	74 D	73	712	104	NA	NA	NA	102	2,000	194	186,216	400,000	37
Plant 4 Pad	74 E	72	429	118	1,146	15,000	151	96	1,500	119	14,676	700,000	219
Plant 7 Pad	74 F	72	296	50	NA	NA	NA	221	1,118	50	NA	NA	NA
Plant 5 East Pad	74 G	241	2,500	514	814	32,000	1,159	375	6,400	513	13,581	450,000	1,250
Plant 5 South Pad	74 H	52	52	22	NA	NA	NA	61	61	22	NA	NA	NA
Plant 6 Pads	74 J	76	1,830	350	200	200	6	177	4,276	375	58,405	1,000,000	222
Plant 9 Pad	74 K	77	897	601	3,200	6,000	20	158	2,260	647	111,816	750,000	586
Building 65 West Pad	74 L	225	225	10	208	400	63	360	360	63	1,619	32,000	63
Building 64 East Pad & R.R. Dock	74 M	234	250	117	210	500	117	377	400	117	3,798	14,000	117
Decontamination Pad	74 P	130	1,380	31	NA	NA	NA	264	2,340	31	15,000	60,000	31
Plant 8 North Pad	74 R	28	134	26	NA	NA	NA	36	171	26	NA	NA	NA
Plant 1 Storage Pad	74 T	41	41	6	NA	NA	NA	37	37	6	NA	NA	NA
Pilot Plant Pad	74 U	32	64	125	NA	NA	NA	39	155	125	NA	NA	NA
Finished Products Warehouse (4A)	77	59	762	181	NA	NA	NA	91	2,180	181	NA	NA	NA
Plant 6 Warehouse	79	70	240	248	NA	NA	NA	79	657	249	6,971	65,000	34
Plant 8 Warehouse	80	34	135	72	NA	NA	NA	38	159	72	NA	NA	NA
Plant 9 Warehouse	81	55	134	661	NA	NA	NA	61	340	662	3,828	10,000	29
Receiving/Incoming Mat'ls. Insp.	82	38	200	84	NA	NA	NA	56	400	84	NA	NA	NA
Parking Lot	89	4	19	11	100	200	25	4	18	77	170	2,000	319
Railroad Tracks	G-001	82	259	148	NA	NA	NA	110	434	202	4,578	100,000	74
Roads	G-002	180	259	552	265	5,900	181	300	652	832	11,813	1,500,000	250
Process Trailers	G-006	64	200	256	NA	NA	NA	95	400	261	1,000	1,000	58
Non-process Trailers	G-007	30	200	228	200	2,000	860	37	400	233	373	10,000	1,100
Copper Metal Scrap Pile	P-004	NA	NA	NA	NA	NA	NA	NA	NA	NA	34,000	100,000	6

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TABLE A.4.5

SUMMARY OF SITE-WIDE ASBESTOS SURVEY RESULTS

Table A.4.5 summarizes the results of the site-wide asbestos survey performed by Diagnostic Engineering, Incorporated (DEI). The report for this asbestos survey was submitted to Westinghouse Environmental Management Company of Ohio by DEI on February 28, 1992. Seventy-four FEMP components were investigated by this survey. Only components identified as potentially having asbestos-containing material (ACM) were investigated (e.g., newer facilities were not investigated because of the ban on use of ACM in construction). Buildings constructed after the asbestos ban were determined as such by Industrial Hygiene (IH). IH's responsibilities include review of construction specifications and materials, and monitoring of the actual construction to verify that buildings in question do not contain ACM in any form.

Each facility or component was divided into homogeneous areas to facilitate sampling and characterization of the ACM. A homogeneous area is broadly defined as an area of material having similar type, consistency, color, appearance, or composition. Bulk samples were collected for analysis from each homogeneous area except where visual observations determined that there was no potential ACM to sample.

The ACM-positive areas, which were identified by the analysis of the bulk samples, were assigned a numeric hazard ranking by the survey. The hazard ranking range was from 1 (low potential for disturbance, ACM in good condition) to 7 (significant damage to ACM, immediate abatement necessary). Table A.4.5 identifies the components investigated.

The following note pertains to Table A.4.5:

a = ACM from these areas was abated during the survey, so these facilities are not among the 56 facilities containing ACM.

characterizing total surface contamination for baseline risk assessment purposes. As for RAA evaluation, removable contamination will be characterized through collection of swipe samples. Locations for these samples will be areas of elevated total surface contamination determined from existing monitoring data or from further measurements taken during characterization, assuming that all major sources of contamination have been identified.

Contaminant Leaching Potential

To evaluate contaminant leaching from OU3 media as a release mechanism, an estimate is needed of leaching potential from various major media. Again, a conservative estimate is sought to set an upper bound on off-site risks. To meet this data need, a small number of samples of affected media representing various conditions from throughout OU3 will be collected and analyzed for contaminant leaching potential (see Section D.3.4.3.4).

Exposure Rates

Radiation exposure rates for both beta and gamma radiation will be needed to estimate on-site risk under an intruder scenario. A conservative value is sought on a component-wide basis to represent a worst-case scenario. Measurements will be taken in areas of highest total surface activity as determined from existing survey data, or from any further surveys conducted during the RI.

Airborne Radioactivity

Similarly, levels of airborne radioactivity are sought for estimating on-site risks (airborne chemical contaminants are not thought to pose a significant risk). A determination of representative levels in each component is sought. To meet this data need, ~~an air monitoring sample will be collected from each component with a high volume air sampler operated for at least 24 hours. Grab samples for radon monitoring will be collected when there is a significant presence of radium 226 or thorium 232 in a component.~~ two different air sampling programs will be performed. First, to measure the long-lived radionuclide airborne particulate contamination, an air monitoring sample will be collected from each component with a general area air sampler operated for at least 24 hours. Second, in components where radium-226 and/or thorium-232 has been handled or stored, alpha track etch cups (Terradex cups) will be collected for radon and thoron.

Container Leakage

The volume of contaminated liquids in various process containers, the concentration of the contaminants in the liquids, and any release rates of these liquids are needed to assess risks associated with the migration of such contaminants. Values for liquid volumes and composition are sought, along with a conservative estimate of release rate. To meet these

3. The types of contaminants present place further constraints on treatment options.

The fundamental conceptual and organizational unit under this approach is the process area. Process areas are defined on the basis of function. Therefore, a component that houses a single operation may be broken down into several processes, each involving a distinct set of materials and equipment. On the basis of this definition, and following assumption 1, above, the process area becomes the basic unit of representativeness for contaminant composition.

The quantitative aspect of representativeness is addressed in assumption 2. The quantity of interest in the investigation is that quantity of each major material from a given process area that will fall into various waste categories. As stated in the assumption, the maximum surface level and/or depth of contamination represents the entire extent of the medium within the process area for treatment purposes. This assumption assures a conservative estimate of waste volumes, guarding against the possibility of a false negative outcome, or underestimate, which is consistent with the stated goals of the uncertainty constraints.

Lastly, regarding the representativeness of contaminant identifications, which affects the applicability of various treatment options, a wide variety of potential contaminants must be considered. Potential contaminants come from the process materials themselves, reagents added to the process, and ancillary materials used in general industrial processes. Such potential contaminant sources represent a fairly large number of both radiological and chemical contaminants. The possibility of mixed radiological and hazardous waste is clearly present and will certainly affect treatment and disposal options for affected materials.

Taking these three assumptions regarding representativeness together, the following sampling approach was devised:

> *A single intrusive sample taken from each major medium in each defined process area at the location of greatest known surface level and/or depth of radiological contamination will be analyzed for all radiological contaminants of potential concern.*

> *A single intrusive sample ~~for each class of chemical contaminants of potential concern taken from each major medium at the location of highest expected surface levels will be analyzed for a standard list of chemical parameters for each class, including all contaminants of interest.~~ will be collected from each major medium in each defined process area at the location of highest expected surface levels of chemical contamination. These single intrusive samples will be of sufficient quantity to meet the requirements for analysis and will be split for each chemical analyte class of potential concern. However, multiple intrusions may be required to collect sufficient sample volume. This approach is based upon the assumption that a single, split sample collected at one specific location will be more truly representative of the actual contamination at that location than a series of individual intrusive samples collected at/or adjacent to a hot spot location.*

This approach addresses the primary data needs for supporting RAA evaluation, and will also coincidentally meet much of the data needs for the baseline risk assessment. Further data needs for both

objectives, container dimensions will be measured and potential leak rates postulated, and composition of unknown liquids ~~of significant volume~~ will be determined from grab samples where volume is sufficient to provide for desired analysis. ~~as needed.~~

Ponds and Basins

~~The concentrations of contaminants in the water and sediment phases of contaminated ponds and basins are needed to assess the risks from infiltration and overflow of water, as well as from direct contact with these media. Representative samples of water and sediment are sought. Composite grab samples of water and sediment will be collected to meet this data need.~~

Identification and preliminary characterization of potential sources and pathways is the principal goal of the surface water and sediment sampling of ponds and basins. The collection of surface water and sediment samples is designed to identify and characterize radiological and chemical contamination in ponds and basins. To ensure that the characteristics of the pond/basin are accurately portrayed, grab surface water and sediment samples will be collected at one point in time, in various locations to be uniformly distributed over the impoundment. Samples will be representative of the basins (through not statistically stated), with locations based on process knowledge, existing data, instrument surveys, and observations. Grab/intrusive samples will be collected and composited for submittal for laboratory analysis. Grab and composite sampling strategies are based on protocol specified in the SCQ, Section K.4.3.

D.3.3 Representativeness, Analytical Support Levels, and Sensitivity Requirements

D.3.3.1 Representativeness and Sampling Approach

Sample locations, frequencies, and types must be selected in such a manner that the information gained from the samples represents specific aspects of the true underlying distribution of contaminants that are of interest for the intended uses of the data. The particular properties of the distribution that are of interest dictate the design of the sampling program. For instance, if the properties of interest are mean contaminant levels in a certain medium, a statistically based, unbiased selection of sample locations and numbers would be appropriate. In the present case, the properties of contaminant distribution of interest are those necessary for evaluating RAAs — principally the type, extent, and depth of surface contamination in large-volume materials in OU3. The sampling approach developed for the RI field program is therefore designed to determine these properties. The constraint on the approach is the determination of these properties within the uncertainty requirements specified in the DQOs for the RI as they relate to volumes of various categories of expected waste materials from OU3.

Because of the great complexity and heterogeneity of OU3, it is neither feasible nor cost-effective to design a sampling program that quantitatively addresses uncertainty, hence the qualitative nature of the uncertainty requirements in the DQOs. Instead, an approach was devised that is essentially mechanistic, assuring that data needs are met through purposeful sampling. The devised approach is based on some important underlying assumptions regarding representativeness, as follows:

TABLE D.3-1 (Cont.)

ASL	Parameters	Analytical Options	Media to be Sampled
B (Cont.)	Metals	• Portable X-ray fluorescence spectrometer	• Surfaces of major media or supplemental sampling locations • Bulk media and beach areas • Sediments, uncharacterized solids/loose media, liquids
	Polychlorinated biphenyls (PCBs)	• Field test kit ~~• Laboratory gas chromatography (GC) procedure~~	• Sediments, uncharacterized solids/loose media, liquids (field test kits) ~~• Surfaces of major media or supplemental sampling locations (laboratory GC procedure)~~
	Organic vapors	• Portable GC	• General component air sampling
C/D	Radiological Suite		
	U, Th, Pu isotopes	• Alpha spectrometry by SCQ protocols	• Intrusive samples from major media and supplemental sampling locations
	Cs-137	• Gamma spectrometry by SCQ protocol	• Bulk media and beach areas
	Ra-226	• Radon emanation by SCQ protocol	• Sediments, uncharacterized solids/loose media, liquids
	Sr-90, Tc-99, Pb-210 Po-210, Ra-228, ~~Rn-222~~, Np-237, Pu-241, Am-241	• Radiochemistry by SCQ protocol	(All apply to entire radiological suite)
	~~Total uranium~~	~~• Phosphorimetry by SCQ protocol~~	

TABLE D.3-2 Analytical Sensitivity Requirements

Parameter	Technique	Protocol/Method	Method Detection Limits		Basis for Method Selection	
			Solids (pCi/g)	Liquids (pCi/L)	Solids	Liquids
Isotopic U	Alpha-spectrometry	WEMCO-SOW/SCQ	0.2	0.5	Soil PRGS	ARARs/TBCs
Isotopic Th	Alpha-spectrometry	WEMCO-SOW/SCQ	0.2	0.5	Soil PRGS	ARARs/TBCs
Isotopic Pu	Alpha-spectrometry	WEMCO-SOW/SCQ	0.2	0.5	Soil PRGS	ARARs/TBCs
Cs-137	Gamma-spectrometry	WEMCO-SOW/SCQ	1.0	1.0	Soil PRGS	ARARs/TBCs
Sr-90	Radiochemistry	WEMCO-SOW/SCQ	0.2	1.0	Soil PRGS	ARARs/TBCs
Tc-99	Radiochemistry	WEMCO-SOW/SCQ	10	30	Soil PRGS	ARARs/TBCs
Pb-210	Radiochemistry	WEMCO-SOW/SCQ	1.0	30	Soil PRGS	ARARs/TBCs
Po-210	Radiochemistry	WEMCO-SOW/SCQ	0.5	1.0	Soil PRGS	ARARs/TBCs
Ra-226	Radon emanation	WEMCO-SOW/SCQ	0.2	1.0	Soil PRGS	ARARs/TBCs
Ra-228	Radiochemistry	WEMCO-SOW/SCQ	0.5	3.0	Soil PRGS	ARARs/TBCs
~~Rn-222~~	~~Radiochemistry~~	~~WEMCO-SOW/SCQ~~	–	~~100~~	-	~~ARARs/TBCs~~
Np-237	Radiochemistry	WEMCO-SOW/SCQ	0.2	0.5	Soil PRGS	ARARs/TBCs
Pu-241	Radiochemistry	WEMCO-SOW/SCQ	0.5	1.0	Soil PRGS	ARARs/TBCs
~~Total U~~	~~Phosphorimetry~~	~~WEMCO-SOW/SCQ~~	~~0.1 µg/g~~	~~1.0 µg/L~~	~~Confirmatory~~	
~~Gross alpha~~	~~Proportional counter~~	~~WEMCO-SOW/SCQ~~	~~4 pCi/filter~~		~~ARARs/TBCs~~	
~~Gross beta~~	~~Proportional counter~~	~~WEMCO-SOW/SCQ~~	~~10 pCi/filter~~		~~ARARs/ TBCs~~	
Am-241	Radiochemistry	WEMCO-SOW/SCQ			Soil PRGS	ARARs/TBCs

TABLE D.3-2 (Cont.)

Parameter	Technique	Protocol/Method	Method Detection Limits: Solids ~~(pCi/g)~~	Method Detection Limits: Liquids ~~(pCi/L)~~	Basis for Method Selection: Solids	Basis for Method Selection: Liquids
			(µg/kg)	(µg/L)		
VOCs	GC/MS	CLP-SOW/SCQ	10	10	Soil PRGS	ARARs
SVOCs	GC/MS	CLP-SOW/SCQ	330	10	Soil PRGS	ARARs
PCBs	GC	SW-846/SCQ	33	1	Soil PRGS	TSCA
Metals	FAA/ICP	CLP-SOW/SCQ	(TAL CRDLs)		Soil PRGS	ARARs
TCLP	ICP and GC/MS	SW-846/SCQ	(See Note[1])		Soil PRGS	ARARs
Removable alpha	Low-background counting	SCQ	<20 dpm		NRC limits	
Removable beta-gamma	Low-background counting	SCQ	<1,000 dpm		NRC limits	
Organic vapors	PID or portable GC	SCQ	1 ppm		Background	
PCB screen	Field test kits	SCQ	50 ppm (bulk)		TSCA	
Metals screen	XRF	SCQ	100-200 ppm		Instrument performance	
			Maximum Allowable Total Surface Contamination[2]			
Total alpha	Geiger-Mueller	SCQ	300 dpm/100cm²		NRC limits	
Total beta-gamma	Geiger-Mueller	SCQ	15,000 dpm/100 cm²		NRC limits	
Low-level gamma	NaI (Tl)	SCQ	background		Background	
Gamma exposure rate	Pressurized ionization chamber	SCQ	background +20 µR/h		DOE Order 5400.5	

Note 1: Should be equal to total analyses MDLs for water matrices, unless there is matrix interference.
Note 2: MDLs do not apply to field equipment. The operational efficiency of field equipment is very instrument specific.
General Note: For listing by analyte of Required Quantitation Limits for Water and Soil, see SCQ Table 2-4.

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- The record of decision (ROD) for OU3 will be performance based and there will be selection only of general technologies (e.g., decontamination of metal surfaces) in the ROD.

- Treatment technologies found applicable to contamination in sampled components will also be applicable to nonsampled components to achieve performance-based ROD requirements.

- ~~Anomalies or unusual conditions may result in the requirement for additional field sampling beyond that anticipated. Such requirements will be identified before or during the sampling of individual components.~~OU3 recognizes that anomalies or unusual conditions which are encountered in the field may require modifications or additions to the sampling approach. A logistics inspection is performed as part of the presampling activities. The inspection is designed to identify any anomalies which may be present, may affect the sampling process, and can be pre-identified. An amendment or modification of the Field Work Plan may be generated based on the results of the logistics inspection or any irregularities noted during other presampling or sampling activities. If sample data is returned to OU3 with higher or lower contaminant levels than anticipated, resampling may be initiated. A 1-2 page amendment to the FWP describing resampling conditions and locations will be produced.

D.3.4.3 Component Sampling Activities

The general approaches to be used to meet particular data objectives are provided in Sections D.3.2.1 and D.3.2.2. The approaches all involve four major areas of RI activity: (1) a preliminary inspection and evaluation of OU3 components designated for sampling, (2) the systematic nonintrusive sampling of media in OU3, (3) the systematic collection and analysis of intrusive samples from contaminated media in OU3, and (4) supplemental intrusive sampling. These four areas are discussed in Sections D.3.4.3.1 - D.3.4.3.4. Activity in the first area was completed in order to support the preparation of the revised Work Plan Addendum. A discussion of how it may be possible to limit sampling in later sampled components on the basis of trends observed during field characterization is provided in Section D.3.4.3.5.

The site characterization program itself will be carried out with the three field sampling protocols discussed in Section D.5. The protocols provide instruction on the specific types, locations, and numbers of samples to be collected to meet the objectives of the field sampling program. Before the actual sampling of a component, a field work package (FWP) will be prepared, specifying sample locations and types, as discussed in Section D.4.6.

D.3.4.3.1 Preliminary Evaluation of Site Conditions

Before nonintrusive and intrusive sampling, a variety of activities have been carried out related to evaluation of conditions in OU3. Some of these evaluations are related to satisfying data needs, others

- Limited treatment options are available for asphalt and wood, which are concentrated in a few components. Limited sampling of asphalt and wood will be conducted under supplemental sampling.

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D.3.4.3.4 Intrusive Sampling — Supplemental

Additional intrusive samples may be taken in OU3 components and media to supplement those identified in Section 3.3. The additional samples would be used to (1) interpret and/or validate the data taken systematically, (2) confirm assumptions, and (3) address specific data needs. The types of supplemental sampling envisioned for OU3 include sampling on a site-wide basis and sampling on a component-specific basis.

Site-wide supplemental sampling would consist of the following:

- *Transite* — Transite is a common construction material used as sheeting for walls and roofs for many OU3 buildings. It consists of a mixture of asbestos and concrete. For the purpose of waste volume estimates, it is assumed that all transite is radiologically contaminated. To evaluate the possibility that transite is contaminated with both radiological and chemical species (other than asbestos) at levels that would classify it as a "mixed waste," and therefore limit disposal options, ~~a small number of~~ ten samples will be taken from transite at site locations with the greatest potential for chemical contamination based on process knowledge and visual inspection. Ten components have been selected and are identified as the: Preparation Plant (1A); Ore Refinery Plant (2A); Hot Raffinate Building (3E); Green Salt Plant (4A); Metals Production Plant (5A); Metals Fabrication Plant (6A); Plant 7 (7A); Recovery Plant (8A); Special Products Plant (9A); and the Incinerator Building (39A). These components were selected for transite sampling due to the process activities that occurred within them. Within each component, the sampling location will be determined by the quantity and types of chemicals involved with the process area and visual stains on transite surfaces. Samples will undergo the toxicity characteristic leaching procedure (TCLP) test~~, as well as radiological analyses~~ to determine its status. If leachable chemical contamination is below toxicity characteristic levels, transite will be assumed to be contaminated with only radiological constituents. Components designated for transite sampling are listed in Section D.9.0.8.

- *Media for Leaching Tests* — To support estimates of quantities of contaminants released by wind and water erosion for use in the baseline risk assessment, several samples will be collected from various media throughout the site for leaching tests. TCLP methods will be used to model leaching Chemical and radiological analyses will be performed on the leachate. Sampling will be in areas with expected elevated levels of chemical or radiological contamination. Components designated for media leaching tests are listed in D.9.0.8.

Component-specific supplemental sampling would consist of the following:

D.4 SITE EVALUATION AND FIELD PLANNING

D.4.1 Introduction

The previous section outlined the RI objectives and presented an approach to gather data to meet them. The purpose of the present section is twofold — (1) to provide a general review of the nature and extent of contamination at the site and (2) to provide some details on practical matters involved in implementing field sampling and analysis, including a discussion of the sample numbering system, field work packages, and aspects of the data management system related to sampling and analysis activities.

With respect to the nature of contamination, the types and sources of known and expected radiological contamination are discussed in Section D.4.2. A similar discussion is provided for chemical contaminants in Section D.4.3. In each section, a discussion of specific contaminants is presented. The identified contaminants are evaluated as to their potential concern, resulting in the generation of a list of target analytes, as shown in Table D.4-6 (contaminants for which an analysis is performed). The elimination of potential contaminants from the final analyte list is discussed on a case-by-case basis. For chemical analyses, standard analyte lists associated with the various analytical methods are used and are listed in Table D.4-6. The lists include identified analytes of interest plus additional analytes not specifically identified for OU3 but of general concern in industrial settings.

In Section D.4.4, a directory of component-specific information is presented. Various parts of the Work Plan Addendum are cited that contain information on the types and levels of contamination in individual components.

The final three sections discuss details related to the implementation of field sampling activities. Section D.4.5 describes the sample numbering system to be used and how it is implemented in the field. Section D.4.6 discusses field work packages, which are the actual field assignment documents for each sampled component used by field sampling teams. Finally, Section D.4.7 discusses, in very general terms, the data management system in place for the FEMP and aspects related to sample numbering and sample entry to the system.

D.4.2 Radiological Contaminants

D.4.2.1 Radionuclides of Interest

A list of radionuclides of interest for OU3 has been drawn from a number of sources that are summarized in the OU3 RI/FS Work Plan Addendum, including Table A.3***. The following radionuclides have been identified through analyses of samples from surface and

*** The following section as well as the radionuclides listed in Table D.4-3 describe the reasoning behind the establishment of the final OU3 RI/FS Analyte List, Table D.4-6

TABLE D.4-4 Chemical Contaminants of Interest by Analysis Class

Analysis Class[a]	Likely Sources	Concerns/Rationale
VOCs (33)	Solvents, fuels, POL	Toxicity, volume, mobility
SVOCs (64)	General industrial, POL	Toxicity
PCBs (7)	Transformers High temperature uses	Toxicity, persistence
Metals (23)	Ores, waste streams	Toxicity, volume
Anions	Acids, salts (nitrate, sulfate, phosphate, fluoride, chloride)	Water quality (runoff)
~~Asbestos~~	~~Insulation, transite~~	~~Toxicity, mobility~~
Other	General industrial (inorganic nitrogen, cyanide, ~~sulfide,~~ phenols)	~~Toxicity, safety,~~ water quality

[a] Number in parentheses are the approximate number of analytes determined in the corresponding group by EPA methods.

D.4.3.2 Expected Locations for Chemical Contaminants

Selection of locations for collecting samples for chemical analysis will rely heavily on existing plant knowledge, as well as on visual observations and on collection of samples from natural collection points, such as in sumps and drains, ditches, and lagoon sediments. Field survey instruments will be used where there is evidence or suspicion of contamination of a type to which those instruments respond, but such instruments will not be used for general surveying of large surface areas.

Widespread chemical contamination over large surfaces at levels of concern is not expected in most OU3 components. Hazardous chemicals were used in relatively small amounts compared with process materials or were minor constituents of process materials, such as nonradioactive metals. Chemicals used in bulk were generally nonhazardous (such as lime), highly mobile (such as anions from mineral acids), or volatile (such as solvents). Mobile or volatile contaminants are not likely to adhere to or remain on surfaces.

Therefore, it will not be an objective of this plan to conduct surveys for chemical contaminants over large surface areas. Moreover, such surveys would be very cost inefficient. Rapid, sensitive, and inexpensive field survey techniques, such as those that exist for radioactivity, are not available for many potential chemical contaminants of interest, thus requiring that expensive laboratory analysis be conducted of any such survey samples. Instead, samples for chemical contaminants will generally be selected from the following sampling contexts: (1) areas that are collection points for runoff or that would otherwise

be used in the field ~~or in an on-site laboratory to locate areas with trace metals contamination.~~ to locate areas with metals contamination high enough to be detected by this technique.

D.4.3.3 Chemical Analysis

The ~~basic~~ OU3 RI/FS list of chemical (and radiological) analytes is given in Table D.4-6. The chemical analytes listed comprise the EPA TAL for inorganics and the TCL for organic substances, with the exception of pesticides. The lists contain most of the potential contaminants of concern (Table D.4-3), with the following exceptions and justifications:

Potential Contaminant	Justification for not Analyzing
Metals	
Europium Germanium Lanthanum Niobium Platinum	These substances are or were present only in small and controlled amounts in the laboratory facilities on-site.
Lithium Tin Titanium Yttrium	These substances are not expected to represent a toxicity hazard.
Molybdenum Zirconium	These substances are present in only small quantities is isolated areas of OU3 and are not expected to represent a toxicity hazard.
Semivolatile organic compounds	
Chlordane	Chlordane was identified in only the Plant 1 Detrex still bottoms and is not expected to exist in significant quantities elsewhere.
Diamylamylphosphonate	Toxicity values not available, presumed to be relatively nonhazardous at levels present in OU3 materials; areas of use were limited.

Tributyl phosphate	Toxicity value low (oral LD50 in rat = 3.0 g/kg, Merck Index, 10th editon); not expected to represent a hazard.
Volatile organic compounds	
Ethylene glycol Methanol	Relatively low toxicity (lethal dose in humans about 100 mL for each, Merck Index, 10th edition), miscible with water; not expected to be present at hazardous levels in OU3 materials.
Anions	
Chloride Fluoride Nitrate Phosphate Sulfate	These parameters are needed as information for the on-site Water Treatment Plant to accept and treat the liquids before discharge. This will not be done until final remediation has begun. Sampling will be done at that time.
Others	
Ammonia	
Sulfide	
Oil and Grease	
Phenols	
Asbestos	Will be completed by a different program at the FEMP.
Petroleum, Oil, and Lubricants (POL)	Covered by VOC and SVOC analysis.

~~In addition to the basic analyte list given in Table D.4-6, several other parameters, mostly related to water quality, will be analyzed on an as needed basis. Included among these parameters are anions, such as chloride, fluoride, nitrate, phosphate, and sulfate, which are primarily residuals from the use of strong acids in plant processes. In addition, ammonia nitrogen, cyanide, and sulfide will be analyzed for precautionary purposes in appropriate situations. Potential contaminants of concern that may be constituents of the petroleum products identified in Table D.4-3, such as benzene or polynuclear aromatic hydrocarbons, are covered in the analysis of VOCs and SVOCs.~~

~~The extensive list of potential chemical contaminants is analyzed through a relatively short list of analytical methods. Table D.4-7 summarizes the class of chemical contaminants and the analytical method.~~

The list of chemical contaminants will be analyzed by standard EPA methods listed in Section D.6.

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TABLE D.4-6 OU3 RI/FS Analyte List

Radionuclides

Isotopic uranium
Isotopic thorium
Isotopic plutonium and 241
Radium-226 and 228
Neptunium-237
Americium-241
Cesium-137
Strontium-90
Lead-210
Polonium-210
Technetium-99
Alpha/Beta Screening

TAL Inorganics

Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Magnesium
Manganese
Mercury
Nickel
Potassium
Selenium
Silver
Sodium
Thallium
Vanadium
Zinc
Cyanide[1]

TCL Semi-Volatile Organics

1,2-Dichlorobenzene
1,2,4-Trichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
2-Chloronaphthalene
2-Chlorophenol
2-Methylnaphthalene
2-Methylphenol
2-Nitroanilene
2-Nitrophenol
2,2-Oxybis-(1-chlororpropane)
2,4-Dichlorophenol
2,4-Dimethylphenol
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
2,6-Dinitrotoluene
3-Nitroaniline
3,3-Dichlorobenzidine
4-Bromophenyl-phenyl ether
4-Chloro-3-methylphenol
4-Chloroaniline
4-Chlorophenyl-phenyl ether
4-Methylphenol
4-Nitroaniline
4-Nitrophenol
4,6-Dinitro-2-methylphenol
Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
bis(2-Chloroethyl) ether
bis(2-Chloroethoxy) methane
bis(2-Ethylhexyl)phthalate
Butylbenzylphthalate
Carbazole
Chryzene
Dibenzofuran
Dibenzo(a,h)anthracene
Diethylphthalate
Dimethylphthalate
Di-n-butylphthalate
Di-n-octylphthalate
Fluoranthene
Fluorene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Ideno(1,2,3-cd)pyrene
Isophorone
Napthalene
Nitrobenzene
N-Nitroso-di-n-dipropylamine
N-Nitrosodiphenylamine
Pentachlorophenol
Phenanthrene
Phenol
Pyrene

TCL PCBs

Arochlor-1016
Arochlor-1221
Arochlor-1232
Arochlor-1242
Arochlor-1248
Arochlor-1254
Arochlor-1260

TCL Volatile Organics

1,1-Dichloroethane
1,1-Dichloroethene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
1,1,2,2-Tetrachloroethane
1,2-Dichloroethane
1,2-Dichloroethene (total)
1,2-Dichloropropane
2-Butanone
2-Hexanone
4-Methyl-2-pentanone
Acetone
Benzene
Bromodichloromethane
Bromoform
Bromomethane
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Chloromethane
cis-1,3-Dichloropropene
Dibromochloromethane
Ethylbenzene
Methylene chloride
Styrene
Tetrachloroethene
Toluene
Total Xylenes
trans-1,3-Dichloropropene
Trichloroethene
Vinyl Chloride

TCLP Metals

Arsenic
Barium
Cadmium
Chromium
Lead
Mercury
Selenium
Silver

TCLP Semi-Volatile Organics

1,4-Dichlorobenzene
2,4-Dinitrotoluene
Hexachlorobenzene
Hexachloroethane
Hexachloro-1,3-butadiene
Nitrobenzene
Pentachlorophenol
Pyridine
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
o-Cresol
m-Cresol
p-Cresol

TCLP Volatile Organics

Benzene
Carbon tetrachloride
Chlorobenzene
Chloroform
2-Butanone
1,2-Dichloroethane
1,1-Dichloroethylene
Tetrachloroethylene
Trichloroethylene
Vinyl chloride

[1] Requested only in components with history of cyanide usage.

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~~TABLE D.4-7 Summary of Chemical Contaminant Classes and Corresponding Analytical Method~~

~~Contaminant~~	~~Analytical Method~~
~~VOC~~	~~Gas chromatography/mass spectrometry~~
~~SVOC~~	~~Gas chromatography/mass spectrometry~~
~~PCBs~~	~~Gas chromatography~~
~~Metals~~	~~Atomic absorption spectroscopy, inductively coupled plasma atomic emission spectroscopy~~
~~Anions~~	~~Ion chromatography, wet methods~~
~~Asbestos~~	~~Light microscopy~~
~~Phenols~~	~~Wet methods~~
~~Sulfides~~	~~Wet methods~~
~~Cyanides~~	~~Wet methods~~
~~Inorganic N~~	~~Wet methods~~
~~Oil and grease~~	~~Gravimetry~~

TABLE D.4-7 Summary of Analysis Requests per Media

Media	Analyses
Concrete	
Chips	Radionuclides, TAL Inorganics, TCL PCBs[1]
Cores	Radionuclides, TAL Inorganics, TCL PCBs[1]
Masonry	Radionuclides, TAL Inorganics, TCL PCBs[1]
Structural Steel	Radionuclides, TAL Inorganics
Soil/Loose Media	Radionuclides, TAL Inorganics, TCL VOCs, TCL SVOCs, TCL PCBs[1]
Liquid	Radionuclides, TAL Inorganics, TCL VOCs, TCL SVOCs, TCL PCBs[1]
Transite	TCLP Metals, TCLP VOC, TCLP SVOC
Composite Swipes	Radionuclides
Air Particulates	Radionuclides

[1] To be sampled only in areas where field screening shows presence of PCBs.

mercury, thallium, arsenic, and selenium. ICP is generally cheaper and faster for analysis of many metals in individual samples. The sensitivity requirements determined by the DQOs of the investigation, and QC criteria specified in the SCQ, will dictate which technique will be used for particular trace metals. Typically, both techniques are employed in investigations of this type. The techniques rely on the absorption (FAA) or emission (ICP) of light of characteristic wavelengths for the identification and quantification of metals.

~~Anions, such as sulfate, nitrate, phosphate, chloride, and fluoride, usually originating from mineral acids used in uranium processing will be analyzed by ion chromatography (IC) or by wet methods. The IC process has the ability to separate and analyze multiple anions in a single analysis. It usually~~

~~The IC process has the ability to separate and analyze multiple anions in a single analysis. It usually employs an anion exchange column to separate anions and a conductivity cell to detect them. Specific anions are identified by their characteristic retention times.~~

~~So called "wet" methods, generally those that involve characteristic chemical reactions, as opposed to instrumental methods, will be used as needed for a variety of analytes, including total phenols, sulfides, cyanides, and inorganic (ammonia) nitrogen. For some analytes, field analysis of air samples can be performed with Draeger tubes that involve similar chemistries. Total oil and grease will be determined by gravimetry (weighing) after a simple extraction and drying process.~~

D.4.3.4 Physical and Chemical Waste Properties

~~Characterization of the physical properties of the contaminants, or contaminated matrices, is particularly important to establish and assess potential remedial actions. Such physical properties include particle size distributions, porosity and void fractions, viscosity, and density.~~ Characterization of physical properties would be obtained during treatability studies, if necessary to support detailed evaluation of a potential remedial alternative.

Chemical properties of the contaminant and/or contaminated matrix are important for both risk assessment and potential remedial action alternatives. Much information will become available through analysis for chemicals and hazardous materials; however, limited additional analyses can be expected. For example, the chemical form of the contaminated matrix will bear upon decontamination and other treatment for waste minimization. For stabilization, storage, and disposal options, the solubility and potential for migration are also important properties.

Most of the information necessary to adequately characterize wastes will be available through analysis for contaminants of concern and through the determination of ~~physical and~~ chemical properties. Known existing wastes and waste forms are sanitary waste, low-level radioactive waste, RCRA hazardous waste, mixed wastes, and other forms of waste that may require controls and proper disposition. The ultimate disposition of wastes presumes the existence of waste acceptance criteria that may require additional characterization and documentation.

D.4.4 Directory to Component Information

A great deal of information on individual components is presented in various parts of the Work Plan Addendum, and it is neither practical nor necessary to summarize all that information here. Instead, this section provides a directory to the locations of relevant component information.

The concept of organizing OU3 into components is discussed in Section 2.2. The designation of 11 component categories is presented in Section 2.2.2, while Table 2.3 lists all OU3 components and grid map locations by component category.

The nature and extent of known contamination in OU3 components is discussed in Section 2.4, along with a description of past radiological and nonradiological monitoring programs. A basis for

D.4.6 Field Work Packages

D.4.6.1 Description

Section D.9 is devoted to component-specific application of the sampling approach and protocols for each of the identified components of the OU3. In addition to this information, a component-specific field work package (FWP) will be completed for each of the components before the field sampling of the individual components is performed.

The primary function of the component-specific FWPs is to document specific sampling activity plans in each component and to obtain site approval for the activity. The FWP also reiterates the component description and process divisions for the benefit of field sampling personnel and further provides a systematic method of identifying procedures (see abstracts in Attachment D.I) to be employed and equipment requirements. A schedule is also prepared to serve as a flag for logistics coordinators.

The FWP specifies sample numbers to be utilized for sample locations identified in the component inspection activities per the OU3 RI/FS sample numbering system described above. Total sample volume needs are discussed relative to laboratory requirements to perform the relevant analyses for each location and media. The FWP also includes the project-specific Health and Safety Plan (HASP) and the authorized forms to perform the sampling, including Radiation Work Permits, FEMP Safety Work Permits, Chain-of-Custody forms, and others as applicable.

The outline for the FWP is as follows:

Signature/Authorization Block: This section includes authorizations from site management to implement the proposed activitity in the field. The preparer, the project supervisor, and the manager of the OU3 RI/FS will authorize the document.

Section 1.0 Introduction: This section provides a short summary of the component and a map. The description of the component is similar to that presented in the Section D.9 component-specific sampling summary; however, this section will highlight any logistics issues or special requirements for field crews.

~~*Section 2.0 QA/QC Requirements*: This section includes a signature block for the QA/QC lead for the project to verify that the identified plan for QA/QC samples in the component meet the intent and requirements of the SCQ.~~

~~*Section 3.0 Sample Locations*: This section describes the sampling locations and notes if changes have been made since the Section D.9 component-specific sampling summary was developed.~~

~~*Section 4.0 Sampling Activities and Sample Handling*: This section includes sample number designations, required volumes, and required containers. A table is provided to aid in sample number correlation to location, procedure, and ASL.~~

~~*Section 5.0 Equipment Needed*: A standard table of sampling equipment is marked to correspond to the specific sampling needs of the component. Additional special requirements are also addressed.~~

~~*Section 6.0 Sampling Procedures*: This section identifies which sampling procedures are to be employed for component sampling.~~

~~*Section 7.0 Component Sampling Schedule*: This section provides a timeline schedule of sampling for the component. Any special activities to be performed in the component and any timing logistics requirements are also addressed.~~

~~*Section 8.0 Health and Safety Compliance*: This section includes the component specific HASP and any other safety related documents are attached.~~

Section 2.0 - QA/QC Requirements: This section includes a signature block for the QA/QC lead for the project to verify that the identified plan for Field QA samples in the component meet the intent and requirements of the SCQ. It also contains information pertaining to the frequency in which each Field QA sample should be taken.

Section 3.0 - Sample Locations: This section describes the sampling locations, and notes if changes have been made since the Section D.9 component-specific sampling summary was developed. This section also breaks down the sampling into the Non-Intrusive and Intrusive sampling requirements for the component. The sampling protocols for the Non-Intrusive surveys are an attachment to the FWP to be used by the sampling technicians as a ready reference in the field.

Section 4.0 - Sampling Activities, Sample Handling, and Procedures: This section references the procedures to be followed during OU3 sampling activities and sample handling. It also outlines which type of sample containers and lids are required during the FWP sampling event.

Section 5.0 - Equipment Needed: A standard table is marked to correspond to the specific sampling needs of the component. Additional special requirements are also addressed.

Section 6.0 - Health and Safety Compliance: This section references the component specific Health and Safety Plan and states required permits for entering the component and performing sampling within the components.

Attachment 1 - Summary of Non-Intrusive Sampling: This is a table to be utilized by the sampling technicians. It summarizes radiological and chemical surveys, as well as air and swipe samples. It states the sample ID numbers, media type and matrix code, sample location, sample type, sampling procedures, ASL level, requested analyses, chain of custody codes for analyses, weight and volumes of samples, hold times, and preservatives for all non-intrusive samples planned for that component.

Attachment 2 - Summary of Intrusive Sampling: This is a table to be utilized by the sampling technicians. It summarizes the major media and supplemental intrusive samples. It states the sample ID numbers, media type and matrix code, sample location, sample type, sampling procedures, ASL level, requested analyses, chain of custody codes for analyses, weight and volumes of samples, hold times, and preservatives for all intrusive samples planned for that component including Field QA samples.

Attachment 3 - Sample Containers Needed per Media Type: This is a chart that gives the total number of sample containers required for the component sampling event based upon the requested analyses, media types, and sample volumes required. It is to be used by the sample technicians as a reference to ensure they have the correct sample container types and quantities for the component sampling event.

Attachment 4 - Map(s): This is the updated map showing the exact sampling locations based upon available radiological screening data.

Attachment 5 - Sampling Protocol 1: This is a restatement of Protocol 1 from Section D.5 of the SAP, which describes radiological surveying used to confirm the locations of "hot spots" (local maxima) for removal alpha and/or total beta-gamma activity as indicated in Attachment 4 to establish final intrusive sample locations. It also describes chemical surveying to be conducted at all intrusive sampling locations.

Attachment 6 - Equipment Requirements: This is to be used by the lead technician as a reference prior to field screening and sampling to ensure the sampling crews are adequately prepared for the daily tasks.

Attachment 7 - Health and Safety Plan: This is the component specific Health and Safety Plan.

D.4.6.2 Procedure for Preparing Field Work Packages

For each OU3 component to be sampled, an engineering inspection has been performed and documented in the Section D.9 component-specific sampling chapters. On the basis of the findings in these inspections, an FWP will be developed for each component to be sampled. The following step-by-step procedure will be used to develop the FWPs:

1. Review corresponding Section D.9 subsection for the component and the backup file for the component.

Two types of radiological air sampling will be performed. ~~Continuous air samples will be assayed for longer half-lived airborne radioactivity concentrations. Shorter term grab samples will be assayed for concentrations of radon, thoron, and their respective short half-lived daughters. If significant levels are observed, continuous monitoring will be employed.~~

- Continuous general area air samples for laboratory analysis of longer half-lived airborne radioactivity contaminants.

- Passive collector, alpha etch cups, air samples for radon and thoron.

Field surveys of chemical contaminants will be made to explore regions of suspected contamination by the following means:

- Organic vapors using a photoionization detector and/or a portable gas chromatograph.

- PCBs using field test kits, and/or an on-site laboratory procedure, and

- ~~Selected trace metals using a portable and/or on-site laboratory X-ray fluorescence spectrometer.~~ Metals from the target list which are detectable using a field portable XRF analyzer.

Field instruments for collection of radiological, chemical, and physical information are illustrated in Section D.6.2. Section D.6.2 lists the field instruments that have been identified as applicable for OU3 activities. Health and safety protection will be supported by the above measurements, as well as by additional measurements of various types made specifically for this purpose. The types of additional measurements are listed in the corresponding section below, and calibration procedures are described in Appendix I of the SCQ.

D.5.1.1.1 Surface Radioactivity Measurements

Total surface contamination measurements will be taken with ZnS(Ag) alpha scintillation detectors and "pancake" thin-window (2 mg/cm^2) Geiger-Müller (G-M) beta-gamma detectors.

The alpha scintillation detectors respond very selectively to alpha-emitting contaminants. Instrument response to a given alpha particle energy is relatively constant, so response to different alpha emitters is comparable. Instrument backgrounds are typically low, and sensitivity, in the scaler mode, is adequate to meet the most restrictive limits.

The thin-window G-M beta-gamma detector response to beta particles is energy dependent. Potential contaminants represent a range of average beta particle energies (e.g., 85 keV from Tc-99 to 935 keV from the Y-90 daughter of Sr-90). The isotopic composition of the contaminants must be known to interpret instrument response. This response may be indeterminate with a variable mix of beta-emitting contaminants. Response to gamma rays is also a function of energy, and similarly it may be impossible to interpret response with a mix of gamma emitters. A mixture of beta emitters further complicates

The PIC response accuracy is reduced at gamma ray energies below 40 keV. Where higher ambient gamma exposure rates are encountered, in excess of the range of the PIC, alternative instruments will be used. An energy-compensated (external plastic probe sheath) G-M detector is effective within the range of 0.1 to 100 mR/h. An ion chamber survey instrument (e.g., Cutie Pie) is effective for exposure rates in excess of 10 mR/h.

Beta emitter dose rates may be of concern for occupational exposure. Both G-M detectors and ion chamber instruments have moveable shields to allow beta plus gamma, as well as gamma only, to permit distinction of beta dose rate.

D.5.1.1.4 Air Sampling

~~Airborne particulate contaminants are primarily of significance for worker exposure. Measurements of airborne contaminant concentrations can also demonstrate the degree of entrainment and resuspension that occurs from contaminant sources. Air sampling locations are selected to be most representative of worker breathing zones within the facilities. Continuous high volume air samples (tens of cubic feet per minute) will be used. where sampling periods may be limited (noncontinuous). Where possible, continuous air sampling will be used for representativeness.~~ Longer half-lived airborne radionuclide contaminants present in each of the components will be determined by stationing at least one continuous general area air sampler in each component. The air filter will then be sent to an analytical laboratory for ASL D radionuclide analysis.

The presence of radium-226 and thorium-232 in a particular component, due to prior radium or thorium handling or storage, may lead to concern for the presence of airborne radon, thoron and their short half-lived daughters. ~~Short term grab air particulate samples will be collected and counted in the field as needed. If significant daughter concentrations are encountered, specific monitoring will be performed to better characterize these airborne contaminants.~~ Alpha Track Etch Cups, Terradex cups, will be stationed in components known to have radium or thorium. In components where routine radon monitoring is already being conducted, previous data will be used for characterization and risk assessment (Table A.4.4).

D.5.1.1.5 Organic Vapor Detection

A variety of types of organic vapors can be detected with a hand-held photoionization detector (PID) at levels as low as 0.1 ppm by volume (ppmv). The PID uses an ultraviolet (UV) light source to ionize and thereby detect organic vapors. The PID responds to a wide variety of chemical classes, particularly to aromatics, including benzene, toluene and xylene, and olefins, such as chlorinated ethenes (e.g., trichloroethene, TCE). Fuels can be detected primarily because of their aromatic content (aliphatic hydrocarbons give poor response). The identity of the detected organic vapor must be determined by a selective method, usually gas chromatograph/mass spectrometry (GC/MS). ~~PIDs are very useful for determining the areal extent of contamination and for locating hot spots.~~ PIDS are useful for determining the areal extent of contamination and for locating "hot spots". Data obtained utilizing a PID may be enhanced by employing a Flame Ionizing Detector (FID) in conjunction with the PID. The FID provides a greater range of contaminant detection since its ionizing capability is not limited to the specific energy

output of the UV light source as with a PID. Another advantage utilizing a FID is that the operational efficiency is not as susceptible to immediate meteorological conditions (i.e. humidity and temperature) as the PID. Relatively high humidity conditions may produce vapor condensation on the PID UV lamp surface. Low air temperatures may also reduce the efficiency of the PID.

An alternative method for characterizing organic vapors is the use of a portable gas chromatograph (GC). Advantages of this method are the ability to identify and quantify specific vapors in air, with proper calibration. A further advantage is that with the use of various detectors, including a PID, a portable GC will respond to a greater variety of vapors than will a hand-held PID detector. Disadvantages include greater difficulty in calibration and use, larger size, and cost, as compared with the PID.

D.5.1.1.6 Detection of PCBs by Field Test Kits ~~or On-Site GC~~

Field test kits are available for detecting PCB contamination in the field. PCBs can be detected at the low-to-mid ppm range in a variety of media, including soils, waters, and ~~removable~~ loose solids. The test kits use a chemical reagent to strip chlorine atoms, as chloride ions, from PCB molecules. The chloride ion concentration generated, determined with a chloride-specific electrode, is proportional to the concentration of PCB in the original sample. The test is nonspecific for a particular PCB mixture (Aroclor) and is subject to false positive results from the presence of other chlorinated organic compounds. Its speed and low cost, however, make it a useful screening tool for selecting laboratory samples. This test will be used at locations determined by process knowledge or visual inspection to be suspected of PCB contamination.

~~An alternative to using the test kits for conducting PCB surveys is to submit surface swipes or media samples to the on-site laboratory for a rapid screen by GC (gas chromatography). The analysis involves a simple and rapid solvent extraction step and analysis using an ASL B level of calibration and QA/QC.~~

D.5.1.1.7 Field Screening of Metals by X-Ray Fluorescence

~~Many trace metal contaminants of interest can be detected in a variety of media with a portable, or laboratory, X-ray fluorescence (XRF) spectrometer. Metal atoms are detected directly in their host media, eliminating the need for sample preparation. Most instruments use a detection cell that holds the sample. Some instruments also use a probe for directly detecting trace metal contamination on surfaces. In either case, various metals are detected with varying sensitivities, corresponding to their ability to fluoresce under the influence of the particular X-ray source. Therefore, the response characteristics of the instrumentation must be considered in light of the sensitivity requirements of the investigation to establish the usability of this technique. It is expected that this technique will be quite useful for locating or confirming the absence of many of the metals of interest to the RI. This emerging technology may prove to be a very useful tool for guiding field sampling for trace metal contamination.~~ Field portable X-ray Fluorescence (XRF) is a technology which is rapidly emerging in the field of environmental remediation. The greatest value of field portable XRF is its use as a qualitative/semi-quantitative screening technique for (1) field identification of "hot spots" of metallic contamination on structural

surfaces or in soil, (2) identification of lead based paint, (3) sorting of ferrous and non-ferrous metals and alloys.

However, XRF, whether a simple portable unit used in the field or a more sophisticated laboratory installation, is very matrix dependent and is potentially subject to errors caused by variations (chemical and physical) between samples.

In a laboratory, physical matrix effects are controlled by sample preparation techniques developed specifically to minimize these effects. Chemical matrix effects are controlled by using "site specific" standards and by extensive calibration. Site specific standards are actual samples generated on-site which contain varied concentrations of analytes and interfering elements of interest. Concentrations of analytes/interferences are independently established by Atomic Absorption (AA) and/or Inductively Coupled Plasma (ICP) analyses. Using such standards and computerized calibration data reduction, a laboratory installed XRF facility provides analytical data meeting requirements of ASL B.

With the field portable XRF unit, chemical matrix effects will be controlled by calibration as described above for the laboratory XRF. However, extensive sample preparation in the field is impractical and is not planned. Consequently, the physical matrix effects such as particle size, and moisture content will not be mitigated. Applied as described above, field portable XRF will provide a valuable screening tool producing qualitative and semi-quantitative analyses meeting requirements of ASL A.

D.5.1.1.8 Health and Safety and Physical Measurement Instruments

The following instruments will be used for industrial hygiene monitoring and for physical property measurements when conditions warrant:

- Oxygen percent meters,
- Combustible gas indicators,
- Photoionization detectors (PID),
- Organic Vapor Analyzers (OVA),
- Indicator tubes (e.g., Draeger — NH_3 vapors),
- Temperature measurement devices,
- Conductivity meters, and
- pH meters.

Descriptions of these devices and instructions for their use are provided in the SCQ. The previously described radiological measurements will also be used for health physics monitoring and controls. Other monitoring is provided at the FEMP, including external radiation dosimetry and both direct and indirect radiobioassay.

component, if no swipe samples exceed this level, no laboratory analysis of swipe samples will be conducted.

D.5.1.2.2 Low-Level Gamma Radiation Measurements

Qualitative low-level gamma ray measurements will be taken during the initial approach to each process area known, or suspected to be, contaminated. In areas where gamma levels are equal to, or greater than, twice background, exposure rate measurements will be taken. Process equipment such as tanks, pumps, traps, and similar features will be surveyed to identify those containing significant quantities of gamma emitters. A reading of greater than 100,000 counts per minute (cpm) is a reasonable guideline for supplemental sampling of unknown material contents.

D.5.1.2.3 Beta and Gamma Exposure Rates

Gamma ray exposure rates will be measured at locations known, or suspected to have levels in excess of typical background (approximately 10,000 cpm low-level gamma). The limit for environmental exposure under DOE Order 5400.5 is 20 μR/h above background.

Prospective locations for beta and gamma ray exposure rate measurements within components are locations exhibiting the highest beta-gamma activity as identified in the corresponding subsections of Section D.9, and specified in the component FWP. To meet the needs of risk assessment (Section 3.1 of the WPA), measurements are required at the location of highest exposure for an individual in a given component. Measurements should be taken at several high exposure locations within a component so that risk assessors can choose one corresponding to the most likely exposure scenario. Exposure rate measurements for occupational exposure are handled separately, according to the requirements of the health and safety plans for individual component FWPs.

D.5.1.2.4 Air Sampling

~~At least one general area particulate air sampler will be in operation per placed in each component undergoing investigation. Sampling locations for air samplers are to be selected to be most representative of worker breathing zones within facilities. This sampling activity will be completed in advance of component sample collection to establish ambient conditions and to indicate any potential need for personal protective equipment. Previous health physics air sample data will also be assessed.~~ At least one general area particulate air sampler will be placed in each component to determine the ambient concentration of longer half-lived airborne particulate radionuclides. These samplers will be operated for 24 hours at a flow rate of 60 L/minute. This 0.8 micron membrane filter will be sent to the analytical laboratory for ASL D analysis of the OU3 radionuclides of concern (Table D.4-6). This data will be used in risk assessment and characterization.

~~In buildings where the presence of radium 226 could lead to airborne radon 220 and radon 222 and/or where the presence of thorium 232 could lead to airborne radon 220, grab samples will be collected daily for one week (five work days) before RI work begins. If the grab samples show concentrations in excess of 0.02 working level (WL), then a continuous sampling program will be~~

~~initiated. Radon and/or thoron daughters will be monitored by a continuous air monitor. If the chosen monitor does not have a direct readout, stored instrument data will be accessed every 24 hours.~~ In buildings where radium-226 or thorium-232 has been stored or handled, there is a concern for airborne radon-220 and radon-222. Passive collectors in the form of alpha track etch cups, Terradex cups, will be stationed in components which have a history of radium-226 or thorium-232. Four cups will be used in each component for at least one month. The cups will be sent to an off-site company for processing of the chip within the cup. Two of the cups will be analyzed for radon and thoron while the other two cups will be analyzed for radon only. Determination of the average thoron concentration will be done be subtracting the radon-only average from the radon plus thoron average. Values for radon cannot exceed 100 pCi/L above background at any given point or exceed an annual average concentration of 30 pCi/L above background. In components where current data already exists for radon, this data will be used in place of OU3 sampling. This data will be used for risk assessment and characterization.

D.5.1.3 Chemical Surveys

Widespread chemical contamination over large surfaces at levels of concern is not expected in most OU3 components. Hazardous chemicals were used in relatively small amounts compared with process materials, or were trace constituents of process materials, such as nonradioactive metals. Chemicals used in bulk were generally nonhazardous (such as lime), highly mobile (such as anions from mineral acids), or volatile (such as solvents). Mobile or volatile contaminants are not likely to adhere to, or remain on, surfaces.

Selection of locations for taking field measurements of chemical contaminants will rely heavily on existing plant knowledge, as well as on visual observations, emphasizing natural collection points. In general, field survey instrument measurements will be taken wherever there is evidence or suspicion of contamination of a type to which the various instruments respond. On the other hand, such instrument measurements will not be used for general surveying of large surface areas on the chance of locating isolated contamination.

Surveys for chemical contaminants will be conducted in the following sampling contexts: (1) areas that are collection points for runoff, or that would otherwise integrate contaminants that are diffusely dispersed at low concentrations over large areas, such as sumps or other runoff collection points; (2) areas that are pathways to environmental or human receptors outside the component, such as unlined sumps, drains, ditches, or lagoons; or (3) areas suspected from process knowledge of being contaminated (such as ore storage pads or other materials handling areas) or near electrical transformers (for PCB contamination). Bulk liquids and solids of uncertain identity will also be surveyed.

D.5.1.3.1 Organic Vapor Surveys

Hand-held photoionization detectors and/or a portable GC will be used to identify areas contaminated with volatile hydrocarbons, such as fuels and solvents, and will thereby help guide sample collection for VOC analysis.

D.5.1.3.2 PCB Surveys

~~Field surveys for PCBs will be conducted using field test kits or rapid turnaround GC analysis in the on-site laboratory, both of which are ASL B procedures. Surveys will be conducted in components that contain or formerly contained electrical transformers or other types of equipment in which PCBs may have been used and spilled.~~

~~Potentially contaminated surfaces and loose media or liquids associated with such equipment should be subjected to screening. Surfaces of major media will be sampled by swiping a 100 cm^2 area with a glass fiber filter wetted with hexane. Surface swipes will be subjected to laboratory GC analysis to achieve required detection limits. Either the ASL B or C/D procedure may be used; however, when surficial PCB contamination in excess of 100 $\mu g/100\ cm^2$ is located on a major medium, at least one swipe sample from the area must be submitted for laboratory analysis at ASL C/D. The approximate areal extent of contamination exceeding this level should be determined through further swipe sampling of the contaminated area and employing analysis at ASL B.~~

~~Solid and liquid media will require a simple extraction procedure before analysis by either field test kits or GC. Sample preparation for field kits will be done according to instructions and using materials supplied in the kits, while extractions for GC analysis will done in the laboratory using a simple solvent extraction procedure. Positive results in excess of 50 ppm by either test must be confirmed by analysis with the ASL C/D procedure.~~ Field surveys for PCBs will be conducted using field test kits which are ASL B procedures. Surveys will be conducted in components that contain or formerly contained electrical transformers or other types of equipment in which PCBs may have been used and spilled.

Potentially contaminated surfaces and loose media or liquids associated with such equipment should be subjected to screening. The area of highest contamination and the approximate areal extent of contamination will be determined using field test kits. Intrusive samples will be taken at the area of highest contamination for analysis in the laboratory using ASL C/D procedures.

D.5.1.3.3 Trace Metals Screening

~~A portable or on-site laboratory X-ray fluorescence analyzer will be used to identify areas and/or media with trace metals contamination under ASL B. It is not practical to analyze the entire 23 element target analyte list using the XRF technique. Therefore, the instrument employed will be configured with the appropriate source or sources required to detect an optimal suite of elements of interest. The suite of analytes will be determined by examining instrument performance characteristic for various elements in conjunction with identifying elements of particular interest determined through specific process knowledge or previous analytical results.~~

~~One possible instrument configuration would be using a Cd-109 source in a field instrument to analyze for copper, zinc, lead, arsenic and zirconium in the range of 10-100 mg/kg in solid media. Configuring the instrument with multiple sources is also possible. In either case, calibration must be performed for all elements of interest in the media of interest to obtain quantitative results.~~

~~Surface contamination on major media can be determined in swipes or scrapings of nonporous media, or in chips of porous media. Loose media and liquids can be analyzed directly, after filtering, screening, or homogenizing as necessary. XRF by itself is not sensitive enough to meet the primary data requirements of the RI, but will be useful for guiding intrusive sampling.~~

~~Locations for measurement and/or sampling will be selected judgmentally based on process knowledge and visual inspections. Surveying will be conducted to support the objectives of locating areas of maximum contamination in major media to be sampled intrusively for laboratory analysis of the TAL, and also for determining the presence or absence and approximate areal extent of trace metals contamination in the media. Screening of prospective supplemental samples will also be possible for determining the presence or absence of trace metal contamination and for selecting intrusive samples.~~

Wherever applicable, a field portable X-ray Fluorescence (XRF) analyzer will be used to identify areas and/or media with detectable levels of metals contamination. XRF is applicable only when the element of interest is present in concentrations above the XRF detection limit. That detection limit may vary with different commercial instruments and with the selection of excitation sources. Most commercial instruments offer selection from two to three installed radioisotope excitation sources so that detection limits can be optimized.

Of the metals in the TAL Inorganics List (Table D.4-6), Aluminum, beryllium, calcium, magnesium, potassium and sodium will not be detected by the use of field portable XRF at this site. Generally, for elements of Atomic Number 24 (chromium) or higher, the field portable XRF unit will be capable of detection limits of 100 to 200 ug/kg. Since these values are considerably higher than the PRGs, it is unlikely that the field portable XRF is capable of determining trace concentrations of metals in soil.

X-ray Fluorescence is matrix dependent and is potentially subject to errors caused by variations (chemical and physical) between samples. Methods for minimizing errors due to matrix effects are described in Section D.5.1.1.7 Field Screening of Metals by X-Ray Fluorescence.

The following uses of field portable XRF are anticipated.

- Screening of soil, concrete and other structural materials for "hot spots" of barium, lead, mercury and other RCRA metals.
- Screening for lead paint on structural debris from demolition

Locations for measurement and/or sampling will be selected judgmentally based on process knowledge and visual inspections. Surveying will be conducted to support the objectives of locating areas of maximum contamination in major media to be sampled intrusively for laboratory analysis of the TAL, and also for determining the presence or absence (relative to detection limits) of metals contamination. XRF will also be used to screen prospective supplemental samples for metal contamination and for selecting intrusive samples.

As experience is gained and the application of field portable XRF is developed at the FEMP, it is anticipated that the total analyte list will be expanded.

D.5.2 Protocol 2: Determining Final Intrusive Sample Locations

Preliminary locations for intrusive and supplemental samples are identified for all components in the respective subsections of Section D.9. These locations were selected after each component was inspected to gather component-specific information in preparation of that section of the SAP. The purpose of this protocol is to provide guidance for selecting final locations for collecting intrusive samples following evaluation of nonintrusive sampling results (Protocol 1) and further inspection of the components.

D.5.2.1 Major Media Sampling

For radiological samples, a single, specific location will be designated for intrusive sampling by such means as coring, chipping, or cutting. For surface swipe or scraping samples, a general area will be designated to be covered by multiple subsamples that will be composited into a single sample. For applicable chemical parameters, a single intrusive sample will also be taken in each major medium in each process area. This location may or may not coincide with the radiological sample location. Guidance for conducting chemical surveys of various types is given in Protocol 1, which aids the selection of intrusive sample locations. If chemical survey data or process knowledge is inconclusive, samples for chemical parameters should be taken at the same location as the radiological sample. The following factors will be considered in designating the optimum radiological sample locations:

1. Areas that represent a maximum for total beta-gamma readings will be given greatest consideration.

    a. If a single area of elevated survey readings exists, that area should be selected as the sampling location, in the absence of prohibiting factors.

    b. If several areas exhibit activity near the maximum, a representative location in terms of orientation and surface exposure should be selected for sampling.

    c. If no elevated levels are found in a given medium in a given process area, other factors listed below will determine the final sampling location.

2. Areas of potential or likely deposition of contaminants on major media will be considered. Factors to be considered include the following:

    a. Proximity of medium to process equipment or materials.

    b. Orientation of this medium with respect to likely contamination pathways, which may include:

        - air deposition,

TABLE D.5-1 Liquid and Solid Sampling Methods

Procedure No./ Applicable Media	Sampling Devices or Methods	Items Sampled
Liquid Sampling Methods		
EP-CRU-001 Surface, shallow or standing liquids	Ladle, scoop, dipper, or container	Standing liquids on or in roofs, floors, tanks, drums, sumps, ducts, process equipment, wet scrubbers, surface skins from impoundments
EP-CRU-009 Deeper liquids	Grab Sampler, Coliwasa, Teflon bailer, or weighted bottle	Retention basins, larger drums, tanks, and vessels
EP-CRU-010 Contained liquids	Valves, disconnects, or penetrations	Tanks, process lines and pipes, other containerized liquids
Solid Sampling Methods		
EP-CRU-016 Removable solids	Dipper, ~~thief, trier,~~ scoop, trowel, or shovel	Process residues, wastes, solids in tanks, vessels, dry sumps, scrubbers, lines, and conduits
EP-CRU-017 Firmer solids	~~Trier,~~ auger, or probe	Stiffer materials from above
~~EP-CRU-018 Surface soil~~	~~Top soil cutter, scoop, chisel~~	~~Dirt storage piles and impoundment beaches~~
EP-CRU-018 Surface and Sub-surface soil	Auger, probe, coring tool, or split-spoon sampler, top soil cutter, scoop	~~Above for profile~~Dirt storage piles and impoundment beaches
EP-CRU-011 Sub-liquid sediments	Dredge	Impoundments, process and waste sumps, tanks and vessels
EP-CRU-019 Soft ~~surfaces~~solids	Rasp, plane, scraper, or rotary hammer drill	Wood, drywall, coatings, laminates, paint, tiles, oxides on metals
EP-CRU-020 Hard ~~surfaces~~solids	Jackhammer, chisel, or rotary hammer drill	Concrete, asphalt, masonry
~~EP-CRU-020 Hard cores~~	~~Diamond coring tool (powered)~~	~~Above for contaminant penetration~~
EP-CRU-021 ~~Metallic surface~~Metals	~~Drill with grinding knurled rasp or coring bit, or cutting wire for tubes~~Shears and scoop or trowel	~~Structural steel~~Thin walled, tanks, equipment, scrap

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TABLE D.5-1 (Cont.)

Procedure No./ Applicable Media	Sampling Devices or Methods	Items Sampled
Solid Sampling Methods (Cont.)		
EP-CRU-022 ~~Fabric and sheet metal~~ Shreddable solids	Shears	Heating, ventilating, or air conditioning filters, curtains, drapes, fabric, ducts, siding
EP-CRU-023 Solids in lines	Bottle and steel brushes, scoop, rod, and hammer	Pipes, conduits, lines

D.5.3.2.1 Sampling Concrete

Wet Process Areas

Concrete in wet (acidic or caustic) process areas will be sampled with procedure EP-CRU-20, Sampling Hard Surface Media, which offers several options for extracting a sample. The first option that should be considered is using the powered diamond coring tool to extract a core of the concrete. If a good quality core, one that can be sectioned, cannot be obtained, other sample extraction options in the procedure may be pursued. If another sampling tool is used, the objective of determining the depth of contamination should still be addressed to the extent practical.

Cores are to be sectioned in the field or in the laboratory with an appropriate saw. Sections are to be cut at depths of 1/2 in. and 1 in., with the remainder of the core constituting the third section (which may be further sectioned later). Core sections are to be surveyed at the top and bottom surfaces with appropriate survey instruments for the types of contamination known or suspected to be present in the area of the core. All readings are to be recorded, along with the core and section surface identification.

Dry Process Areas

Concrete in dry process areas will also be sampled with procedure EP-CRU-20. In this instance, obtaining a core sample is not required. Any of the sample extraction options that will produce a sample consisting of surface concrete chips may be used, including use of a jackhammer, chisel, or hammer drill.

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D.5.3.2.2 Sampling Structural Steel

Wet Process Areas

Structural steel in wet process areas is likely to be corroded and will require vigorous abrasive action ~~sampling~~ to remove the sample ~~surface contamination~~. Samples, generally in the form of "scrapings," will be obtained using sampling procedure~~EMON~~ EP-CRU-21, Sampling Metallic Surfaces. Of the sampling tools suggested for removing a surface sample, one should be used that provides a strong abrasive action to penetrate the full depth of contamination, such as a knurled rasp or coring bit, and the device should be used forcefully to ensure effective sampling. The option of using a diamond coring bit should be considered where it is feasible to cut completely through a steel member. This option should be used only if structural integrity is not compromised.

Dry Process Areas

Structural steel in dry process areas will not require as vigorous sampling as that in wet areas. Any of the sample extraction options in sampling procedure~~EMON~~ EP-CRU-21 may be used.

D.5.3.2.3 HVAC Ducts

Selecting locations for sampling HVAC systems is described in Protocol 1. If ductwork is to be sampled, procedure~~EMON~~ EP-CRU-22, Sampling Fabric and Sheet Metal, should be used. Shears are used to cut the sheet metal. Care must be taken in removing cut portions of ductwork to avoid falling deposits of loose media. Survey readings and swipe samples should be taken from the inside surface of the ductwork sample. Loose media within the ductwork should be surveyed for possible collection as a supplemental sample.

TABLE D.6-1 Potential Sample Media and Required Sampling Procedures

		Procedure Identification	
Sampling Procedure	Potential Media	SCQ Sec. No.	Procedure No.
Samples from Shallow or Standing Liquids	Aqueous Liquids	K.4.3	EP-CRU3-001
Samples from Structural Components	Wood	K.8.2	EP-CRU3-019
	Concrete	K.8.3	EP-CRU3-020
	Asphalt	K.8.5	EP-CRU3-020
	Masonry	K.8.6	EP-CRU3-020
	Shreddable Solids	K.8.7	EP-CRU3-022
	Sheet Metal	K.8.8	EP-CRU3-021
	Structural Steel	K.8.9	EP-CRU3-021
	Transite	K.8.10	SP-P-41-052
Air Samples - Particulate	Filter Media	K.6.3,K.6.4.5	SP-P-35-026
Air Samples - Radon	Detection Film	K.6.2.1	EM-RM-001
Uncharacterized Liquid Samples	In Drums	K.5.5.4.c,K.5.5.5	EP-CRU3-009
	In Tanks	K.5.5.4.c,K.5.5.5	EP-CRU3-009
Uncharacterized Solid Samples from Storage Drums	Sediments	K.5.5.4,K.5.2	EP-CRU3-011
	Sludge	K.5.5.4,K.5.6	EP-CRU3-011
	Residues	K.5.5.4,K.5.7	EP-CRU3-016
	Soils/Sand/Gravel	K.5.5.4,K.5.1	EP-CRU3-018
Uncharacterized Solid Samples from Tanks	Sludge	K.5.6	EP-CRU3-011
	Residues	K.5.7	EP-CRU3-016
Surface Samples	Soil/Sand/Gravel	K.5.1	EP-CRU3-018
Sub-Surface Samples	Soil/Sand/Gravel Piles	K.5.3	EP-CRU3-018

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TABLE D.6-1 (Cont.)

Sampling Procedure	Potential Media	Procedure Identification: SCQ Sec. No.	Procedure Identification: Procedure No.
Samples from Waste Piles	Soil/Sand/Gravel	K.5.1	EP-CRU3-018
	Paint Chips	K.8.1	EP-CRU3-019
	Wood	K.8.2	EP-CRU3-019
	Concrete	K.8.3	EP-CRU3-020
	Asphalt	K.8.5	EP-CRU3-020
	Masonry	K.8.6	EP-CRU3-020
	Shreddable Solids	K.8.7	EP-CRU3-022
	Sheet Metal	K.8.8	EP-CRU3-021
	Structural Steel	K.8.9	EP-CRU3-021
Sub-Liquid Solid Samples	Sludge	K.5.6	EP-CRU3-011
	Residues	K.5.7	EP-CRU3-011

TABLE D.6-3 CRU3 ANALYTICAL METHODS SELECTION FOR ORGANIC AND INORGANIC

(NOTE: This table as well as the performance based criteria for the radionuclides are currently only in **DRAFT** form. They are presently being reviewed by DOE and U.S. EPA for acceptance into the SCQ, and are subject to change based on these reviews. This table will be revised, as necessary, once the SCQ versions have received final approval.

Analyte or Class of Analytes	ASL Matrices and Methods Water & Wastewater			Soil & Solids	
		Prep Method(s)[1]	Analytical Method(s)	Prep Method(s)[1]	Analytical Method(s)
TAL Metals by ICP	C, D	W	3/90 CLP	W	3/90 CLP
TAL Metals by GFAAS	C, D	W	3/90 CLP	W	3/90 CLP
Cyanide	B	W	335.2[2] or 335.3[2]	W	335.2[2] or 335.3[2]
TCL Volatile Organics	C, D	W	3/90 CLP	W	3/90 CLP
TCL Semi-Volatile Org.	C, D	W	3/90 CLP	W	3/90 CLP
PCBs	C, D	W	3/90 CLP	W	3/90 CLP
TCLP Metals	C, D	SW 846-1311	3/90 CLP	SW 846-1311	3/90 CLP
TCLP Volatile Organics	C, D	SW 846-1311	3/90 CLP	SW 846-1311	3/90 CLP
TCLP Semi-Volatile Org.	C, D	SW 846-1311	3/90 CLP	SW 846-1311	3/90 CLP

[1] "W" signifies that prep. is contained within the analytical method.

[2] *Methods for Chemical Analysis of Water and Wastes*, EPA 600/4-79-020.

contamination surveys for the OU3 RI/FS are discussed in Sections D.5 and D.6 of the SAP and will be reflected in future revisions to the SCQ. Other sampling activities, including the collection of aqueous, solid matrix, gaseous, and miscellaneous samples, will be conducted in accordance with Sections 6.2, 6.3, 6.4, and 6.6 of the SCQ, as well as Appendix K of the SCQ. Procedures for additional sampling activities not currently addressed in the SCQ are being developed as is discussed in Section D.6 of the SAP and will be submitted as an addendum to the SCQ. Procedures for the field storage and shipment of samples, as well as decontamination of equipment, will be in accordance with Sections 6.7 and 6.8, respectively, of the SCQ.

D.7.2.5 Sample Custody

Sample custody will be in accordance with Section 7 of the SCQ. The sample chain-of-custody form which will be used is SCQ Form 7-1 (Appendix A).

D.7.2.6 Sample Container Requirements

Sample volume, sample containers, preservatives, and sample holding times will be in accordance with Section 6 of the SCQ and SCQ Table 6-1 (Appendix A). A table listing these items for the parameters specific to OU3 will become an attachment to the FWPs.

D.7.2.7 Calibration Procedures and Frequency

Calibration procedures, frequency of calibration, and the associated documentation requirements are covered by Section 8 and Appendix I of the SCQ. Before any instrument is used for making measurements at the FEMP, it must be documented that the particular instrument has been calibrated against standards traceable to the National Institute for Standards and Technology (NIST), EPA-certified standards, or if neither are available, the best quality standard that is obtainable. Additional details on instrument calibration will be provided in approved site procedures.

D.7.2.8 Analytical Procedures

Analytical procedures and methods for sample analysis will be in accordance with the requirements of Section 9 of the SCQ, as well as other procedures/methods developed specifically for the needs of the OU3 RI/FS, as discussed in Section D.6 of SAP. The new analytical requirements identified in Section D.6 of the SAP, and further discussed in Attachment D.I of the SAP, will be submitted for approval as an addendum to the SCQ.

D.7.2.9 ~~Internal~~ Quality Control Checks and Frequency

~~Internal quality control checks and frequency will be in accordance with Section 10 of the SCQ and will be defined in the component FWPs and in approved sampling procedures. Required frequencies for the quality control checks are found in SCQ Table 2-2 (Appendix A). These frequencies will satisfy~~

~~requirements for the OU3 RI/FS ASLs listed in Table D.3-1 of the SAP.~~ Field and analytical quality control/quality assurance checks and frequencies will be in accordance with Section 4 of the SCQ and will be defined in the component FWPs and in approved sampling procedures. Required frequencies for these quality control/quality assurance checks are found in SCQ Table 2-2 (Appendix A).

Further OU3 defined definitions for field QA/QC samples are listed below:

- **Field Duplicates:**
  1 per 20 per matrix per sampling crew.

- **Trip Blanks:**
  1 per Volatile Organic sample transport container per day.

- **Field Blanks:**
  1 per 20 per process area per day.

- **Rinsate Blanks:**
  1 per 20 per matrix per sampling crew.

- **Split Samples:**
  1 per matrix per laboratory used for analyzing OU3 samples.

- **Container Blanks:**
  1 per lot of containers unless QA information from the supplier can be obtained on pre-cleaned containers.

- **Preservative Blanks:**
  1 per lot of preservatives unless QA information from the supplier can be obtained on the preservative.

The sampling of Field QA samples will be tracked daily and the FWPs revised prior to sample collection to ensure that the proper number of QA samples are collected.

D.7.2.10 Data Reduction, Validation and Reporting

Data reduction, validation and reporting will be in accordance with requirements specified in Section 11 of the SCQ and the Data Validation Plan located in Appendix D of the SCQ.

D.7.2.11 Performance and System Audits

Self assessments and independent assessments of the OU3 RI/FS activities will be in accordance with requirements specified in Section 12 of the SCQ.

D.7.2.12 Preventive Maintenance

TABLE D.8-1 Estimated Sampling Man Hours per Media per Sample

Media	Man Hours
Concrete	
Chips	~~10~~ 36
Cores	~~20~~ 38
Masonry	~~10~~ 36
Steel Surface Scrapings	~~20~~ 35
Soil/Loose Media	~~10~~ 34
Liquid	~~5~~ 36
Transite	30
HVAC Filters	~~10~~ 36

- One supplemental liquid sample may be collected in each wet process area.
- One transite sample will be collected in components anticipated to have chemical contamination.
- Field duplicate samples will be collected by media type per team, 1 for every 20 samples.
- Trip blanks will be developed for each sample collected requiring volatile or semivolatile organic analysis.
- RCRA and non-RCRA drums and product inventory were assumed to be characterized through continuation of existing and ongoing site programs.

D.8.2 Sample Quantity Estimates

The sampling approach outlined by the protocols was individually applied to all of the components. For each component, assumptions were made to estimate the sample quantities. More than 1,000 samples will be required and include solid and liquid samples removed from floors, walls, soils, vessels, and other features.* Access to residues and contaminated areas will require additional precautions in preparation for sampling and sample collection.

*Of the 1,000 samples, approximately 800 are component specific, with the remaining 200 consisting of QA/QC samples representing field duplicates and trip blanks.

The overall sampling program will require significant levels of analytical (laboratory) support. For the approximate 1,000 samples submitted to the labs, multiple analytes will be requested. Samples may be submitted for radiological analyses, with 20 separate analytes, and not all of these can be determined by a single analytical method. Samples may also be submitted for chemical analyses with as many as 150 analytes being requested. QA/QC samples comprise 1/5 of the total samples estimated (200 out of 1,000). The result is a need for several specialized labs or one comprehensive lab facility. In either case, a very complicated data management, tracking, and validation program will result. Since laboratories provide the results of analyses and the necessary documentation to support the ASL requirements of the sample, laboratory capacity can be a constraint to the overall RI/FS field program schedule. For OU3, laboratory capacity may present a constraint to the overall schedule, but this is unknown at this time. Efforts have been initiated to identify and contract with multiple laboratories for the support of this project.

D.8.3 Field Schedule

On the basis of the assumptions detailed in Section D.8.1, sample quantities and person-hours were estimated for each component. These estimates were combined with the sequential approach to scheduling each component, as detailed in Figure D.8-1, to develop the schedule for the field program. The specific component sampling order has been established. This order may be adjusted throughout the sampling program based on influences from on-site programs and activities. The sampling program is expected to commence on ~~April 1, 1992~~ June 7, 1993, and to be complete on December 5, 1994.

The activities that comprise a component sampling program are presampling, sampling, and post sampling. Presampling activities consist of all actions required before the sampling crew initiates sampling tasks. Table D.8-2 details these activities and references the number of days (duration) required to complete the activity. Included in this table is the day number, which sequentially adds the days from the inception of presampling activities throughout the completion of the component sampling schedule. X denotes the number of days required to collect the samples. This table illustrates that ~~11~~ 8 days are required to complete all presampling activities.

Sampling activities consist of intrusive sample collection within each component. Nonintrusive measurements are performed as a presampling activity. Table D.8-3 details the sample quantities by media type, as developed in Section D.9, and the estimated sampling duration for each of the OU3 components. This table does not include quantities of QA/QC samples. The duration of sampling in the field will be based on the total number of field technicians that are (and can be reasonably) assigned to this task. The durations do not include the time required to receive results from the laboratories.

Post-sampling activities consist of equipment decontamination and teardown, laboratory analysis, data validation, and data entry. Equipment decontamination and teardown is a one-day or less activity for dismantling/relocating equipment used for component-wide

TABLE D.8-2 Estimated Duration for Sampling Preparation Activities by Component

Activity Description	Duration (Days)	Activity Completion Day
Presampling Activities:		
Field Work Package Development	6-10	0
Particulate Air Sampling Initiated	1	1
Logistic Inspection	1	1
Nonintrusive Survey Performed	1-4	1-4
Particulate Air Sampling Completed	5	5
Radiological Survey Assessment	2	7
Field Work Package Updates	1	8
Sampling and Postsampling Activities:		
Equipment Setup	1	9
Decontamination Setup	~~X~~	9 (start)
Perform Sampling	X	X + 9
Complete Sampling	0	;
Decon/Teardown Equipment	~~X~~	X + 9

sampling activities. This activity occurs after component sampling is complete. Laboratory analyses are assumed to take 120 days or less. Data validation and data entry will continue until all OU3 data is validated and entered into the database. These activities are anticipated to extend past the field program completion date by seven months (July 31, 1995). All component data packages will be reviewed in-house to verify the component sampling completion prior to the end of the field characterization program.

Assumptions that were included in the development of the field program schedule are:

- Additional characterization may be required as a result of unexpected conditions or contaminants that have not been included in schedule planning.
- Time required to mobilize the work force necessary to complete the effort has been assumed to occur before the field activities, and assumes hiring and training complete by the field start date (~~April 1, 1993~~ June 7, 1993).
- National laboratory capacity to support the FEMP OU3 RI/FS as scheduled is assumed to exist.
- Laboratory turn-around time is assumed to be 120 days or less (per the Amended Consent Agreement schedules).
- Sampling teams are supported by others to the extent that sample technicians can sample in an uninterrupted mode throughout the duration of the RI/FS field program.

TABLE D.8–3 Estimated Sample Quantities by Component

Component	Component Designation	Concrete Chips	Concrete Cores	Masonry	Steel Surface	Loose Media	Liquid	Transite	Composite Swipe	Air Particulate	Total Samples	Duration Days
Preparation Plant	1 A	3	4	0	7	2	1	1	1	1	20	24
Plant 1 Storage Shelter	1 B	0	0	0	0	0	0	0	0	0	C*	15
Plant 1 Ore Silos	1 C	1	0	0	0	0	1	0	0	1	3	10
Ore Refinery Plant	2 A	0	4	3	4	1	3	1	1	1	18	23
General/Refinery Sump Control Building	2 B	1	0	0	1	0	1	0	1	1	5	11
Bulk Lime Handling Building	2 C	0	1	0	1	0	1	0	1	1	5	11
Metal Dissolver Building	2 D	0	3	3	3	1	1	0	1	1	13	18
NFS Storage & Pump House	2 E	0	1	1	1	0	1	0	1	1	6	12
Cold Side Ore Conveyor	2 F	1	0	0	1	0	0	0	1	1	4	10
Hot Side Ore Conveyor	2 G	1	0	0	1	0	0	0	1	1	4	10
Conveyor Tunnel (From Plant 1)	2 H	1	0	0	1	0	0	0	1	1	4	10
Maintenance Building	3 A	0	1	1	1	0	0	0	1	1	5	11
Ozone Building	3 B	0	1	0	1	0	0	0	1	1	4	10
NAR Control House	3 C	1	0	0	1	0	0	0	1	1	4	10
NAR Towers	3 D	0	1	0	1	0	1	0	1	1	5	11
Hot Raffinate Building	3 E	0	1	1	1	0	2	1	1	1	8	13
Harshaw Digestion Fume Recovery	3 F	0	1	1	1	0	1	0	1	1	6	12
Refrigeration Building	3 G	0	1	0	1	0	0	0	1	1	4	10
Refinery Sump	3 H	0	1	1	1	1	0	0	1	1	6	12
Combined Raffinate Tanks	3 J	0	1	1	1	0	1	0	1	1	6	12
Old Cooling Water Tower	3 K	0	1	0	0	0	1	0	0	1	3	10
Electrical Power Center Building	3 L	1	0	1	1	0	0	0	1	1	5	11
Green Salt Plant	4 A	1	2	0	3	2	2	1	1	1	13	18
Plant 4 Warehouse	4 B	0	0	0	0	0	0	0	0	0	C*	15
Plant 4 Maintenance Building	4 C	1	0	0	1	0	0	0	1	1	4	10
Metals Production Plant	5 A	9	3	1	12	3	3	1	1	1	34	36
Plant 5 Ingot Pickling	5 B	0	0	0	0	0	0	0	0	0	0	0
Plant 5 Electrical Substation	5 C	1	0	0	1	0	0	0	1	1	4	10
West Derby Breakout/ Slag Milling	5 D	0	0	0	0	0	0	0	0	0	0	0
Plant 5 Filter Building	5 E	0	0	0	0	0	0	0	0	0	0	0
Plant 5 Covered Storage Pad	5 F	1	0	0	1	0	0	0	1	1	4	10
Plant 5 Ingot Storage Shelter	5 G	1	0	0	1	0	0	0	1	1	4	10
Metals Fabrication Plant	6 A	5	2	0	7	0	3	1	1	1	20	24
Plant 6 Covered Storage Area	6 B	1	0	0	1	0	0	0	1	1	4	10
Plant 6 Electrostatic Precipitator (South)	6 C	1	0	0	1	0	0	0	1	1	4	10
Plant 6 Electrostatic Precipitator (Central)	6 D	1	0	0	0	0	0	0	0	1	2	9
Plant 6 Electrostatic Precipitator (North)	6 E	1	0	0	1	0	0	0	1	1	4	10
Plant 6 Salt Oil Heat Treat Building	6 F	0	1	1	1	0	1	0	1	1	6	12
Plant 6 Sump Building	6 G	0	0	0	0	0	0	0	0	0	0	0
Plant 7	7 A	3	1	0	4	0	0	1	1	1	11	15
Plant 7 Overhead Crane	7 B	0	0	0	0	0	0	0	0	0	C*	15
Recovery Plant	8 A	12	3	2	15	6	3	1	1	1	44	46
Plant 8 Maintenance Building	8 B	1	0	2	0	1	1	0	1	1	7	12

TABLE D.8–3 Estimated Sample Quantities by Component

Component	Component Designation	Concrete Chips	Concrete Cores	Masonry	Steel Surface	Loose Media	Liquid	Transite	Composite Swipe	Air Particulate	Total Samples	Duration Days
Rotary Kiln/Drum Reconditioning	8 C	0	0	0	0	0	0	0	0	0	0	0
Plant 8 Railroad Filter Building	8 D	0	0	0	0	0	0	0	0	0	C*	15
Drum Conveyor Shelter	8 E	0	0	0	0	0	0	0	0	0	0	0
Plant 8 Old Drum Washer	8 F	0	0	0	1	0	0	0	0	0	1	9
Special Products Plant	9 A	2	5	1	7	0	2	1	1	1	20	25
Plant 9 Sump Treatment Facility	9 B	0	1	1	1	0	0	0	1	1	5	11
Plant 9 Dust Collector	9 C	1	0	0	1	0	0	0	1	1	4	10
Plant 9 Substation	9 D	1	0	0	1	0	0	0	1	1	4	10
Plant 9 Cylinder Shed	9 E	0	0	0	0	0	0	0	0	0	0	0
Electrostatic Precipitator	9 F	1	0	0	1	0	0	0	1	1	4	10
Boiler Plant	10 A	0	0	0	0	0	0	0	0	0	C*	15
Boiler Plant Maintenance Bldg.	10 B	0	1	0	1	0	1	0	1	1	5	11
Wet Salt Storage Bin	10 C	0	0	0	0	0	0	0	0	0	0	0
Cont. Oil/Graphite Burn Pad	10 D	0	1	0	0	1	1	0	0	1	4	11
Service Building	11	3	1	4	0	0	1	0	1	1	11	16
Main Maintenance Building	12 A	0	6	7	6	0	1	0	1	1	22	26
Cylinder Storage Building	12 B	0	0	0	0	0	0	0	0	0	0	0
Lumber Storage Building	12 C	0	0	0	0	0	0	0	0	0	0	0
Pilot Plant Wet Side	13 A	0	8	6	3	3	1	0	1	2	24	27
Pilot Plant Maintenance Bldg.	13 B	0	1	1	0	0	0	0	1	1	4	10
Sump Pump House	13 C	0	1	1	0	0	0	0	1	1	4	10
Pilot Plant Thorium Tank Farm	13 D	0	1	0	0	0	1	0	0	1	3	10
Administration Building	14 A	1	0	1	0	0	0	0	1	1	4	10
Building 14 EOC Generator Set	14 B	0	0	0	0	0	0	0	0	0	0	0
Laboratory	15	1	2	2	0	1	1	0	1	1	9	14
Main Electrical Station	16 A	1	0	0	1	0	1	0	1	1	5	11
Electrical Substation	16 B	1	0	1	0	0	0	0	1	1	4	10
Electrical Panels & Transformer	16 C	1	0	0	0	0	0	0	0	0	1	9
Main Electrical Switch House	16 D	1	0	1	0	1	0	0	1	1	5	11
Main Electrical Transformers	16 E	1	0	0	0	0	0	0	0	0	1	9
Trailer Substation #1	16 F	1	0	0	0	0	0	0	0	0	1	9
Trailer Substation #2	16 G	1	0	0	0	0	0	0	0	0	1	9
BDN Surge Lagoon	18 A	0	0	0	0	1	1	0	0	1	3	10
General Sump	18 B	0	1	0	1	1	0	0	1	1	5	11
Coal Pile Runoff Basin	18 C	0	0	0	0	1	1	0	0	1	3	10
Biodenitrification Towers	18 D	0	0	0	0	0	0	0	0	0	C*	15
Storm Water Retention Basin	18 E	0	0	0	0	2	2	0	0	1	5	11
Clearwell Pump House	18 G	0	0	0	0	0	0	0	0	0	0	0
BDN Effluent Treatment Facility	18 H	0	0	0	0	0	0	0	0	0	0	0
Methanol Tank	18 J	1	0	0	1	0	1	0	1	1	5	11
Low Nitrate Tank	18 K	0	0	0	0	1	1	0	1	1	4	10
High Nitrate Tank	18 L	0	0	0	0	1	1	0	1	1	4	10
High Nitrate Storage Tank	18 M	1	0	0	1	0	0	0	1	1	4	11

TABLE D.8–3 Estimated Sample Quantities by Component

Component	Component Designation	Concrete Chips	Concrete Cores	Masonry	Steel Surface	Loose Media	Liquid	Transite	Composite Swipe	Air Particulate	Total Samples	Duration Days
Main Tank Farm	19 A	0	0	0	0	0	0	0	0	0	0	0
Pilot Plant Ammonia Tank Farm	19 B	0	0	0	0	0	0	0	0	0	C*	15
Tank Farm Control House	19 C	0	0	0	0	0	0	0	0	0	0	0
Old North Tank Farm	19 D	0	2	0	1	1	1	0	1	1	7	13
Pump Station & Power Center	20 A	0	0	0	0	0	0	0	0	0	0	0
Water Plant	20 B	0	0	0	0	0	0	0	0	0	C*	15
Cooling Towers	20 C	0	1	0	0	0	0	0	0	1	2	9
Elevated Potable Storage Tank	20 D	0	0	0	0	0	0	0	0	0	0	0
Well House #1	20 E	0	0	0	0	0	0	0	0	0	0	0
Well House #2	20 F	0	0	0	0	0	0	0	0	0	0	0
Well House #3	20 G	0	0	0	0	0	0	0	0	0	0	0
Process Water Storage Tank	20 H	0	0	0	0	0	0	0	0	0	0	0
Gas Meter Building	22 A	0	0	0	0	0	0	0	0	0	0	0
Storm Sewer Lift Station	22 B	0	0	0	0	0	0	0	0	0	0	0
Truck Scale	22 C	0	0	0	0	0	0	0	0	0	0	0
Scale House & Weigh Scale	22 D	0	0	0	0	0	0	0	0	0	0	0
Utility Trench to Pit Area	22 E	0	1	0	0	1	0	0	1	0	3	10
Meteorological Tower	23	0	0	0	0	0	0	0	0	0	0	0
Railroad Scale House	24 A	1	0	1	0	0	0	0	0	0	2	10
Railroad Engine House	24 B	1	0	1	1	0	0	0	1	1	5	11
Chlorination Building	25 A	0	0	0	0	0	0	0	0	0	0	0
M.H.#175/Eff. Line/Sampling Bldg.	25 B	0	0	0	0	0	0	0	0	0	C*	15
Sewage Lift Station Building	25 C	0	0	0	0	0	0	0	0	0	0	0
U.V. Disinfection Building	25 D	0	0	0	0	0	0	0	0	0	0	0
Digester & Control Building	25 E	0	1	1	1	0	0	0	1	1	5	11
Sludge Drying Beds	25 F	0	1	0	0	1	1	0	0	1	4	11
Primary Settling Basins	25 G	1	0	0	0	1	1	0	0	1	4	11
Trickling Filters	25 H	0	1	0	0	1	1	0	0	1	4	11
Pump House–HP Fire Protection	26 A	0	0	0	0	0	0	0	0	0	0	0
Elevated Water Storage Tank	26 B	0	0	0	0	0	0	0	0	0	0	0
Main Electrical Strainer House	26 C	0	1	1	0	0	1	0	1	1	5	11
Security Building	28 A	1	0	1	0	0	0	0	1	1	4	10
Human Resources Building	28 B	0	0	0	0	0	0	0	0	0	C*	15
Guard Post on South End of 'D' St.	28 C	0	0	0	0	0	0	0	0	0	0	0
Guard Post on West End of 2nd St.	28 D	0	0	0	0	0	0	0	0	0	C*	15
Chemical Warehouse	30 A	3	0	0	2	0	0	0	1	1	7	13
Drum Storage Warehouse	30 B	0	0	0	0	0	0	0	0	0	C*	15
Old Ten Ton Scale	30 C	0	0	0	0	0	0	0	0	0	0	0
Engine House/Garage	31 A	0	1	1	0	1	2	0	1	1	7	13
Old Truck Scale	31 B	0	0	0	0	0	0	0	0	0	0	0
Magnesium Storage Building	32 A	0	0	0	0	0	0	0	0	0	0	0
Building 32 Covered Loading Dock	32 B	1	0	0	1	0	0	0	1	1	4	10
Pilot Plant Annex	37	9	0	6	0	1	3	0	1	1	21	25

TABLE D.8–3 Estimated Sample Quantities by Component

Component	Component Designation	Concrete Chips	Concrete Cores	Masonry	Steel Surface	Loose Media	Liquid	Transite	Composite Swipe	Air Particulate	Total Samples	Duration Days
Propane Storage	38 A	0	0	0	0	0	0	0	0	0	0	0
Cylinder Filling Station	38 B	0	0	0	0	0	0	0	0	0	0	0
Incinerator Building	39 A	2	2	1	4	1	1	1	1	1	14	18
Waste Oil Decant Shelter	39 B	0	1	0	1	1	0	0	1	1	5	11
Incinerator Sprinkler Riser House	39 C	0	0	0	0	0	0	0	0	0	0	0
Sewage Treatment Plant Incinerator	39 D	1	0	0	1	0	0	0	1	1	4	10
Rust Engineering Building	45 A	1	0	0	1	0	0	0	1	1	4	10
Utility Shed East of Rust Trailers	45 B	0	0	0	0	0	0	0	0	0	0	0
Heavy Equipment Building	46	0	1	0	1	0	0	0	1	1	4	10
Six to Four Reduction Facility #2	51	0	0	0	0	0	0	0	0	0	0	0
Health & Safety Building	53 A	3	0	3	0	0	0	0	1	1	8	13
In–Vivo Building	53 B	0	0	0	0	0	0	0	0	0	0	0
Six to Four Reduction Facility #1	54 A	6	2	8	8	0	0	0	1	1	26	30
Pilot Plant Shelter	54 B	1	0	1	0	0	0	0	1	1	4	10
Pilot Plant Dissociator Shelter	54 C	1	0	0	1	0	0	0	1	1	4	10
Slag Recycling Building	55 A	1	0	0	0	0	0	0	1	1	3	9
Slag Recycling Pit/Elevator	55 B	1	0	0	0	0	0	0	1	1	3	9
CP Storage Warehouse	56 A	1	0	0	1	0	0	0	1	1	4	10
Storage Shed (West)	56 B	0	0	0	0	0	0	0	0	0	0	0
Storage Shed (East)	56 C	0	0	0	0	0	0	0	0	0	0	0
Quonset Hut #1	60	1	0	0	1	0	0	0	1	1	4	10
Quonset Hut #2	61	1	0	0	1	0	0	0	1	1	4	9
Quonset Hut #3	62	1	0	0	1	0	0	0	1	1	4	9
KC–2 Warehouse	63	1	0	1	0	0	0	0	1	1	4	10
Thorium Warehouse	64	2	0	0	2	0	0	0	1	1	6	12
(Old) Plant 5 Warehouse	65	1	0	0	1	0	0	0	1	1	4	10
Drum Reconditioning Building	66	3	1	0	4	0	2	0	1	1	12	17
Plant 1 Thorium Warehouse	67	1	0	0	1	0	0	0	1	1	4	10
Pilot Plant Warehouse	68	1	0	0	1	0	0	0	1	1	4	10
Decontamination Building	69	0	1	2	1	0	1	0	1	1	7	13
General In–Process Warehouse	71	2	0	2	0	0	0	0	1	1	6	12
Drum Storage Building	72	1	0	0	1	0	0	0	1	1	4	10
Fire Brigade Training Center Bldg.	73 A	0	0	0	0	0	0	0	0	0	C*	15
Fire Training Pond	73 B	0	0	0	0	1	1	0	0	1	3	10
Fire Training Tank	73 C	0	0	0	0	0	0	0	0	0	C*	15
Fire Training Burn Trough	73 D	0	0	0	0	1	1	0	0	1	3	10
Confined Space Burn Tank	73 E	0	0	0	0	0	0	0	0	0	0	0
Plant 2 East Pad	74 A	1	0	0	0	1	0	0	0	1	3	10
Plant 2 West Pad	74 B	1	0	0	0	0	0	0	0	1	2	9
Plant 8 East Pad	74 C	1	0	0	0	1	1	0	0	1	4	11
Plant 8 West Pad	74 D	1	0	0	0	0	1	0	0	1	3	10
Plant 4 Pad	74 E	1	0	0	0	1	0	0	1	1	4	10
Plant 7 Pad	74 F	1	0	0	0	0	0	0	0	1	2	9

TABLE D.8–3 Estimated Sample Quantities by Component

Component	Component Designation	Concrete Chips	Concrete Cores	Masonry	Steel Surface	Loose Media	Liquid	Transite	Composite Swipe	Air Particulate	Total Samples	Duration Days
Plant 5 East Pad	74 G	1	0	0	0	0	0	0	0	1	2	12
Plant 5 South Pad	74 H	1	0	0	0	0	0	0	0	1	2	12
Plant 6 Pads	74 J	1	0	0	0	0	0	0	0	1	2	9
Plant 9 Pad	74 K	1	0	0	0	1	0	0	0	1	3	10
Building 65 West Pad	74 L	1	0	0	0	0	0	0	0	1	2	9
Building 64 East Pad & R.R. Dock	74 M	1	0	0	0	0	0	0	0	1	2	9
Building 12 North Pad	74 N	1	0	0	0	1	0	0	1	1	4	10
Decontamination Pad	74 P	1	1	0	0	0	0	0	1	1	4	10
Plant 8 Old Metal Dissolver Pad	74 Q	0	1	1	0	1	1	0	1	1	6	12
Plant 8 North Pad	74 R	0	1	0	0	1	1	0	0	1	4	11
Building 63 West Pad	74 S	1	0	0	0	0	0	0	0	1	2	9
Plant 1 Storage Pad	74 T	7	0	0	0	0	1	0	1	1	10	15
Pilot Plant Pad	74 U	1	0	0	0	0	0	0	0	1	2	9
Laboratory Pad	74 V	1	0	0	0	0	0	0	0	1	2	9
Building 39A Pad	74 W	0	1	0	0	0	0	0	0	0	1	9
Finished Products Warehouse(4A)	77	1	0	0	1	0	0	0	1	1	4	10
D & D Building(Under Constr.)	78	0	0	0	0	0	0	0	0	0	0	0
Plant 6 Warehouse	79	1	0	0	1	0	0	0	1	1	4	10
Plant 8 Warehouse	80	1	0	0	1	0	0	0	1	1	4	20
Plant 9 Warehouse	81	1	0	0	1	0	0	0	1	1	4	10
Receiving/Incoming Mat'ls. Insp.	82	0	0	0	0	0	0	0	0	0	0	0
Clearwell Line	88	0	0	0	0	1	1	0	0	0	2	10
Parking Lot	89	0	0	0	0	0	0	0	0	0	0	0
Skeet Range Building	90	0	0	0	0	0	0	0	0	0	0	0
Railroad Tracks	G–001	0	0	0	0	0	0	0	0	0	0	0
Roads	G–002	0	0	0	0	0	0	0	0	0	C*	15
Storm Sewer System	G–003	0	0	0	0	1	1	0	0	0	2	10
Utility Lines	G–004	0	0	0	0	0	0	0	0	0	0	0
Underground Storage Tanks	G–005	0	0	0	0	7	0	0	0	0	7	14
Process Trailers	G–006	0	0	0	0	0	0	0	0	0	0	0
Non–process Trailers	G–007	0	0	0	0	0	0	0	0	0	0	0
Pipe Bridges	G–008	0	0	0	0	0	0	0	0	0	0	0
Drums (Non–RCRA)	G–009	0	0	0	0	0	0	0	0	0	0	0
RCRA Drums	G–010	0	0	0	0	0	0	0	0	0	0	0
Inventory	G–011	0	0	0	0	0	0	0	0	0	0	0
Mobile Containers (Sea–Land)	G–012	0	0	0	0	0	0	0	0	0	0	0
Soil Piles	G–013	0	0	0	0	15	0	0	0	0	15	21
Rock salt pile	P–001	0	0	0	0	0	0	0	0	0	0	0
Sand piles	P–002	0	0	0	0	0	0	0	0	0	0	0
Gravel pile	P–003	0	0	0	0	0	0	0	0	0	0	0
Copper metal scrap pile	P–004	0	0	0	0	2	0	0	0	1	3	10
Coal pile	P–005	0	0	0	0	1	0	0	0	0	1	9
Scrap metal pile	P–006	0	0	0	0	2	0	0	0	0	2	10

TABLE D.8–3 Estimated Sample Quantities by Component

Component	Component Designation	Concrete Chips	Concrete Cores	Masonry	Steel Surface	Loose Media	Liquid	Transite	Composite Swipe	Air Particulate	Total Samples	Duration Days
Outside Equipment Storage Area	P–007	0	0	0	0	0	0	0	0	0	C*	15
Tension Support Structure #1	TS–001	0	0	0	0	0	0	0	0	0	0	0
Tension Support Structure #2	TS–002	0	0	0	0	0	0	0	0	0	0	0
Tension Support Structure #3	TS–003	0	0	0	0	0	0	0	0	0	0	0
	TOTALS:	146	84	76	147	77	68	10	97	127	832	**

* Does not fit typical duration schedule.
Includes systematic confirmatory sampling.
See Section D.9.0.3, Confirmatory Sampling.
**Duration is not a cummulative effort.
Four teams will work simultaneously to complete sampling.

D.9 COMPONENT-SPECIFIC SAMPLING PLANS

D.9.0 Introduction

D.9.0.1 General Information

The following sections describe in detail the sampling plans for each Operable Unit 3 (OU3) component. The sampling approach described by the sampling protocols in Section D.5 has been implemented in Sections D.9.1 through D.9.11 for each of the 11 component categories. The sampling approach applies the data needs and data uses as presented in Table 4.2 (Section 4.2.3) and the ASLs as presented in Table 4.1 (Section 4.2.1) to implement a data collection approach to meet OU3 objectives. The DQOs, as developed to support the OU3 field program, are media-specific rather than component-specific. Components are described in additional detail. Process areas are identified according to activities performed, contaminants expected, and contamination modes (process types). Major media for each process area are identified. Available radiological data are summarized for each process area, with a hot spot (area of elevated radiation level) for each identified and an overall assessment of the data set provided. Nonintrusive and intrusive sampling requirements for the component are described, and a summary of sampling for the component is provided. A map of the component is also supplied, with process areas, major equipment, and radiological hot spots identified.

Information about components that will not be sampled is also included in Sections D.9.1 through D.9.11, including descriptions of the component, the process areas and processes, the major media employed in the construction, and available radiological data, as well as supporting justification for not sampling. Table D.9.0-1 identifies each component not sampled and provides reasons for not sampling the component. Additionally, 16 components in the not sampled category are identified for confirmatory sampling. Confirmatory sampling for those components is further detailed in Section D.9.0.3. To minimize repetition of certain basic approach details in each component-specific section, information applicable to all sampled components is discussed in the following introductory sections.

D.9.0.2 FEMP Radiological Survey Program

Radiological survey information from 1989 through 1992 has been assembled to provide background data for each component to be sampled. The data focus for the OU3 Remedial Investigation/Feasibility Study (RI/FS) characterization has been on total beta-gamma and removable alpha radiation on surfaces of major media. The data available for this use have been generated at Fernald Environmental Management Project (FEMP) by the ongoing health physics/radiological safety program. The program is governed by existing U.S. Department of Energy (DOE) orders as implemented at FEMP.

The data collection focus under this program has shifted in the last several years, from fixed to removable contamination and from production areas to personnel areas. This shift is primarily a result of the shutdown of production activities in 1989 but also is reflected

in the DOE orders governing the program. The sample locations are generally chosen by radiological technicians to reflect areas of probable contamination; therefore, data from the program generally represent higher levels of contamination.

Because of the high quality of the data taken under this program, including traceability of the data to calibration standards and controlled archiving of the data, the radiological survey data in the program have been deemed acceptable for ~~RI/FS decision-making uses, in screening to determine~~ use in screening of locations for intrusive sampling, and for use in gauging component contamination levels.

Data from 1989 through 1991 are summarized in Appendix A Table A.4.0, and data from early 1992 are summarized in Table A.4.1. Table A.4.0 information was compiled before the finalization of the operable unit component designation scheme; therefore, data for many of the smaller components are summarized with nearby larger components. In the component-specific sampling summaries provided in Sections D.9.1 through D.9.11, radiological data have been summarized for each process area of each component. Where discrepancies exist, the information presented in these sections supercedes information presented in the Appendix A tables, because data usability has been factored into data reported in the following sections (e.g., radiological data reported without maps to substantiate location have not been used as hot spots in the following sections) and because data not representing major media have been filtered from the data set (e.g., contaminated equipment sitting on a shelf in a maintenance shop has not been included in hot spot determination).

In some locations, no recent radiological screening data were available. In others, only removable radiological contamination data were available. Total beta-gamma radiological contamination was used as the basis for hot spot (a local maximum, not necessarily exceeding any criterion) determination, when available. Removable alpha radiological contamination (reported as disintegrations per minute [dpm] in the text, but referring to dpm/100 cm^2) was used as the basis for hot spot determination when no total beta-gamma data were available. Total beta-gamma radiation was chosen as a marker because this information is a generally available measurement for each component and because this information is generally a good representation of the extent of contamination and provides a meaningful measure for understanding the magnitude of the requirements of any treatment options. Removable alpha radiation is also listed, both as a means to represent a portion of the potential airborne radioactivity for risk assessment modeling (Section 3.1) and for worker health protection (because the primary radiological contaminants in the operable unit are all considered major alpha radiation emitters). Removable beta-gamma radiation was not used as a marker because total beta-gamma radiation measurements are generally available, even for components with little or no detectable removable contamination (representing fixed contamination in the media from past activities). Removable beta-gamma radiation results will be available from airborne particulate samples and from swipe sample counting results from each component at the time of sampling. Fixed alpha radiation field measurements were likewise not chosen because the information will be generated from intrusive sampling results.

In locations with no recent radiological survey data, no hot spot was identified. Further surveys before the time of intrusive sampling will be performed to support hot spot identification. In all components, additional radiological surveys will be taken in the field before field sampling activities (to identify or to field verify a hot spot and to provide data for health physics personnel protection).

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D.9.0.9 Chemical Sampling

The Field Work Packages will present any chemical analytical history available in Section 3.0, Sample Location. Chemical analysis results or an analytical history are not, however, usually present for OU3's facilities and/or media. Extensive chemical contamination (inorganics, VOC, SVOC) at levels of concern is not anticipated in most of OU3's components. Hazardous chemicals which were used in small amounts and mobile or volatile contaminants are not expected to adhere to, or remain on, surfaces. If process knowledge or data results are present, however, OU3 will utilize this information to direct screening and intrusive sampling locations, numbers and types.

Two sections of the Sampling & Analysis Plan describe how areas are targeted for intrusive sampling and the intrusive sampling procedures. Section D.5.1, Protocol 1: Nonintrusive Sampling, discusses methods for selecting field screening locations, screening frequencies and chemical screening procedures. Section D.5.2, Protocol 2: Determining Final Intrusive Sampling Locations, provides guidance for selecting the final locations for chemical intrusive sampling following evaluation of the nonintrusive screening results. In general, these sections state that chemical field screening shall be performed where there is evidence or suspicion of chemical contamination. These locations are determined primarily on process knowledge, visual inspection and natural collection points and include: collection points for runoff, areas that are pathways to the environment or human receptors, areas from process knowledge which are suspected contaminated or near electrical transformers, and bulk liquid and solids of uncertain identity. One intrusive sample will be collected at the location of highest identified chemical contamination per major medium, per process area. In the case where chemical screening results are ambiguous, intrusive samples for chemical determinations should be taken at the same location as the radiological intrusive sample. Conversely, if there are more than one distinct areas of chemical and radiological contamination, more than one intrusive sample may be taken. Intrusive samples will be sent for laboratory analysis to establish the types and levels of chemical and/or radiological contamination. Section D.9 contains Component Specific Sampling Plans. The WPA contains a table which describes the general types and quantities of nonintrusive and intrusive samples to be collected for each component.

D.I.1 FIELD PROCEDURES, INSTRUMENTAL

D.I.1.1 Flame-Ionization Detector Operations (EP-CRU3-012)

1 Scope and Application

This method describes taking field measurements through the calibration and use of ~~a flame-ionization detector for taking field measurements~~ the Sensidyne Portable Flame Ionization Detector (FID). Refer to Appendix I of the SCQ for more information concerning calibration of the FID. Appendix K of the SCQ discusses the use of the FID for field measurements.

2 Method Summary

2.1 The following equipment is needed:

A. Flame-ionization detector
B. Field measurement logbook
C. Indelible black ink pen.

2.2 The work packet is reviewed and the screening locations are determined.

2.3 The flame-ionization detector is calibrated and verified.

2.4 The measurements are performed using the flame-ionization detector.

2.5 The measurements are recorded in the Field Measurement Logbook.

D.I.1.7 Portable Gas Chromatograph Operations (EP-CRU3-027)

1 Scope and Application

~~This method describes taking field measurements through the calibration and use of a portable gas chromatograph. Operations may be supported using a computer.~~ Procedure EP-CRU3-026, currently in development, will provide instructions for the operation and utilization of a Photovac 10-S Plus Portable Gas Chromatograph. The procedure will provide specific calibration and operational information and will be attached to this document. Appendix I of the SCQ will be revised for Portable GC calibration requirements.

2 Method Summary

2.1 The following equipment is needed:

A. Portable gas chromatograph
B. Field Measurement Logbook
C. Indelible black ink pen.

2.2 The work packet is reviewed, and the screening locations are determined.

2.3 The portable gas chromatograph is calibrated and verified.

2.4 The sample is prepared using the injection syringe.

2.5 The sample is introduced into the portable gas chromatograph using the injection port.

2.6 The measurements are performed using the portable gas chromatograph.

2.7 The measurements are recorded in either the portable gas chromatograph internal memory or the computer and the Field Measurement Logbook.

ATTACHMENT D.I.3

RADIOLOGICAL ANALYSIS PERFORMANCE BASED CRITERIA

The attached pages are **DRAFTS** of the performance based criteria for Radiological Analysis that will replace the Radiological Methods currently in Volume V of the SCQ. The review and approval of these documents are currently being done by DOE and U.S. EPA Region V (Quality Assurance) and are being submitted in the OU3 SAP for informational purposes only. Once approved, the pages in this section of the OU3 SAP will be revised as necessary.

RADIOCHEMICAL ANALYSIS PERFORMANCE SPECIFICATIONS
ANALYTICAL SUPPORT LEVEL (ASL) C & D

ANALYTE: U-234, U-235/236, U-238

PERFORMANCE PARAMETERS	SAMPLE MATRIX				
	WATER	SOIL/ SEDIMENT	AIR FILTERS (2)	INCINERATOR ASH	CONTAMINATED LIQUID (3)
Highest Allowable Minimum Detectable Concentration (HAMDC) (1)	0.2 pCi/L	0.1 pCi/g	4.0 pCi/Filter	0.2 pCi/g	0.5 pCi/L
Percent Overall Tracer/Chemical Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Percent Matrix Spike Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Method Blank Concentration	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)
Laboratory Control Sample: Percent of Known Value (6)	80-110%	80-110%	80-110%	80-110%	80-110%
Precision Requirements for Duplicate Samples	RER≤2(5)	RER≤2(5)	RER≤2(5)	RER≤2(5)	RER≤2(5)

(1) $MDC = \frac{4.65\ S_{BLK}}{K} \cdot \frac{2.71}{T \times K}$

Where S_{BLK} is the standard deviation of an appropriate method blank and, K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency and the chemical recovery. T is the counting time of the sample.

(2) Glass Fiber 8" X 10".

(3) Two phase system containing 90% Water + 10% Organic liquid.

(4) Less than HAMDC or 5% of sample concentration whichever is greater.

(5) Relataive Error Ratio, $RER = |C_1 - C_2| / |(TPU_1)^2 + (TPU_2)^2|^{1/2}$ where C_1 and C_2 are the measured concentrations for the sample and duplicate and TPU_1 and TPU_2 are the respective total propagated uncertainties. Measurements are acceptable if RER ≤ 2. If RER is greater than 2 but less than or equal to 3, investigate the cause. If RER > 3, take corrective actions and reanalyze samples.

(6) Recoveries which are 15% above or below the ranges listed are acceptable on an infrequent basis, i.e., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.

RADIOCHEMICAL ANALYSIS PERFORMANCE SPECIFICATIONS
ANALYTICAL SUPPORT LEVEL (ASL) C & D

ANALYTE: Th-227, 228, 230, 232

PERFORMANCE PARAMETERS	SAMPLE MATRIX				
	WATER	SOIL/ SEDIMENT	AIR FILTERS (2)	INCINERATOR ASH	CONTAMINATED LIQUID (3)
Highest Allowable Minimum Detectable Concentration (HAMDC) (1)	0.2 pCi/L	0.1 pCi/g	4.0 pCi/Filter	0.2 pCi/g	0.5 pCi/L
Percent Overall Tracer/Chemical Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Percent Matrix Spike Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Method Blank Concentration	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)
Laboratory Control Sample: Percent of Known Value (6)	80-110%	80-110%	80-110%	80-110%	80-110%
Precision Requirements for Duplicate Samples	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)

(1) $MDC = \frac{4.65\ S_{BLK}}{K} + \frac{2.71}{T \times K}$

Where S_{BLK} is the standard deviation of an appropriate method blank and, K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency and the chemical recovery. T is the counting time of the sample.

(2) Glass Fiber 8" X 10".

(3) Two phase system containing 90% Water + 10% Organic liquid.

(4) Less than HAMDC or 5% of sample concentration whichever is greater.

(5) Relataive Error Ratio, $RER = |C_1 - C_2| / [(TPU_1)^2 + (TPU_2)^2]^{1/2}$ where C_1 and C_2 are the measured concentrations for the sample and duplicate and TPU_1 and TPU_2 are the respective total propagated uncertainties. Measurements are acceptable if RER ≤ 2. If RER is greater than 2 but less than or equal to 3, investigate the cause. If RER > 3, take corrective actions and reanalyze samples.

(6) Recoveries which are 15% above or below the ranges listed are acceptable on an infrequent basis, i.e., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.

RADIOCHEMICAL ANALYSIS PERFORMANCE SPECIFICATIONS
ANAYLTICAL SUPPORT LEVEL (ASL) C & D

ANALYTE: Pu-238, 239/240

PERFORMANCE PARAMETERS	SAMPLE MATRIX				
	WATER	SOIL/ SEDIMENT	AIR FILTERS (2)	INCINERATOR ASH	CONTAMINATED LIQUID (3)
Highest Allowable Minimum Detectable Concentration (HAMDC) (1)	0.5 pCi/L	0.2 pCi/g	2.0 pCi/Filter	0.2 pCi/g	0.5 pCi/L
Percent Overall Tracer/Chemical Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Percent Matrix Spike Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Method Blank Concentration	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)
Laboratory Control Sample: Percent of Known Value (6)	80-110%	80-110%	80-110%	80-110%	80-110%
Precision Requirements for Duplicate Samples	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)

(1) $MDC = \frac{4.65\ S_{BLK}}{K} + \frac{2.71}{T \times K}$

Where S_{BLK} is the standard deviation of an appropriate method blank and, K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency and the chemical recovery. T is the counting time of the sample.

(2) Glass Fiber 8" X 10".

(3) Two phase system containing 90% Water + 10% Organic liquid.

(4) Less than HAMDC or 5% of sample concentration whichever is greater.

(5) Relataive Error Ratio, $RER = |C_1 - C_2| / [(TPU_1)^2 + (TPU_2)^2]^{1/2}$ where C_1 and C_2 are the measured concentrations for the sample and duplicate and TPU_1 and TPU_2 are the respective total propagated uncertainties. Measurements are acceptable if RER ≤ 2. If RER is greater than 2 but less than or equal to 3, investigate the cause. If RER > 3, take corrective actions and reanalyze samples.

(6) Recoveries which are 15% above or below the ranges listed are acceptable on an infrequent basis, i.e., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.

RADIOCHEMICAL ANALYSIS PERFORMANCE SPECIFICATIONS
ANALYTICAL SLUPPORT LEVELS (ASL) C & D

ANALYTE: Pu-241

PERFORMANCE PARAMETERS	SAMPLE MATRIX				
	WATER	SOIL/ SEDIMENT	AIR FILTERS (2)	INCINERATOR ASH	CONTAMINATED LIQUID (3)
Highest Allowable Minimum Detectable Concentration (HAMDC) (1)	0.5 pCi/L	0.1 pCi/g	5.0 pCi/Filter	0.5 pCi/g	1.0 pCi/L
Percent Overall Tracer/Chemical Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Percent Matrix Spike Recovery (6)	70-125%	60-130%	60-130%	60-130%	60-130%
Method Blank Concentration	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)
Laboratory Control Sample: Percent of Known Value (6)	75-125%	75-125%	75-125%	75-125%	75-125%
Precision Requirements for Duplicate Samples	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)

(1) $MDC = \frac{4.65\ S_{BLK}}{K} \cdot \frac{2.71}{T \times K}$

Where S_{BLK} is the standard deviation of an appropriate method blank and, K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency and the chemical recovery. T is the counting time of the sample.

(2) Glass Fiber 8" X 10".

(3) Two phase system containing 90% Water + 10% Organic liquid.

(4) Less than HAMDC or 5% of sample concentration whichever is greater.

(5) Relataive Error Ratio, $RER = |C_1 - C_2| / [(TPU_1)^2 + (TPU_2)^2]^{1/2}$ where C_1 and C_2 are the measured concentrations for the sample and duplicate and TPU_1 and TPU_2 are the respective total propagated uncertainties. Measurements are acceptable if RER ≤ 2. If RER is greater than 2 but less than or equal to 3, investigate the cause. If RER > 3, take corrective actions and reanalyze samples.

(6) Recoveries which are 15% above or below the ranges listed are acceptable on an infrequent basis, i.e., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.

RADIOCHEMICAL ANALYSIS PERFORMANCE SPECIFICATIONS
ANALYTICAL SUPPORT LEVEL (ASL) C & D

ANALYTE: Ra-226

PERFORMANCE PARAMETERS	SAMPLE MATRIX				
	WATER	SOIL/ SEDIMENT	AIR FILTERS (2)	INCINERATOR ASH	CONTAMINATED LIQUID (3)
Highest Allowable Minimum Detectable Concentration (HAMDC) (1)	1.0 pCi/L	0.25 pCi/g	2.0 pCi/Filter	0.2 pCi/g	1.0 pCi/L
Percent Overall Tracer/Chemical Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Percent Matrix Spike Recovery (6)	75-125%	65-130%	65-130%	65-130%	65-130%
Method Blank Concentration	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)
Laboratory Control Sample: Percent of Known Value (6)	75-125%	75-125%	75-125%	75-125%	75-125%
Precision Requirements for Duplicate Samples	RER ≤ 2(6)	RER ≤ 2(6)	RER ≤ 2(6)	RER ≤ 2(6)	RER ≤ 2(6)

(1) $MDC = \frac{4.65\ S_{BLK}}{K} \cdot \frac{2.71}{T \times K}$

Where S_{BLK} is the standard deviation of an appropriate method blank and, K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency and the chemical recovery. T is the counting time of the sample.

(2) Glass Fiber 8" X 10".

(3) Two phase system containing 90% Water + 10% Organic liquid.

(4) Less than HAMDC or 5% of sample concentration whichever is greater.

(5) Relataive Error Ratio, $RER = |C_1 - C_2| / [(TPU_1)^2 + (TPU_2)^2]^{1/2}$ where C_1 and C_2 are the measured concentrations for the sample and duplicate and TPU_1 and TPU_2 are the respective total propagated uncertainties. Measurements are acceptable if RER ≤ 2. If RER is greater than 2 but less than or equal to 3, investigate the cause. If RER > 3, take corrective actions and reanalyze samples.

(6) Recoveries which are 15% above or below the ranges listed are acceptable on an infrequent basis, i.e., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.

RADIOCHEMICAL ANALYSIS PERFORMANCE SPECIFICATIONS
ANALYTICAL SUPPORT LEVEL (ASL) C & D

ANALYTE: Ra-228

PERFORMANCE PARAMETERS	SAMPLE MATRIX				
	WATER	SOIL/ SEDIMENT	AIR FILTERS (2)	INCINERATOR ASH	CONTAMINATED LIQUID (3)
Highest Allowable Minimum Detectable Concentration (HAMDC) (1)	3.0 pCi/L	0.5 pCi/g	5.0 pCi/Filter	0.5 pCi/g	3.0 pCi/L
Percent Overall Tracer/Chemical Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Percent Matrix Spike Recovery (6)	70-125%	60-130%	60-130%	60-130%	60-130%
Method Blank Concentration	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)
Laboratory Control Sample: Percent of Known Value (6)	75-125%	75-125%	75-125%	75-125%	75-125%
Precision Requirements for Duplicate Samples	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)

(1) $MDC = \frac{4.65\ S_{BLK}}{K} \cdot \frac{2.71}{T \times K}$

Where S_{BLK} is the standard deviation of an appropriate method blank and, K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency and the chemical recovery. T is the counting time of the sample.

(2) Glass Fiber 8" X 10".

(3) Two phase system containing 90% Water + 10% Organic liquid.

(4) Less than HAMDC or 5% of sample concentration whichever is greater.

(5) Relataive Error Ratio, $RER = |C_1 - C_2| / [(TPU_1)^2 + (TPU_2)^2]^{1/2}$ where C_1 and C_2 are the measured concentrations for the sample and duplicate and TPU_1 and TPU_2 are the respective total propagated uncertainties. Measurements are acceptable if RER ≤ 2. If RER is greater than 2 but less than or equal to 3, investigate the cause. If RER > 3, take corrective actions and reanalyze samples.

(6) Recoveries which are 15% above or below the ranges listed are acceptable on an infrequent basis, i.e., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.

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RADIOCHEMICAL ANALYSIS PERFORMANCE SPECIFICATIONS
ANALYTICAL SUPPORT LEVEL (ASL) C & D

ANALYTE: Np-237

PERFORMANCE PARAMETERS	SAMPLE MATRIX				
	WATER	SOIL/ SEDIMENT	AIR FILTERS (2)	INCINERATOR ASH	CONTAMINATED LIQUID (3)
Highest Allowable Minimum Detectable Concentration (HAMDC) (1)	0.5 pCi/L	0.2 pCi/g	2.0 pCi/Filter	0.2 pCi/g	0.5 pCi/L
Percent Overall Tracer/Chemical Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Percent Matrix Spike Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Method Blank Concentration	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)
Laboratory Control Sample: Percent of Known Value (6)	80-110%	80-110%	80-110%	80-110%	80-110%
Precision Requirements for Duplicate Samples	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)

(1) $MDC = \frac{4.65\ S_{BLK}}{K} \cdot \frac{2.71}{T \times K}$

Where S_{BLK} is the standard deviation of an appropriate method blank and, K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency and the chemical recovery. T is the counting time of the sample.

(2) Glass Fiber 8" X 10".

(3) Two phase system containing 90% Water + 10% Organic liquid.

(4) Less than HAMDC or 5% of sample concentration whichever is greater.

(5) Relataive Error Ratio, $RER = |C_1 - C_2| / [(TPU_1)^2 + (TPU_2)^2]^{1/2}$ where C_1 and C_2 are the measured concentrations for the sample and duplicate and TPU_1 and TPU_2 are the respective total propagated uncertainties. Measurements are acceptable if RER ≤ 2. If RER is greater than 2 but less than or equal to 3, investigate the cause. If RER > 3, take corrective actions and reanalyze samples.

(6) Recoveries which are 15% above or below the ranges listed are acceptable on an infrequent basis, i.e., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.

RADIOCHEMICAL ANALYSIS PERFORMANCE SPECIFICATIONS
ANALYTICAL SUPPORT LEVEL (ASL) C & D

ANALYTE: Am-241

PERFORMANCE PARAMETERS	SAMPLE MATRIX				
	WATER	SOIL/ SEDIMENT	AIR FILTERS (2)	INCINERATOR ASH	CONTAMINATED LIQUID (3)
Highest Allowable Minimum Detectable Concentration (HAMDC) (1)	4.0 pCi/L	0.2 pCi/g	10 pCi/Filter	1.0 pCi/g	10 pCi/L
Percent Overall Tracer/Chemical Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Percent Matrix Spike Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Method Blank Concentration	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)
Laboratory Control Sample: Percent of Known Value (6)	80-110%	80-110%	80-110%	80-110%	80-110%
Precision Requirements for Duplicate Samples	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)

(1) $MDC = \frac{4.65\ S_{BLK}}{K} \cdot \frac{2.71}{T \times K}$

Where S_{BLK} is the standard deviation of an appropriate method blank and, K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency and the chemical recovery. T is the counting time of the sample.

(2) Glass Fiber 8" X 10".

(3) Two phase system containing 90% Water + 10% Organic liquid.

(4) Less than HAMDC or 5% of sample concentration whichever is greater.

(5) Relataive Error Ratio, $RER = |C_1 - C_2| / [(TPU_1)^2 + (TPU_2)^2]^{1/2}$ where C_1 and C_2 are the measured concentrations for the sample and duplicate and TPU_1 and TPU_2 are the respective total propagated uncertainties. Measurements are acceptable if RER ≤ 2. If RER is greater than 2 but less than or equal to 3, investigate the cause. If RER > 3, take corrective actions and reanalyze samples.

(6) Recoveries which are 15% above or below the ranges listed are acceptable on an infrequent basis, i.e., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.

RADIOCHEMICAL ANALYSIS PERFORMANCE SPECIFICATIONS
ANALYTICAL SLUPPORT LEVEL (ASL) C & D

ANALYTE: Cs-137

PERFORMANCE PARAMETERS	SAMPLE MATRIX				
	WATER	SOIL/ SEDIMENT	AIR FILTERS (2)	INCINERATOR ASH	CONTAMINATED LIQUID (3)
Highest Allowable Minimum Detectable Concentration (HAMDC) (1)	4.0 pCi/L	0.2 pCi/g	10 pCi/Filter	1.0 pCi/g	10 pCi/L
Percent Overall Tracer/Chemical Recovery	N/A	N/A	N/A	N/A	N/A
Percent Matrix Spike Recovery	N/A	N/A	N/A	N/A	N/A
Method Blank Concentration	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)
Laboratory Control Sample: Percent of Known Value (6)	85-115%	80-120%	80-120%	80-120%	80-120%
Precision Requirements for Duplicate Samples	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)

(1) $MDC = \frac{4.65\ S_{BLK}}{K} + \frac{2.71}{T \times K}$

Where S_{BLK} is the standard deviation of an appropriate method blank and, K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency and the chemical recovery. T is the counting time of the sample.

(2) Glass Fiber 8" X 10".

(3) Two phase system containing 90% Water + 10% Organic liquid.

(4) Less than HAMDC or 5% of sample concentration whichever is greater.

(5) Relatnive Error Ratio, $RER = |C_1 - C_2| / [(TPU_1)^2 + (TPU_2)^2]^{1/2}$ where C_1 and C_2 are the measured concentrations for the sample and duplicate and TPU_1 and TPU_2 are the respective total propagated uncertainties. Measurements are acceptable if RER ≤ 2. If RER is greater than 2 but less than or equal to 3, investigate the cause. If RER > 3, take corrective actions and reanalyze samples.

(6) Recoveries which are 15% above or below the ranges listed are acceptable on an infrequent basis, i.e., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.

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RADIOCHEMICAL ANALYSIS PERFORMANCE SPECIFICATIONS
ANALYTICAL SUPPORT LEVEL (ASL) C & D

ANALYTE: Sr-90

PERFORMANCE PARAMETERS	SAMPLE MATRIX				
	WATER	SOIL/ SEDIMENT	AIR FILTERS (2)	INCINERATOR ASH	CONTAMINATED LIQUID (3)
Highest Allowable Minimum Detectable Concentration (HAMDC) (1)	1.0 pCi/L	0.5 pCi/g	2.0 pCi/Filter	0.5 pCi/g	1.0 pCi/L
Percent Overall Tracer/Chemical Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Percent Matrix Spike Recovery (6)	70-125%	60-130%	60-130%	60-130%	60-130%
Method Blank Concentration	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)
Laboratory Control Sample: Percent of Known Value (6)	75-125%	75-125%	75-125%	75-125%	75-125%
Precision Requirements for Duplicate Samples	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)

(1) $MDC = \frac{4.65\ S_{BLK}}{K} \cdot \frac{2.71}{T \times K}$

Where S_{BLK} is the standard deviation of an appropriate method blank and, K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency and the chemical recovery. T is the counting time of the sample.

(2) Glass Fiber 8" X 10".

(3) Two phase system containing 90% Water + 10% Organic liquid.

(4) Less than HAMDC or 5% of sample concentration whichever is greater.

(5) Relataive Error Ratio, $RER = |C_1 - C_2| / [(TPU_1)^2 + (TPU_2)^2]^{1/2}$ where C_1 and C_2 are the measured concentrations for the sample and duplicate and TPU_1 and TPU_2 are the respective total propagated uncertainties. Measurements are acceptable if RER ≤ 2. If RER is greater than 2 but less than or equal to 3, investigate the cause. If RER > 3, take corrective actions and reanalyze samples.

(6) Recoveries which are 15% above or below the ranges listed are acceptable on an infrequent basis, i.e., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.

RADIOCHEMICAL ANALYSIS PERFORMANCE SPECIFICATIONS
ANALYTICAL SUPPORT LEVEL (ASL) C & D

ANALYTE: Pb-210

PERFORMANCE PARAMETERS	SAMPLE MATRIX				
	WATER	SOIL/ SEDIMENT	AIR FILTERS (2)	INCINERATOR ASH	CONTAMINATED LIQUID (3)
Highest Allowable Minimum Detectable Concentration (HAMDC) (1)	3.0 pCi/L	0.5 pCi/g	10 pCi/Filter	1.0 pCi/g	30 pCi/L
Percent Overall Tracer/Chemical Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Percent Matrix Spike Recovery (6)	70-125%	60-130%	60-130%	60-130%	60-130%
Method Blank Concentration	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)
Laboratory Control Sample: Percent of Known Value (6)	75-125%	75-125%	75-125%	75-125%	75-125%
Precision Requirements for Duplicate Samples	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)

(1) $MDC = \frac{4.65\ S_{BLK}}{K} \cdot \frac{2.71}{T \times K}$

Where S_{BLK} is the standard deviation of an appropriate method blank and, K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency and the chemical recovery. T is the counting time of the sample.

(2) Glass Fiber 8" X 10".

(3) Two phase system containing 90% Water + 10% Organic liquid.

(4) Less than HAMDC or 5% of sample concentration whichever is greater.

(5) Relataive Error Ratio, $RER = |C_1 - C_2| / |(TPU_1)^2 + (TPU_2)^2|^{1/2}$ where C_1 and C_2 are the measured concentrations for the sample and duplicate and TPU_1 and TPU_2 are the respective total propagated uncertainties. Measurements are acceptable if RER ≤ 2. If RER is greater than 2 but less than or equal to 3, investigate the cause. If RER > 3, take corrective actions and reanalyze samples.

(6) Recoveries which are 15% above or below the ranges listed are acceptable on an infrequent basis, i.e., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.

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RADIOCHEMICAL ANALYSIS PERFORMANCE SPECIFICATIONS
ANALYTICAL SUPPORT LEVEL (ASL) C & D

ANALYTE: Po-210

PERFORMANCE PARAMETERS	SAMPLE MATRIX				
	WATER	SOIL/ SEDIMENT	AIR FILTERS (2)	INCINERATOR ASH	CONTAMINATED LIQUID (3)
Highest Allowable Minimum Detectable Concentration (HAMDC) (1)	0.5 pCi/L	0.2 pCi/g	2 pCi/Filter	0.2 pCi/g	0.5 pCi/L
Percent Overall Tracer/Chemical Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Percent Matrix Spike Recovery (6)	50-100%	45-100%	45-100%	45-100%	45-100%
Method Blank Concentration	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)
Laboratory Control Sample: Percent of Known Value (6)	80-110%	80-110%	80-110%	80-110%	80-110%
Precision Requirements for Duplicate Samples	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)	RER ≤ 2(5)

(1) $MDC = \frac{4.65\ S_{BLK}}{K} + \frac{2.71}{T \times K}$

Where S_{BLK} is the standard deviation of an appropriate method blank and, K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency and the chemical recovery. T is the counting time of the sample.

(2) Glass Fiber 8" X 10".

(3) Two phase system containing 90% Water + 10% Organic liquid.

(4) Less than HAMDC or 5% of sample concentration whichever is greater.

(5) Relataive Error Ratio, $RER = |C_1 - C_2| / [(TPU_1)^2 + (TPU_2)^2]^{1/2}$ where C_1 and C_2 are the measured concentrations for the sample and duplicate and TPU_1 and TPU_2 are the respective total propagated uncertainties. Measurements are acceptable if RER ≤ 2. If RER is greater than 2 but less than or equal to 3, investigate the cause. If RER > 3, take corrective actions and reanalyze samples.

(6) Recoveries which are 15% above or below the ranges listed are acceptable on an infrequent basis, i.e., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.

RADIOCHEMICAL ANALYSIS PERFORMANCE SPECIFICATIONS
ANALYTICAL SUPPORT LEVEL (ASL) C & D

ANALYTE: Tc-99

PERFORMANCE PARAMETERS	SAMPLE MATRIX				
	WATER	SOIL/ SEDIMENT	AIR FILTERS (2)	INCINERATOR ASH	CONTAMINATED LIQUID (3)
Highest Allowable Minimum Detectable Concentration (HAMDC) (1)	3.0 pCi/L	1.0 pCi/g	50 pCi/Filter	10 pCi/g	30 pCi/L
Percent Overall Tracer/Chemical Recovery (6)	50-100%(7)	45-100%(7)	45-100%(7)	45-100%(7)	45-100%(7)
Percent Matrix Spike Recovery (6)	65-120%	60-130%	60-130%	60-130%	60-130%
Method Blank Concentration	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)	<HAMDC(4)
Laboratory Control Sample: Percent of Known Value (6)	70-130%	70-130%	70-130%	70-130%	70-130%
Precision Requirements for Duplicate Samples	RER≤2(5)	RER≤2(5)	RER≤2(5)	RER≤2(5)	RER≤2(5)

(1) $MDC = \frac{4.65\ S_{BLK}}{K} \cdot \frac{2.71}{T \times K}$

Where S_{BLK} is the standard deviation of an appropriate method blank and, K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency and the chemical recovery. T is the counting time of the sample.

(2) Glass Fiber 8" X 10".

(3) Two phase system containing 90% Water + 10% Organic liquid.

(4) Less than HAMDC or 5% of sample concentration whichever is greater.

(5) Relatnive Error Ratio, $RER = |C_1 - C_2| / [(TPU_1)^2 + (TPU_2)^2]^{1/2}$ where C_1 and C_2 are the measured concentrations for the sample and duplicate and TPU_1 and TPU_2 are the respective total propagated uncertainties. Measurements are acceptable if RER ≤ 2. If RER is greater than 2 but less than or equal to 3, investigate the cause. If RER > 3, take corrective actions and reanalyze samples.

(6) Recoveries which are 15% above or below the ranges listed are acceptable on an infrequent basis, i.e., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.

(7) Use average recovery of matrix spike and matrix spike duplicate for batch chemical recovery correction.

RADIOCHEMICAL ANALYSIS PERFORMANCE SPECIFICATIONS
ANALYTICAL SUPPORT LEVEL (ASL) B

ANALYTE: Gross Alpha Activity

PERFORMANCE PARAMETERS	SAMPLE MATRIX		
	WATER	SOIL/ SEDIMENT	AIR FILTERS (2)
Highest Allowable Minimum Detectable Concentration (HAMDC) (1)	2.0 pCi/L	15 pCi/g	4.0 pCi/Filter
Percent Overall Tracer/Chemical Recovery	N/A	N/A	N/A
Method Blank Concentration	<HAMDC(3)	<HAMDC(3)	<HAMDC(3)
Laboratory Control Sample: Percent of Known Value (4)	40-160%	40-160%	40-160%

(1) $MDC = \frac{4.65\ S_{BLK}}{K} + \frac{2.71}{T \times K}$

Where S_{BLK} is the standard deviation of an appropriate method blank and, K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency and the chemical recovery. T is the counting time of the sample.

(2) Glass Fiber 8" X 10".

(3) Less than HAMDC or 5% of sample concentration whichever is greater.

(4) Recoveries which are 15% above or below the ranges listed are acceptable on an infrequent bassi, i.e., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.

RADIOCHEMICAL ANALYSIS PERFORMANCE SPECIFICATIONS
ANALYTICAL SUPPORT LEVEL (ASL) B

ANALYTE: Gross Beta Activity

PERFORMANCE PARAMETERS	SAMPLE MATRIX		
	WATER	SOIL/ SEDIMENT	AIR FILTERS (2)
Highest Allowable Minimum Detectable Concentration (HAMDC) (1)	4.0 pCi/L	30 pCi/g	10 pCi/Filter
Percent Overall Tracer/Chemical Recovery	N/A	N/A	N/A
Method Blank Concentration	<HAMDC(3)	<HAMDC(3)	<HAMDC(3)
Laboratory Control Sample: Percent of Known Value (4)	50-150%	50-150%	50-150%

(1) $MDC = \frac{4.65\ S_{BLK}}{K} + \frac{2.71}{T \times K}$

Where S_{BLK} is the standard deviation of an appropriate method blank and, K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency and the chemical recovery. T is the counting time of the sample.

(2) Glass Fiber 8" X 10".

(3) Less than HAMDC or 5% of sample concentration whichever is greater.

(4) Recoveries which are 15% above or below the ranges listed are acceptable on an infrequent bassi, i.e., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.

Section 4 Revised Field Work Package (FWP) Example

The following section includes a significantly revised (improved) example Field Work Package (FWP) for Building 39A. The revised FWP example reflects and references as appropriate the sampling approach detailed in the SAP, the requirements of the SCQ, the preliminary sampling information contained in D.9 of the SAP, and the sampling procedures which have been developed for the OU3 RI/FS field activities, without repeating this information in the FWP. This provides for a sampling document which presents the intent of these primary documents without reiterating material which will be common among all FWPs. In doing so, the revised FWP presents only that information which is needed by the field sampling team to sample a specific component. The revised FWP also reflects issues/concerns expressed by USEPA in the comments provided by letter of November 19, 1992 on the submittal of the draft example FWP.

The outline for the FWP, including the identification of any notable changes and the impact of any USEPA comments, is as follows:

Section 1 Introduction: This section provides a short summary of the component, similar to that presented in Section D.9 of the SAP.

Section 2 QA/QC Requirements: This section addresses Field QA samples, and has been enhanced to provide the frequency with which each of the Field QA samples is to be taken. These frequencies reflect the requirements of the SCQ and the SAP, and the current scheduling of the component. Proposed Field QA samples, based on these frequencies, are identified further in the FWP in Attachment 2 - Summary of Intrusive Sampling.

Section 3 Sample Locations: This section has been greatly enhanced from the first draft. It is accompanied by maps (Attachment 4) which identify proposed sampling locations and associated sample numbers, as well as tables summarizing the proposed Non-Intrusive and Intrusive sampling (Attachments 1 and 2, respectively). For clarity to the two different groups to be doing the sampling, this section has been divided into the following two subsections:

> **3.1 Non-Intrusive Sampling:** This section summarizes the radiological and chemical surveys necessary to field finalize sampling locations, as well as proposed air samples and swipes. The sampling protocol for the Non-Intrusive surveys are included as an attachment to the FWP, as a ready reference to the sampling technicians.
>
> **3.2 Intrusive Sampling:** This section summarizes the major-media and supplemental intrusive sampling proposed for the component. This sampling is based on the proposed sampling identified in Section D.9 of the SAP. Major-media sampling is reflective of the definition provided in Section 4.3.3 of the WPA, which omits such material as insulation due to the relatively small volumes of this material and the lack of available treatment options.

Section 4 Sampling Activities, Handling, and Procedures: This section provides a table of sampling procedures which are to be utilized for the sampling activities identified in the subject FWP. The identified procedures are specific to a particular media, a particular survey instrument, or a particular activity. For example, the procedures could be for the sampling of

concrete, the use of an XRF, or instructions on field measurement logbook use and maintenance. Selection of specific procedures, within the table, will be based on the media to be sampled, the anticipated survey activities, etc. This section also includes a discussion on required sample containers, which has been enhanced with the development of Attachment 3 - Sample Containers per Media Type.

Section 5 Equipment Needed: This section sets up minimum guidelines for required sampling equipment and identifies the equipment in Attachment 6 of the FWP.

Section 6 Health and Safety Compliance: This section references the component-specific health and safety plan as being in Attachment 7 of the FWP, and also discusses permits relevant to the proposed sampling and the particulars of the sampling environment.

Attachment 1 Summary of Non-Intrusive Sampling: This attachment is a table which summarizes the radiological and chemical surveys, as well as the air and swipe samples. The table is an enhancement over what was in the first draft of the FWP in that it combines into one table various information which had been included in multiple tables, making it easier for the sampling technicians to perform their work. Specifically, the table provides sample ID numbers, media type and matrix code, sample location, sample type, sample procedure, ASL level, requested analyses, chain of custody codes for analyses, weight and volume of samples, hold times, and preservatives for all non-intrusive samples planned for that component. For the proposed surveys, many of these items are not appropriate. For example, the sample numbering system employed for the intrusive samples will not be used for the surveys. Instead, the data will be recorded in the Field Measurement Logbook and the Radiological Survey Logbook (as directed by the associated site procedures), as well as on the component maps.

Attachment 2 Summary of Intrusive Sampling: This attachment is essentially the same as Attachment 1, except that it summarizes the major media and supplemental intrusive samples. Again, this table is a great enhancement over what was in the first draft FWP. This Attachment also identifies all of the Field QA samples anticipated to be taken.

Attachment 3 Sample Containers Needed per Media Type: This attachment has also been added as enhancement to the FWP to assist the sampling technicians. Specifically, it is a chart that summarizes sample container requirements, to assist the sampling technicians in determining the correct type and quantity of sample containers needed for the component sampling event.

Attachment 4 Maps: This attachment will include updated maps showing the exact sampling locations, and associated sample numbers, based upon radiological screening data available through that point in time.

Attachment 5 Sampling Protocol 1: This attachment will include a restatement of activities discussed in Protocol 1 from Section D.5 of the SAP, relative to the performance of surveying proposed in Section 3.1 and Attachment 1 of the FWP. In essence, this protocol provides guidance for conducting surveys necessary to support the much of the sampling program. Specifically, this protocol describes radiological surveying used to confirm the locations of "hot spots" (local maxima) for removable alpha and/or total beta-gamma activity as indicated in Attachment 4 to establish final intrusive sample locations. This protocol also describes chemical surveying to be conducted at all intrusive sampling locations. Results of

these survey activities will be recorded in the Field Measurement Logbook and the Radiological Survey Logbook (as directed by the associated site procedures), as well as on the component maps.

Attachment 6 Equipment Requirements: This is to be used by the field characterization staff as a reference prior to sampling to ensure the sampling crews are adequately prepared for the sampling proposed for the component addressed by the subject FWP.

Attachment 7 Health and Safety Plan: This is the component-specific health and safety plan.

CRU3 FIELD WORK PACKAGE

BUILDING 39A - DRUM DRYER

PREPARED BY _____ DATE:_____
(ENGINEER/TECHNOLOGIST)

REVIEWED BY _____ DATE:_____
(PROJECT SUPERVISOR)

AUTHORIZED BY _____ DATE:_____
(MANAGER CRU3 RI/FS)

1.0 INTRODUCTION

Building 39A, a two story square structure measuring approximately 53'x 53'x 25', is located within the west-central portion of the Fernald Environmental Management Project (FEMP) production area between Plant 2/3 and Plant 8, south of 102nd Street. The building consists of a structural steel frame on a reinforced monolithic concrete base and floor, transite interior and exterior siding panels with insulation materials between the two, and transite roof panels.

This building contains or formerly contained a drum dryer and a diked exterior pad in Process Area 1, a trash baler in Process Area 2, a liquid waste incinerator in Process Area 3, and a solid waste incinerator in Process Area 4 (see Attachment 4, Maps, Building 39A). This building and associated appurtenances were initially devoted to the drum dryer process on the second floor including the diked,outside pad; however, the drum dryer was subsequently removed and the trash baler and incinerators were added. The liquid waste incinerator and associated equipment in Process Area 3 is a hazardous waste management unit (HWMU) due to the incineration of waste oils containing levels of 1,1,1-trichloroethane and lead above regulatory levels.

2.0 QA/QC REQUIREMENTS

N/A if not applicable

CONCURRENCE QA/QC _____

CERCLA/RCRA Unit 3 (CRU3) sampling personnel will adhere to the QA/QC requirements as outlined in the **Sitewide CERCLA Quality Assurance Project Plan (SCQ), Section D.7.2 of the OU3 Work Plan Addendum Sampling & Analysis Plan (SAP)** and in procedure **EP-CRU3-014** for trip blanks, field blanks, rinsate blanks, and duplicate sampling. Field QA sampling frequencies for CRU3 sampling personnel, as defined through these documents are as follows:

Trip Blank: **1 per VOA transport container per day.**

Field Blanks: **1 per 20 samples per process area per day.**

Rinsate Blank: **1 per 20 samples per major media per sampling crew.**

Duplicates: **1 per 20 samples per major media per sampling crew.**

Based on the current scheduling of components, and the above QA sampling frequencies, the quantity of each type of Field QA sample is provided, along with the other sample quantities, in Attachment 1 & 2 - Summaries of Non-Intrusive and Intrusive Sampling, respectively. Actual Field QA samples will be tracked by the Daily Operations Unit and the FWP revised prior to sampling to ensure that the proper number and type of Field QA samples are collected.

Note: Field blanks, trip blanks, and equipment rinsate samples will consist of the appropriate volume of deionized water necessary for analysis as listed on Attachment 2 (trip blanks will be analyzed for Total VOCs only).

3.0 SAMPLE LOCATIONS

Based on the sampling preliminarily identified in Section D.9 of the SAP, the field sampling protocols defined in Section D.5 of the SAP, and the FWP development procedures defined in Section D.4.6.2 of the SAP, a number of Non-Intrusive and Intrusive samples have been identified as being necessary for the sampling of Building 39A. These samples are listed on Attachment 1 - Summary of Non-Intrusive Sampling, and are summarized as follows:

3.1 Non-Intrusive Sampling

3.1.1 Surveys

3.1.1.1 Radiological Surveys

Radiological surveys will be conducted at all Intrusive sampling locations immediately prior to sampling in order to field finalize the sampling location. These surveys will be conducted in accordance with Protocol 1 of the SAP, which has been summarized in Attachment 5 of this FWP. The data recorded from the surveys will be used to confirm the locations of "hot spots" (local maxima) for removable alpha and/or total beta-gamma activity as indicated in Attachment 4, and in doing so establishing final intrusive sampling locations. Refer to the maps (Attachment 4) for sampling locations and radiological contamination levels.

3.1.1.2 Chemical Surveys

Chemical surveys will be conducted at all Supplemental Intrusive sampling locations immediately prior to sampling to identify areas of elevated chemical contamination. Surveys will be conducted in accordance with Protocol 1 of the SAP, which has been summarized in Attachment 5 of this FWP. In the absence of historical chemical screening data to indicate the potential for distinct chemical hot spots within Building 39A, no chemical surveys for major media Intrusive samples have been identified.

3.1.2 Air Samples

As identified in Attachment 1 - Summary of Non-Intrusive Sampling, one Air Filter sample has been identified. To obtain this sample, high volume air sampling equipment will be put within the component and left in place for a period of 8 - 24 hours. The filters will be removed from the monitor, placed in a sample container, and delivered to the on-site lab.

3.1.3 Swipes

As identified in Attachment 1 - Summary of Non-Intrusive Sampling, one composite Swipe sample has been identified. All swipes taken during the radiological surveying performed under 3.1.1.1 will be field surveyed to check for radiological levels. All swipes in Building 39A with levels that exceed by an order of magnitude the surface contamination guidelines in DOE Order 5400.5 will be composited as a single sample for laboratory analysis of individual radionuclides.

3.2 Intrusive Sampling

The intrusive samples to be collected under this FWP are listed on Attachment 2 - Summary of Intrusive Sampling, and consist of both major media and supplemental samples. Field QA samples identified below are based on the current scheduling of components, and the Field QA sampling frequencies discussed in 2.0. The field blanks are estimated based on the the assumption that sampling technicians will be collecting about two (2) samples per day per sampling crew.

3.2.1 Major Media Sampling

For each of the major media in each process area, intrusive sampling locations have been identified based on existing data

resulting from past and recently conducted radiological survey efforts. The locations are shown on the map included herewith as Attachment 4. The identified sampling locations are the points of greatest contamination as represented by the available data. In the absence of historical chemical screening data, it is assumed that the point of greatest radiological contamination coincides with the point of greatest chemical contamination. The major media samples are summarized as follows:

Summary of Major Media Samples
Building 39A

Total Major Media Intrusive Samples	13*
Total Duplicate Samples	3
Estimated Trip Blanks	0
Estimated Field Blanks	5
Estimated Rinsate Blanks	3
Estimated Total Quantity of Samples	24

* This total reflects the nine major media intrusive samples identified in D.9 of the SAP. The additional four samples reflected here is due to the fact that there are two concrete core locations proposed, with each concrete core designated to be sectioned into three samples.

3.2.2 Supplemental Sampling

Various supplemental sampling locations have been identified within Building 39A. The locations are shown on Attachment 4, and the samples are noted in Attachment 2 - Summary of Intrusive Sampling. These supplemental samples include liquid, sediment, and loose media samples. In addition, Building 39A has been identified as a component requiring transite sampling.

An estimate of the supplemental samples is shown below.

Summary of Supplemental Samples
Building 39A

Total Supplemental Samples	4
Total Duplicate Samples	4
Estimated Trip Blanks	1
Estimated Field Blanks	2
Estimated Rinsate Blanks	4
Estimated Total Quantity of Samples	15

4.0 SAMPLING ACTIVITIES, HANDLING, AND PROCEDURES

Sampling activities will conform to CRU3 Specific Procedures as identified with an "X" on Table 1 - Required Procedures. All samples will be submitted to the FEMP Site Analytical Department, Sample Receiving Section for packaging and shipment to the proper laboratory for analyses identified in Attachments 1 and 2. A screening aliquot, required when samples are shipped off-site, has also been factored into Attachment 2 for collection by field sampling personnel for submission for gross α/β screening.

Table 1 - Required Procedures

USE	DOCUMENT NUMBER	TITLE	USE	DOCUMENT NUMBER	TITLE
X	EP-CRU3-001	SAMPLING STANDING OR SHALLOW LIQUIDS		EP-CRU3-018	SAMPLING SURFACE AND SUBSURFACE SOIL
	EP-CRU3-002	WATER QUALITY		EP-CRU3-019	SAMPLING SOFT SOLIDS
X	EP-CRU3-003	FIELD LOGBOOK	X	EP-CRU3-020	SAMPLING HARD SOLIDS
X	EP-CRU3-004	EQUIPMENT DECONTAMINATION	X	EP-CRU3-021	SAMPLING METALS
X	EP-CRU3-005	FIELD OPERATIONS COORDINATION		EP-CRU3-022	SAMPLING SHREDDABLE SOLIDS
X	EP-CRU3-006	OPERATION OF HNU-SEFA-P XRF ANALYZER		EP-CRU3-023	SAMPLING SOLIDS IN PIPING
	EP-CRU3-007	CONTROL AND TRANSPORT SEALED SOURCES	X	EP-CRU3-024	FIELD MEASUREMENT LOGBOOK
X	EP-CRU3-008	HEALTH AND SAFETY PROCEDURES	X	EP-CRU3-025	RADIOLOGICAL SURVEY LOGBOOK
	EP-CRU3-009	SAMPLING DEEP LIQUIDS	X	EP-CRU3-026	OPERATION OF FIELD GAS CHROMATAGRAPH
	EP-CRU3-010	SAMPLING CONTAINED LIQUIDS	X	EP-CRU3-027	ASL A AND B SAMPLING
X	EP-CRU3-011	SAMPLING SUB-LIQUID SEDIMENTS	X	SP-P-41-052	COLLECTING BULK SAMPLES OF SUSPECT ASBESTOS CONTAINING MATERIALS
X	EP-CRU3-012	FLAME IONIZATION DETECTOR	X	SP-P-35-016	RADIATION WORK PERMITS
	EP-CRU3-013	PCB SOIL SCREENING	X	SP-P-35-023	RADIOLOGICAL CONTAMINATION SURVEYS
X	EP-CRU3-014	QA/QC SAMPLES	X	SP-P-35-026	OCCUPATIONAL AIR SAMPLING FOR RADIOACTIVITY
	EP-CRU3-015	PCB OIL SCREENING	X	SP-P-35-037	OPERATION OF THE TENNELEC AUTOMATIC LOW BACKGROUND COUNTING SYSTEM
X	EP-CRU3-016	SAMPLING LOOSE SOLIDS	X	SP-P-35-046	COUNTING SMEARS WITH FIELD SURVEY INSTRUMENTS
	EP-CRU3-017	SAMPLING FIRM SOLIDS	X	SP-P-35-057	RADIOLOGICAL SURVEY OF X-RAY DIFFRACTION AND FLUORESCENCE ANALYSIS EQUIPMENT

4.1. REQUIRED SAMPLE CONTAINER

CERCLA/RCRA Unit 3, during the course of FEMP on-site sampling, will use only glass containers certified to be clean (manufacturers certification is included with every shipment). Glass containers used may vary in size from those specified, according to availability, and will be sealed using Teflon™-Lined Closures (TLC). Attachment 3, "Sample Containers Needed Per Media Type", shows the sample container

requirements for the work included in this FWP. 4245

5.0 EQUIPMENT NEEDED

As a minimum, the required sampling equipment needed will be that which is checked on Attachment 6 - Equipment Requirements. The equipment listed has been established as a guide to the equipment utilized by CRU3 in the extraction of media samples. Regardless of listing, the Lead Technician will choose the equipment appropriate for each media sample extraction. **Any exception to the equipment listed in Attachment 6 will be noted in the field logbook applicable to each project.**

6.0 HEALTH AND SAFETY COMPLIANCE

The work to be performed as outlined in this Field Work Package must be accomplished in accordance with the attached project specific Health and Safety Plan (Attachment 7). Other documents utilized for field control of this project which protect worker health and help insure worker safety are attached to this package.

6.1 PERMITS

Since Building 39A is designated as a Controlled Area under criteria established by United States Department of Energy Order 5480.11, a Radiation Work Permit is required prior to start of work within this area.

A Safety Work Permit is required at the FEMP prior to the commencement of any work in support of a specific project.

An Asbestos Work Permit is required at the FEMP when the potential for asbestos fiber release is exists.

Attachment 1 - Summary of Non-Intrusive Sampling

Sample ID	Media (Matrix Code)	Location (refer to attached map)	Sample Type	Sampling Procedure[a]	ASL	Analysis	COC Codes	Wt./Vol.	Hold Time	Preservatives
N/A	Concrete (M305)	Process Area 1 - concrete flooring of outside diked pad and second floor	Radiological Surveys	SP-P-35-023	A/B					
N/A	Masonry (M305)	At the area of highest radiologic contamination in the Drum Dryer process area	Radiological Surveys	SP-P-35-023	A/B					
N/A	Steel (M312)	At the area of highest radiologic contamination in each of the process area	Radiological Surveys	SP-P-35-023	A/B					
N/A	Liquid (M310)	In the trench in the outside diked pad associated with the Drum Dryer process area	Radiologiocal Surveys, FID, & XRF	SP-P-35-023, EP-CRU3-012 & EP-CRU3-006	A/B					
N/A	Loose Media (M118)	In the channel beams within the component	Radiological Surveys & XRF	SP-P-35-023 & EP-CRU3-006	A/B					
39A-001	Swipes[b]	Those swipes with radiologic levels above preestablished Decision Levels	Filter Composite	SP-P-35-023	C	Radiological		1000 g	180 days	None Required
39A-002	Air Filters	Filters from Continuous Air Monitors	Filter Composite	SP-P-35-023	C	Radiological		1000 g	180 days	None Required

a - Although the reference below is generally to a site procedure, these are also defined/discussed in various Section/Appendices of the SCQ.
b - The need for this sample will depend on the levels of contamination found through screening.

HR - Suspected **HIGH RADIOLOGICAL** contamination sample.
HO - Suspected **HIGH ORGANIC** contamination sample.

Attachment 2 - Summary of Intrusive Sampling

Sample ID	Media (Matrix Code)	Location (refer to attached map)	Sample Type	Sampling Procedure[a]	ASL	Analysis	COC Codes	Wt./Vol.	Hold Time	Preservatives
39A-003	Concrete (M305)	At the area of highest radiologic contamination in the Drum Dryer process area	Core (top ½ inch)	EP-CRU3-020	D	Radiological		(1) 8 oz.	1 year	None required
					C	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-004	Concrete (M305)	Another portion of the concrete core taken at the location of 39A-003	Core (depth from ½ to 1 inch)	EP-CRU3-020	D	Radiological		(1) 8 oz.	1 year	None required
					C	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-005	Concrete (M305)	Another portion of the concrete core taken at the location of 39A-003	Core (depth from 1 to 6 inches)	EP-CRU3-020	D	Radiological		(1) 8 oz.	1 year	None required
					C	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-006 (F003)	Deionized Water	Field blank to be taken at the same time and location as 39A-003	Grab	EP-CRU3-014	D	Radiological		(4) Liter[b]	6 months	HNO_3 to pH < 2
					C	TAL Inorgan.		(1) Liter[b]	28d/6m	HNO_3 to pH < 2
					B	α/β Screening		(1) 4 oz.	6 months	HNO_3 to pH < 2
39A-007	Concrete (M305)	At the area of highest radiologic contamination in the Trash Baler process area	Chips	EP-CRU3-020	D	Radiological		(1) 8 oz.	1 year	None required
					D	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-008 (D007)	Concrete (M305)	Duplicate sample to be taken at the same location as 39A-007	Chips	EP-CRU3-020 & EP-CRU3-014	D	Radiological		(1) 8 oz.	1 year	None required
					C	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-009 (R007)	Deionized Rinsate Water	Rinsate blank to be taken after decontamination of 39A-007 sampling equipment	Grab	EP-CRU3-014	D	Radiological		(4) Liter[b]	6 months	HNO_3 to pH < 2
					C	TAL Inorgan.		(1) Liter[b]	28d/6m	HNO_3 to pH < 2
					B	α/β Screening		(1) 4 oz.	6 months	HNO_3 to pH < 2
39A-010 (F007)	Deionized Water	Field blank to be taken at the same time and location as 39A-007	Grab	EP-CRU3-014	D	Radiological		(4) Liter[b]	6 months	HNO_3 to pH < 2
					C	TAL Inorgan.		(1) Liter[b]	28d/6m	HNO_3 to pH < 2
					B	α/β Screening		(1) 4 oz.	6 months	HNO_3 to pH < 2
39A-011	Concrete (M305)	At the area of highest radiologic contamination in the Liquid Waste Incinerator process area	Core (top ½ inch)	EP-CRU3-020	D	Radiological		(1) 8 oz.	1 year	None required
					C	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-012	Concrete (M305)	Another portion of the concrete core taken at the location of 39A-011	Core (depth from ½ to 1 inch)	EP-CRU3-020	D	Radiological		(1) 8 oz.	1 year	None required
					C	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required

Sample ID	Media (Matrix Code)	Location (refer to attached map)	Sample Type	Sampling Procedure*	ASL	Analysis	COC Codes	Wt./Vol.	Hold Time	Preservatives
39A-013	Concrete (M305)	Another portion of the concrete core taken at the location of 39A-011	Core (depth from 1 to 6 inches)	EP-CRU3-020	D	Radiological		(1) 8 oz.	1 year	None required
					C	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4C
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-014	Concrete (M305)	At the area of highest radiologic contamination in the Solid Waste Incinerator process area	Chips	EP-CRU3-020	D	Radiological		(1) 8 oz.	1 year	None required
					C	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-015	Masonry (M305)	At the area of highest radiologic contamination in the Drum Dryer process area	Chips	EP-CRU3-020	D	Radiological		(1) 8 oz.	1 year	None required
					C	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-016 (D015)	Masonry (M305)	Duplicate sample to be taken at the same location as 39A-015	Chips	EP-CRU3-020 & EP-CRU3-014	D	Radiological		(1) 8 oz.	1 year	None required
					D	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-017 (F015)	Deionized Water	Field blank to be taken at the same time and location as 39A-015	Grab	EP-CRU3-014	D	Radiological		(4) Liter[P]	6 months	HNO_3 to pH <2
					C	TAL Inorgan.		(1) Liter[P]	28d/6m	HNO_3 to pH <2
					B	α/β Screening		(1) 4 oz.	6 months	HNO_3 to pH <2
39A-018 (R015)	Deionized Rinsate Water	Rinsate blank to be taken after decontamination of 39A-015 sampling equipment	Grab	EP-CRU3-014	D	Radiological		(4) Liter[P]	6 months	HNO_3 to pH <2
					C	TAL Inorgan.		(1) Liter[P]	28d/6m	HNO_3 to pH <2
					B	α/β Screening		(1) 4 oz.	6 months	HNO_3 to pH <2
39A-019	Steel (M312)	At the area of highest radiologic contamination in the Drum Dryer process area	Scrapings	EP-CRU3-021	D	Radiological		(1) 8 oz.	1 year	None required
					C	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-020	Steel (M312)	At the area of highest radiologic contamination in the Trash Baler process area	Scrapings	EP-CRU3-021	D	Radiological		(1) 8 oz.	1 year	None required
					C	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-021	Steel (M312)	At the area of highest radiologic contamination in the Liquid Waste Incinerator process area	Scrapings	EP-CRU3-021	D	Radiological		(1) 8 oz.	1 year	None required
					C	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-022 (F021)	Deionized Water	Field blank to be taken at the same time and location as 39A-021	Grab	EP-CRU3-014	D	Radiological		(4) Liter[P]	6 months	HNO_3 to pH <2
					C	TAL Inorgan.		(1) Liter[P]	28d/6m	HNO_3 to pH <2
					B	α/β Screening		(1) 4 oz.	6 months	HNO_3 to pH <2
39A-023	Steel (M312)	At the area of highest radiologic contamination in the Solid Waste Incinerator process area	Scrapings	EP-CRU3-021	D	Radiological		(1) 8 oz.	1 year	None required
					C	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required

Sample ID	Media (Matrix Code)	Location (refer to attached map)	Sample Type	Sampling Procedure[a]	ASL	Analysis	COC Codes	Wt./Vol.	Hold Time	Preservatives
39A-024 (D023)	Steel (M312)	Duplicate sample to be taken at the same location as 39A-023	Scrapings	EP-CRU3-021 & EP-CRU3-014	D	Radiological		(1) 8 oz.	1 year	None required
					D	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-025 (F023)	Deionized Water	Field blank to be taken at the same time and location as 39A-023	Grab	EP-CRU3-014	D	Radiological		(4) Liter[P]	6 months	HNO_3 to pH <2
					C	TAL Inorgan.		(1) Liter[P]	28d/6m	HNO_3 to pH <2
					B	α/β Screening		(1) 4 oz.	6 months	HNO_3 to pH <2
39A-026 (R023)	Deionized Rinsate Water	Rinsate blank to be taken after decontamination of 39A-023 sampling equipment	Grab	EP-CRU3-014	D	Radiological		(4) Liter[P]	6 months	HNO_3 to pH <2
					C	TAL Inorgan.		(1) Liter[P]	28d/6m	HNO_3 to pH <2
					B	α/β Screening		(1) 4 oz.	6 months	HNO_3 to pH <2
39A-027	Liquid[b] (M310)	In the trench in the outside diked pad associated with the Drum Dryer process area	Grab	EP-CRU3-001	D	Radiological		(4) Liter[P]	6 months	HNO_3 to pH <2
					C	TCL VOCs		(2) 40 ml	14 days	4 drops HCl, NO HEAD SPACE
					C	TCL S-VOCs		(1) Liter[A]	7 days	Cool, 4 C
					C	TAL Inorgan.		(1) Liter[P]	28d/6m	HNO_3 to pH <2
					B	α/β Screening		(1) 4 oz.	6 months	HNO_3 to pH <2
39A-028 (D027)	Liquid[b] (M310)	Duplicate sample to be taken at the same location as 39A-027	Grab	EP-CRU3-001 & EP-CRU3-014	D	Radiological		(4) Liter[P]	6 months	HNO_3 to pH <2
					D	TCL VOCs		(2) 40 ml	14 days	4 drops HCl, NO HEAD SPACE
					D	TCL S-VOCs		(1) Liter[A]	7 days	Cool, 4 C
					D	TAL Inorgan.		(1) Liter[P]	28d/6m	HNO_3 to pH <2
					B	α/β Screening		(1) 4 oz.	6 months	HNO_3 to pH <2
39A-029 (F027)	Deionized Water	Field blank to be taken at the same time and location as 39A-027	Grab	EP-CRU3-014	D	Radiological		(4) Liter[P]	6 months	HNO_3 to pH <2
					C	TCL VOCs		(2) 40 ml	14 days	4 drops HCl, NO HEAD SPACE
					C	TCL S-VOCs		(1) Liter[A]	7 days	Cool, 4 C
					C	TAL Inorgan.		(1) Liter[P]	28d/6m	HNO_3 to pH <2
					B	α/β Screening		(1) 4 oz.	6 months	HNO_3 to pH <2
39A-030 (R027)	Deionized Water	Rinsate blank to be taken after decontamination of 39A-027 sampling equipment	Grab	EP-CRU3-014	D	Radiological		(4) Liter[P]	6 months	HNO_3 to pH <2
					C	TCL VOCs		(2) 40 ml	14 days	4 drops HCl, NO HEAD SPACE
					C	TCL S-VOCs		(1) Liter[A]	7 days	Cool, 4 C
					C	TAL Inorgan.		(1) Liter[P]	28d/6m	HNO_3 to pH <2
					B	α/β Screening		(1) 4 oz.	6 months	HNO_3 to pH <2

Sample ID	Media (Matrix Code)	Location (refer to attached map)	Sample Type	Sampling Procedure[a]	ASL	Analysis	COC Codes	Wt./Vol.	Hold Time	Preservatives
39A-031	Sediment (M327)	In the trench in the outside diked pad associated with the Drum Dryer process area	Grab	EP-CRU3-011	D	Radiological		(4) Liter[P]	6 months	HNO_3 to pH <2
					C	TCL VOCs		(2) 40 ml	14 days	4 drops HCl, NO HEAD SPACE
					C	TCL S-VOCs		(1) Liter[A]	7 days	Cool, 4 C
					C	TAL Inorgan.		(1) Liter[P]	28d/6m	HNO_3 to pH <2
					B	α/β Screening		(1) 4 oz.	6 months	HNO_3 to pH <2
39A-032 (D031)	Sediment (M327)	Duplicate sample to be taken at the same location as 39A-031	Grab	EP-CRU3-011 & EP-CRU3-014	D	Radiological		(4) Liter[P]	6 months	HNO_3 to pH <2
					D	TCL VOCs		(2) 40 ml	14 days	4 drops HCl, NO HEAD SPACE
					D	TCL S-VOCs		(1) Liter[A]	7 days	Cool, 4 C
					D	TAL Inorgan.		(1) Liter[P]	28d/6m	HNO_3 to pH <2
					B	α/β Screening		(1) 4 oz.	6 months	HNO_3 to pH <2
39A-033 (R031)	Deionized Rinsate Water	Rinsate blank to be taken after decontamination of 39A-031 sampling equipment	Grab	EP-CRU3-014	D	Radiological		(1) Liter[P]	6 months	HNO_3 to pH <2
					C	TCL VOCs		(2) 40 ml	14 days	4 drops HCl, NO HEAD SPACE
					C	TCL S-VOCs		(1) Liter[A]	7 days	Cool, 4 C
					C	TAL Inorgan.		(1) Liter[P]	28d/6m	HNO_3 to pH <2
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-034	Loose Media[b] (M118)	In the channel beams within the component	Grab	EP-CRU3-016	D	Radiological		(1) 8 oz.	1 year	None required
					C	TCL VOCs		(1) 4 oz.	14 days	Cool, 4 C
					C	TCL SVOCs		(1) 8 oz.	14 days	Cool, 4 C
					C	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-035 (D034)	Loose Media[b] (M118)	Duplicate sample to be taken at the same location as 39A-034	Grab	EP-CRU3-016 & EP-CRU3-014	D	Radiological		(1) 8 oz.	1 year	None required
					D	TCL VOCs		(1) 4 oz.	14 days	Cool, 4 C
					D	TCL SVOCs		(1) 8 oz.	14 days	Cool, 4 C
					D	TAL Inorgan.		(1) 8 oz.	28d/6m	Cool, 4 C
					B	α/β Screening		(1) 4 oz.	6 months	None required
39A-036 (F034)	Deionized Water	Field blank to be taken at the same time and location as 39A-034	Grab	EP-CRU3-014	D	Radiological		(4) Liter[P]	6 months	HNO_3 to pH <2
					C	TCL VOCs		(2) 40 ml	14 days	4 drops HCl, NO HEAD SPACE
					C	TCL SVOCs		(1) Liter[A]	7 days	Cool, 4 C
					C	TAL Inorgan.		(1) Liter[P]	28d/6m	HNO_3 to pH <2
					B	α/β Screening		(1) 4 oz.	6 months	HNO_3 to pH <2

Sample ID	Media (Matrix Code)	Location (refer to attached map)	Sample Type	Sampling Procedure*	ASL	Analysis	COC Codes	Wt./Vol.	Hold Time	Preservatives
39A-037 (R034)	Deionized Rinsate Water	Rinsate blank to be taken after decontamination of 39A-034 sampling equipment	Grab	EP-CRU3-014	D	Radiological		(4) Liter	6 months	HNO_3 to pH <2
					C	TCL VOCs		(2) 40 ml	14 days	4 drops HCl, NO HEAD SPACE
					C	TCL SVOCs		(1) Liter[A]	7 days	Cool, 4 C
					C	TAL Inorgan.		(1) Liter[P]	28d/6m	HNO_3 to pH <2
					B	α/ß Screening		(1) 4 oz.	6 months	HNO_3 to pH <2
39A-038 (T001)	Deionized Water	Trip blank for the transport container to be used for samples 39A-027, 39A-031, and 39A-034	Grab	EP-CRU3-014	D	Radiological		(4) Liter[P]	6 months	HNO_3 to pH <2
					C	TCL VOCs		(2) 40 ml	14 days	4 drops HCl, NO HEAD SPACE
					C	TCL SVOCs		(1) Liter[A]	7 days	Cool, 4 C
					C	TAL Inorgan.		(1) Liter[P]	28d/6m	HNO_3 to pH <2
					B	α/ß Screening		(1) 4 oz.	6 months	HNO_3 to pH <2
39A-039	Transite	In the Liquid Waste Incinerator process area	Core	SP-P-41-052	C	TCLP Inorg.		(1) 8 oz.	28d/6m	Cool, 4 C
					C	TCLP VOCs		(1) 4 oz.	14 days	Cool, 4 C
					C	TCLP SVOCs		(1) 8 oz.	7 days	Cool, 4 C
					B	α/ß Screening		(1) 4 oz.	6 months	None required
39A-040 (D039)	Transite	Duplicate sample to be taken at the same location as 39A-039	Core	SP-P-41-052 & EP-CRU3-014	D	TCLP Inorg.		(1) 8 oz.	28d/6m	Cool, 4 C
					D	TCLP VOCs		(1) 4 oz.	14 days	Cool, 4 C
					D	TCLP SVOCs		(1) 8 oz.	7 days	Cool, 4 C
					B	α/ß Screening		(1) 4 oz.	6 months	None required
39A-041 (R039)	Deionized Rinsate Water	Rinsate blank to be taken after decontamination of 39A-039 sampling equipment	Grab	EP-CRU3-014	C	TCLP Inorg.		(1) Liter	28 days	HNO_3 to pH <2
					C	TCLP VOCs		(2) 40 ml	14 days	4 drops HCL, No HEAD SPACE
					C	TCLP SVOCs		(1) Liter[A]	7 days	Cool, 4 C
					B	α/ß Screening		(1) 4 oz.	6 months	HNO_3 to pH <2

* - The analyses requested for the Blanks will be the same analyses requested for the samples collected.
a - Although the reference below is generally to a site procedure, these are also defined/discussed in various Section/Appendices of the SCQ.
b - The need for this sample will depend on the levels of contamination found through screening.

A - Requires an **AMBER** tinted glass container.
P - Requires a **POLYETHYLENE** container.
HR - Suspected **HIGH RADIOLOGICAL** contamination sample.
HO - Suspected **HIGH ORGANIC** contamination sample.

ATTACHMENT 3 – SAMPLE CONTAINERS NEEDED PER MEDIA TYPE

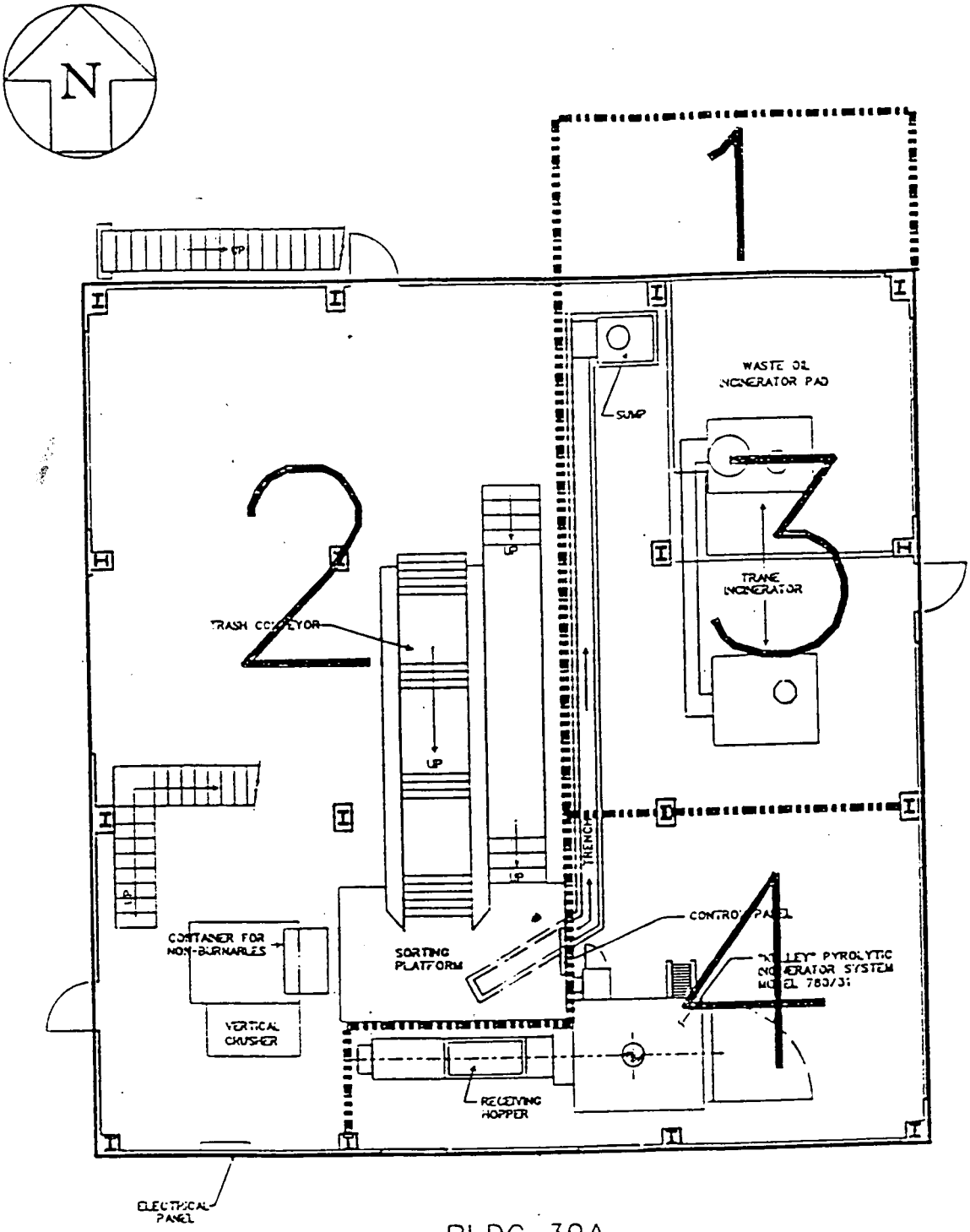
		Containers per Analysis							Quantity of Containers						
ANALYSIS GROUP	Quantity of Analyses	8 oz. Glass	4 oz. Glass	40 ml Glass Vial	1 liter Glass	1 liter Poly–ethylene	1 liter Amber	1/2 gal. Amber Glass	8 oz. Glass	4 oz. Glass	40 ml Glass	1 liter Glass	1 liter Poly–ethylene	1 liter Amber	1/2 gal. Amber Glass
SOLID															
Radiologic	18	1							18	0	0	0	0	0	0
TAL Inorganic	18	1							18	0	0	0	0	0	0
TCL VOC	2		1						0	2	0	0	0	0	0
TCL Semi–VOC	2	1							2	0	0	0	0	0	0
TCLP Inorganics	2	1							2	0	0	0	0	0	0
TCLP VOC	2		1						0	2	0	0	0	0	0
TCLP Semi–VOC	2	1							2	0	0	0	0	0	0
Gross Alpha/Beta	20		1						0	20	0	0	0	0	0
LIQUID															
Radiologic	18					4			0	0	0	0	72	0	0
TAL Inorganic	18					1			0	0	0	0	18	0	0
TCL VOC	10			2					0	0	20	0	0	0	0
TCL Semi–VOC	10						1		0	0	0	0	0	10	0
TCLP Inorganics	1					1			0	0	0	0	1	0	0
TCLP VOC	1			2					0	0	2	0	0	0	0
TCLP Semi–VOC	1						1		0	0	0	0	0	1	0
Gross Alpha/Beta	19		1						0	19	0	0	0	0	0
								TOTAL	42	43	22	0	91	11	0

ATTACHMENT 4

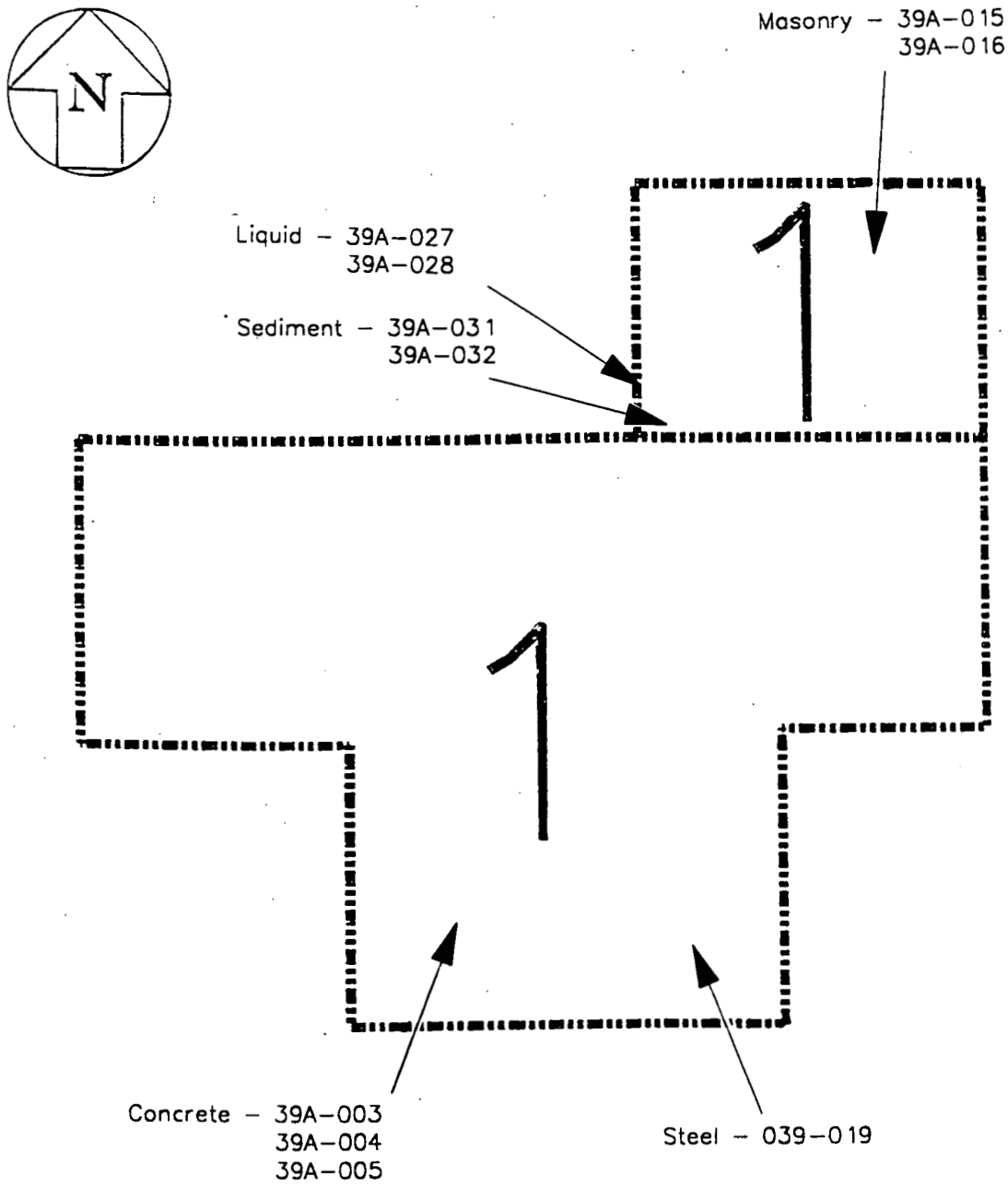
MAPS

BUILDING 39A

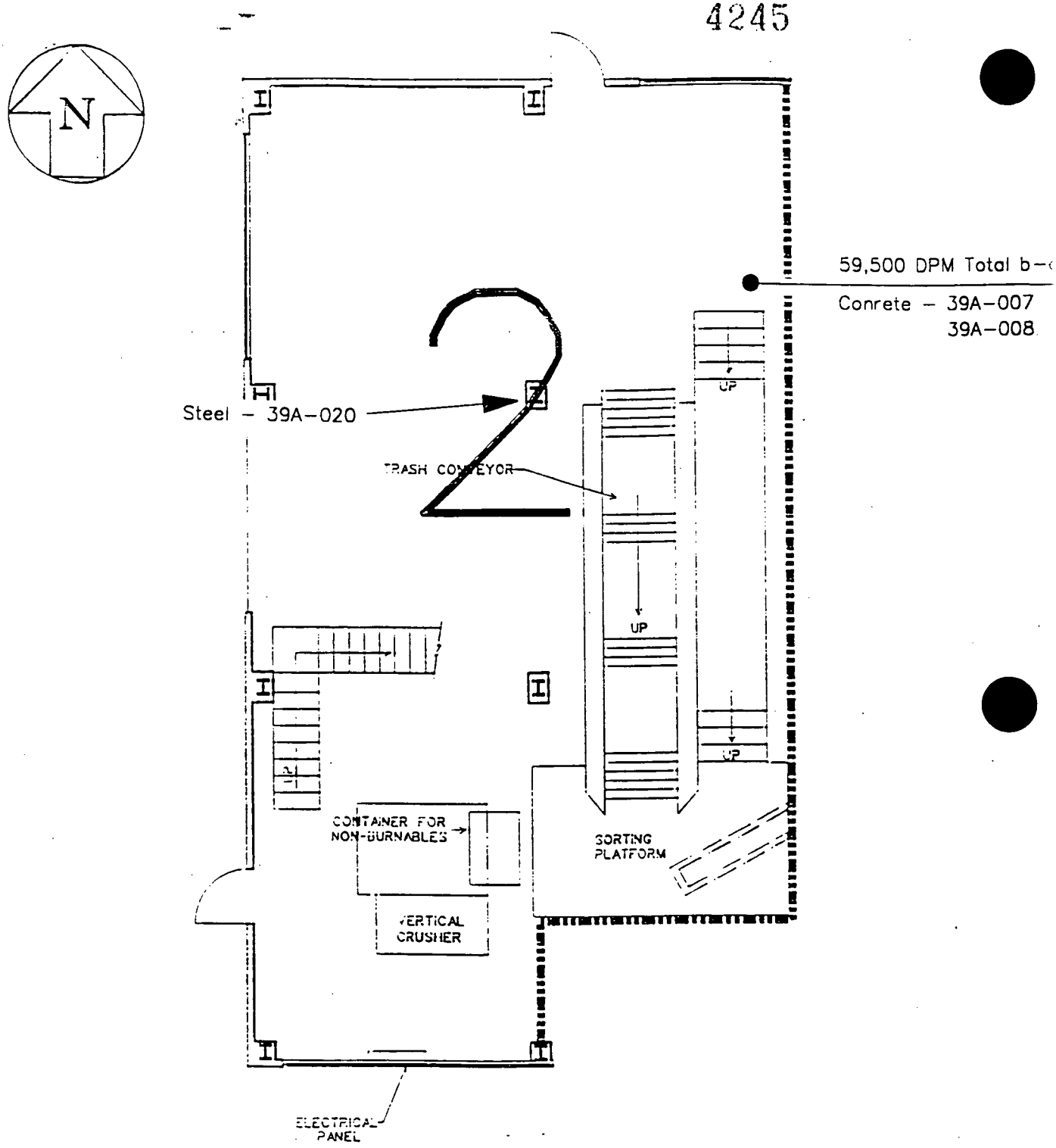
Note: Radiation surveys for Building 39A major media, other than concrete have not been conducted. Therefore, the attached maps reflect proposed sampling locations intended to be utilized to characterize the remaining major media, i.e. steel and masonry. The maps also display existing radiological data from the concrete surveys.



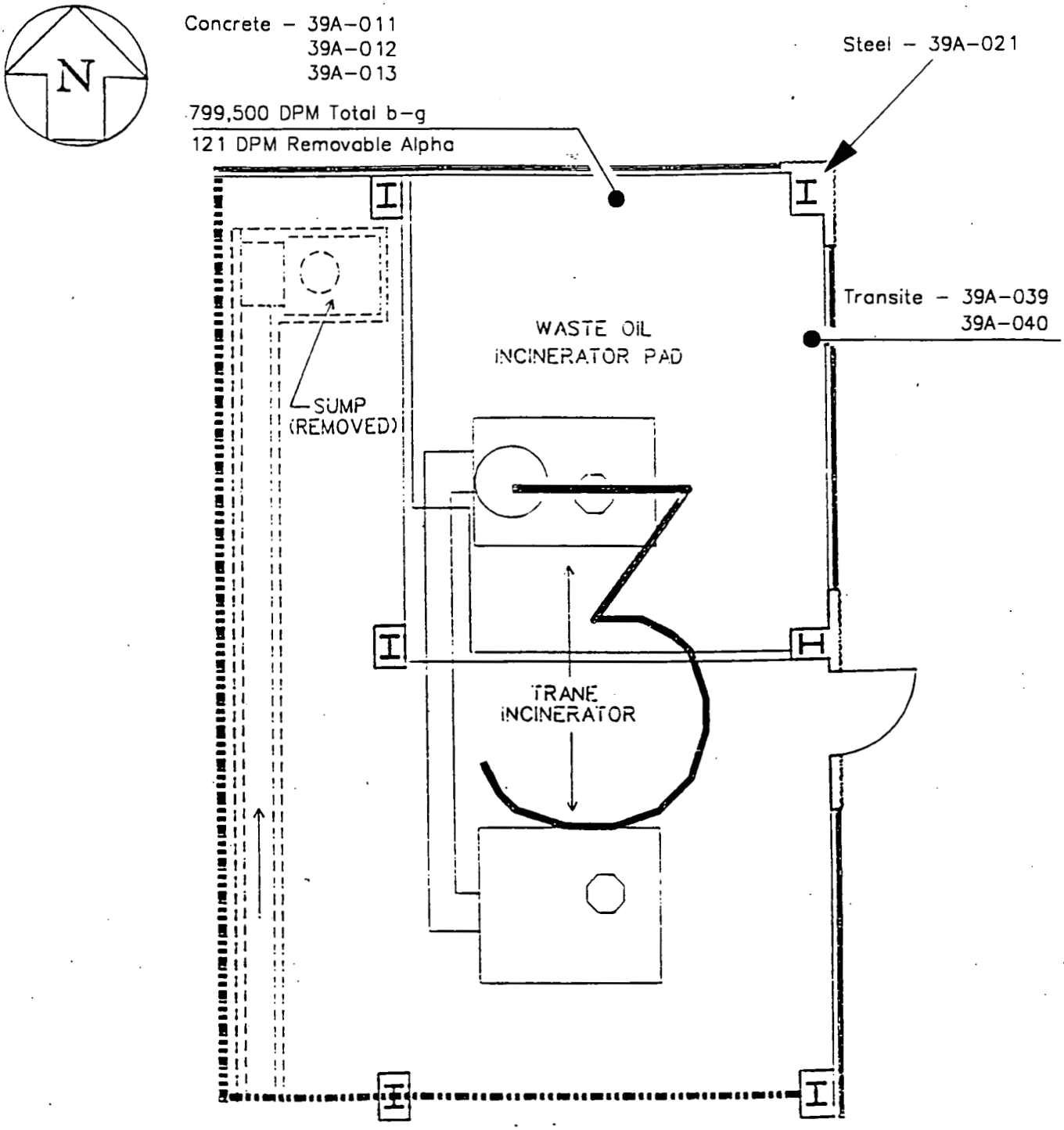
BLDG 39A
FIRST FLOOR
EL. 580'-0"



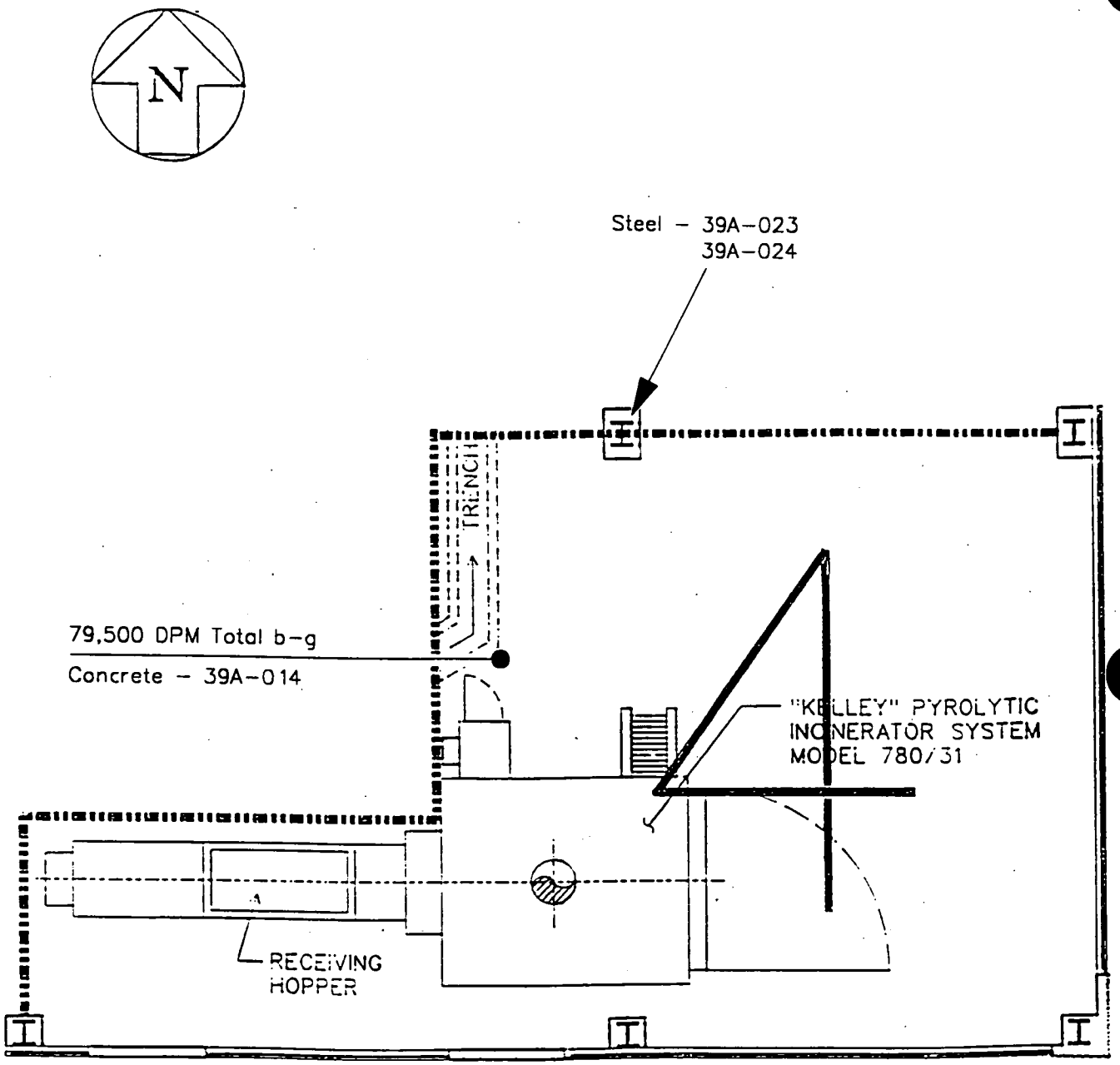
BLDG 39A
PROCESS 1
DRUM DRYER



BLDG 39A
PROCESS 2
TRASH BALER OPERATION



BLDG 39A
PROCESS 3
LIQUID WASTE INCINERATOR



BLDG 39A
PROCESS 4
SOLID WASTE INCINERATOR

ATTACHMENT 5

Protocol 1: Nonintrusive Sampling

PROTOCOL 1: NONINTRUSIVE SAMPLING

Conducting Radiological Surveys

Surface Contamination Surveys

The objective of the survey within a given process area is to identify the locations of highest radiological levels within each of the media types sampled, for the purpose of selecting appropriate intrusive sampling locations. Generally, final sampling locations will be selected on the basis of highest total beta-gamma activity (Protocol 2). Removable alpha, as well as removable beta-gamma measurements, will supplement the total beta-gamma measurements to help select final locations. Measurements of removable contamination are also required to fill specific data needs related to risk assessment and worker protection.

Surveys of the removable fraction of gross alpha and/or beta-gamma radioactivity will be determined through surface swipe sampling. Generally, a surface swipe sample will be collected at locations of elevated activity identified in the measurements of total activity. The sampling goals are to obtain at least one swipe sample per major medium in each process area and to collect multiple swipes in extensively contaminated areas in order to characterize the general levels and composition of removable activity in those areas.

Radiological Surveys of Major Media

Surveys will be conducted of major media (concrete, masonry, and structural steel, etc.) within each process area of a component, as defined in the Field Work Package. Component drawings, outlining the various process areas, are included in Attachment 4 of the FWP, and should be consulted during the survey. The following surveys will be conducted as identified in the FWP:

1. Within a process area, confirm the locations of "hot spots" (local maxima) for removable alpha and total beta-gamma activity as indicated on the FWP maps and Attachment 1 of the FWP, by resurveying the locations. Survey removable alpha and total beta-gamma as necessary to pinpoint previously identified maxima.

2. For each major medium identified in a process area in the FWP, characterize the region around the maximum by systematically surveying at an increasing radius. The distance between measurements and the total number of measurements will be determined in the field based on the size of the area being surveyed and the degree to which readings change with distance. Continue to survey until readings stop decreasing, or begin to increase. Record all readings in the Radiological Survey Logbook.

3. If readings do begin to increase outward from an identified maximum, locate this adjacent maximum and confirm that it does not exceed the original maximum. If it does, designate this as the current maximum, note the change in the Radiological Survey Logbook and inform the FWP Writer.

Surveys of Prospective Supplemental Sampling Locations

Prospective supplemental sampling locations within a component identified in the FWP, or during the present inspection and survey phase, are to be screened for alpha and/or beta-gamma activity to guide intrusive sampling. The survey should be conducted as follows:

1. Locate the prospective areas and media for supplemental sampling for a given component as identified in the FWP.

2. Note any other prospective locations for supplemental sampling identified during major media surveying or further inspections, and annotate in a figure in the Radiological Survey Logbook.

3. Survey surfaces and any identifiable loose media present in the vicinity that are reasonable candidates for intrusive sampling using conventional surveying practices. Locate a maximum at each location. Record all readings in the Radiological Survey Logbook.

4. If an air or liquid handling system within a component, such as HVAC, has been designated for supplemental sampling without predesignation of sampling locations, a survey should be conducted at key points in the system, particularly the filters themselves, loose solids, and locations in ductwork or piping where deposition is likely, such as at elbows or drainage points, as accessible.

5. If the component being surveyed has been designated for characterization of media addressed under supplemental sampling, such as transite, prospective locations for intrusive sampling of the involved media, as identified in the FWP, should be surveyed for total beta-gamma activity.

The location of each identified hot spot with respect to a standard survey point in each component identified by state planar coordinates will be measured with a tape, recorded in the Radiological Survey Logbook (along with a description of the media sampled), and the physical location marked and numbered with a chalk/crayon-like substance.

All swipe samples in the component exceeding one order of magnitude of the limits for release without radiological restrictions as stated in DOE Order 5400.5 will be composited for a single laboratory analysis to identify the radionuclide mix that is present. For each component, if no swipe samples exceed this level, no laboratory analysis of swipe samples will be conducted.

Low-Level Gamma Radiation Measurements

Qualitative low-level gamma ray measurements will be taken during the initial approach to each process area known, or suspected to be, contaminated. In areas where gamma levels are equal to, or greater than, twice background, exposure rate measurements will be taken. Process equipment such as tanks, pumps, traps, and similar features will be surveyed to identify those containing significant quantities of gamma emitters. A reading of greater than

100,000 counts per minute (cpm) is a reasonable guideline for supplemental sampling of unknown material contents.

Beta and Gamma Exposure Rates

Gamma ray exposure rates will be measured at locations known, or suspected to have levels in excess of typical background (approximately 10,000 cpm low-level gamma). The limit for environmental exposure under DOE Order 5400.5 is 20 μR/h above background.

Prospective locations for beta and gamma ray exposure rate measurements within components are locations exhibiting the highest beta-gamma activity as identified in the corresponding subsections of Section D.9, and specified in the component FWP. To meet the needs of risk assessment (Section 3.1 of the WPA), measurements are required at the location of highest exposure for an individual in a given component. Measurements should be taken at several high exposure locations within a component so that risk assessors can choose one corresponding to the most likely exposure scenario. Exposure rate measurements for occupational exposure are handled separately, according to the requirements of the health and safety plans for individual component FWPs.

Conducting Chemical Surveys

Selection of locations for taking field measurements of chemical contaminants will rely heavily on existing plant knowledge, as well as on visual observations, emphasizing natural collection points. In general, field survey instrument measurements will be taken wherever there is evidence or suspicion of contamination of a type to which the various instruments respond. On the other hand, such instrument measurements will not be used for general surveying of large surface areas on the chance of locating isolated contamination.

Surveys for chemical contaminants will be conducted in the following sampling contexts: (1) areas that are collection points for runoff, or that would otherwise integrate contaminants that are diffusely dispersed at low concentrations over large areas, such as sumps or other runoff collection points; (2) areas that are pathways to environmental or human receptors outside the component, such as unlined sumps, drains, ditches, or lagoons; or (3) areas suspected from process knowledge of being contaminated (such as ore storage pads or other materials handling areas) or near electrical transformers (for PCB contamination). Bulk liquids and solids of uncertain identity will also be surveyed.

Organic Vapor Surveys

Hand-held photoionization detectors and/or a portable GC will be used to identify areas contaminated with volatile hydrocarbons, such as fuels and solvents, and will thereby help guide sample collection for VOC analysis.

Features of the component that have been identified as requiring organic vapor surveys are those in which VOCs may have collected, such as sumps and drains. Unknown materials in various containers or process equipment may also be surveyed for the presence of organic vapors. Such materials must be surveyed for radioactivity prior to organic vapor sampling.

To identify areas of elevated vapor concentrations, the general background vapor level within a component must first be determined. Readings should be taken in an open area of

a component, away from suspected sources, to establish background. Sources contaminated with VOCs will generally yield readings that are 2 ppm or more above background in the air immediately above the source.

PCB Surveys

Field surveys for PCBs will be conducted on potentially contaminated surfaces and/or loose media or liquids using field test kits which are ASL B procedures. Survey locations are based on the potential for the media to be contaminated based on its current or former association with electrical transformers or other types of equipment in which PCBs may have been used and spilled. The area of highest contamination and the approximate areal extent of contamination will be determined using these field test kits. Intrusive samples will then be taken at the area of highest contamination for analysis in the laboratory using ASL C/D procedures.

Trace Metals Screening

The following uses of field portable XRF are anticipated:

- Screening of soil, concrete and other structural materials for "hot spots" of barium, lead, mercury, and other RCRA metals.
- Screening for lead paint on structural debris from demolition.

Locations for measurement and/or sampling have been selected judgementally based on process knowledge and visual inspections. Surveys will be conducted to support the objectives of locating areas of maximum contamination in major media to be sampled intrusively for laboratory analysis of the TAL, and also for determining the presence or absence (relative to detection limits) of metals contamination. XRF will also be used to screen prospecitve supplemental samples for metal contamination and for selecting intrusive samples.

Of the metals in the TAL Inorganics List (Table D.4-6), Aluminum, beryllium, calcium, magnesium, potassium, and sodium will not be detected by the use of field portable XRF at this site. Generally, for elements of Atomic Number 24 (chromium) or higher, the field portable XRF unit will be capable of detection limits of 100 to 200 ug/kg. Since these values are considerably higher than the PRGs, it is unlikely that the field portable XRF is capable of determining trace concentrations of metals in soil.

XRF is matrix dependent and is potentially subject to errors caused by variations (chemical and physical) between samples. Methods for minimizing errors due to matrix effects are described in Section D.5.1.1.7 of the SAP.

ATTACHMENT 6

EQUIPMENT REQUIREMENTS

Attachment 6 - Equipment Requirements

Decontamination Equipment

- x Stainless steel buckets
- x Spill containment dikes
- x Non-phosphate detergent
- x Chemical resistant gloves
- x Portable sprayers
- x Deionized water
- x Scrub brushes(dedicated)
- x Plastic sheeting

Personal Protective Equipment

- x Feet protection
  - x Safety shoes
  - x Rubber boots
  - ___ Latex Booties
- x Safety glasses
- ___ Hearing protection
- ___ Safety harness/lanyard
- x Hard hat
- x Coveralls
  - x Cotton
  - ___ Tyvek
  - ___ Saranex
- ___ Face shield
- x Breathing protection
  - ___ Air purifying resp.
  - x Full face w/ cartridges
  - ___ 1/2 face w/ cartridges
  - ___ Supplied air respirator
  - ___ Self-contained breathing apparatus
- x Gloves
  - x Surgical latex
  - x Rubber/nitrile
  - x Cotton and/or leather
- x Barricades /caution ribbon

Sampling Equipment

- x Sample extraction equip
- x Tamper proof tape
- x Field logbook
- x Pens/markers
- x Stainless steel pans/bowls
- x Sample containers
  - x Glass/TLC
  - ___ Other
- x Sample container labels
- x Chain of custody/request for analysis forms

Miscellaneous Equipment

- x Van(s) or truck(s)
- x Plastic bags
- x Weighing scales
- x Location flags
- x Monitoring equipment
  - ___ Organic vapor monitor
  - x Photo ionization detector
  - x Alpha scintillator
  - x Geiger-Mueller detector
- x Distance measuring devices
- x HEPA vacuum
- x Dust contaminant enclosures
- x Generator
- x Extension cords
- x Used decon soltn containers
- x Razor knife
- ___ Portable pH meter w/ extended
- ___ Self excited fluorescent

ATTACHMENT 7

HEALTH AND SAFETY PLAN

BUILDING 39A

HEALTH AND SAFETY PLAN

BUILDING 39A

AUTHOR: _____

AUTHORIZING CONCURRENCES:

_____
(IRS&T)

_____
(INDUSTRIAL HYGIENE)

_____
(SAFETY ENGINEERING/FIRE SERVICES)

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Section 10.0	WASTES
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Section 13.0	APPROVAL AND COMPLIANCE STATEMENT

1.0 PROJECT/TASK TO BE PERFORMED

The work to be performed in support of this project involves sampling of concrete by coring with power equipment, sampling of concrete and masonry by chipping with hammer and chisel, sampling of structural metal by power rasping, sampling of loose media by stainless steel scoop, and sampling of liquids by grab sampling.

2.0 SITE HISTORY

2.1 Historical Overview of Buildings, Equipment, and Site

Building 39A, a two story square structure measuring approximately 53'x 53'x 25', is located within the west-central portion of the Fernald Environmental Management Project (FEMP) production area between Plant 2/3 and Plant 8, and south of 102nd Street. The building consists of a structural steel frame on a reinforced monolithic concrete base and floor, transite interior and exterior siding panels with insulation materials between the two, and transite roof panels.

This building contains or formerly contained a drum dryer, a trash baler, a liquid waste incinerator, and a solid waste incinerator. This building and associated appurtenances were initially devoted to the drum dryer process; however, the drum dryer was subsequently removed and the trash baler and incinerators were installed.

3.0 PROJECT/TASK SPECIFIC HAZARD ASSESSMENT

All work at the FEMP shall be analyzed for safety and health hazards prior to the initiation of the work activity. The requirements and methods of the analysis of safety and health hazards are contained in the FERMCO Site Policies and Procedures (FEMP-2054) and in the FEMP Site Health and Safety Plan.

All newly identified hazards will be discussed to determine the degree of hazard and to determine if any changes to this Safety Plan or the Field Work Package is needed. One or more types of hazard analysis may be required depending on the scope of the work and the potential hazards involved. The Job Analysis, Section 12.0, is to be completed before starting field activities.

OU3 sampling personnel shall review all applicable sections of the known above documents with the understanding that all known or potential health and safety hazards have been identified, documented, and communicated to them before performing any associated work. They shall also review all associated MSDSs.

In addition, Industrial Hygiene and Radiological Safety shall review the work site(s) for safety and health hazards and inform OU3 sampling personnel of their findings before actual work is performed at the work site(s).

The following are types of hazards which may be encountered by OU3 sampling personnel in support of this project. A detailed description is found in the FEMP Site Health and Safety Plan.

Categories of hazards which may be found in Building 39A are addressed in Sections 3.1, 3.2, 3.3, and 3.4.

3.1 Physical Hazards

Energized Equipment: Energy Control procedures (PP-SSOP-0719) must be followed.

Overhead Utilities: N/A

Underground Utilities: N/A

Confined Spaces: N/A

3.2 Radiation Hazards: Low level radiation is present.

3.3 Chemical Hazards: Pre-sampling field screening will be performed.

3.4 Other Hazards: Slip, Trip and Fall Hazards.

4.0 MONITORING

4.1 Goals

It is the policy of the FEMP to maintain radiation exposures, and exposures to toxic substances and combustible gases As Low As Reasonably Achievable (ALARA). As appropriate, work place monitoring shall be performed to ensure that contaminant concentrations in the breathing zone and exposures to external radiation do not exceed established exposure standards.

4.2 Air Monitoring

4.2.1 Air sampling to monitor potential airborne concentrations at the immediate work site(s) associated with any sampling project is required at the discretion of IRS&T representatives (Radiological Safety Technician, and Industrial Hygiene and Safety Technician).

4.2.2 Potential contaminants or hazardous conditions present:

	YES	NO
Airborne Radioactive Materials	X	—
Organic Vapors	X	—
Combustible Gases	—	X
Oxygen Deficient Atmosphere	—	X
Other (specify)	—	X

Monitoring for these potential hazards shall be based on process knowledge and pre-job portable instrument/swipe measurements of the affected sampling area(s). These pre-job radiological surveys shall be performed by Radiological Safety Technicians.

4.3 Action Levels and Requirements

4.3.1 The following Action Levels determine level of respiratory protection required. Refer to Section 5.0 for additional personal protective equipment (which may required), and is specific to sampling/task being performed. "Notes" referred to in all **"Action"** columns follow the **"Industrial Hygiene Action Levels"** segment of this section.

RADIOLOGICAL SAFETY ACTION LEVELS

Portable instrument/swipe measurements:

Measurement:	Level:	Action:
Alpha	50,000 dpm/100 cm^2 (removable)	See Notes 1 & 9
Beta-gamma	100,000 dpm/100 cm^2 (removable)	See Notes 1 & 9
Dose Rate	> 2 mrem/hr	Stay-time Calc.

Airborne radioactivity measurements (See Note 11):

Measurement:	Level:	Action (See Notes 4 & 6):
U-238, Th-230, and Th-232	> 10% DAC	Area posted as "Airborne Radioactivity Area"
	> 25% DAC	Full-face air purifying respirator
	> 1.0 X DAC	Full-face air purifying respirator with anti-C hood
	> 5.0 X DAC	Hooded air-supplied respirator.
	> 10.0 X DAC	Contact Radiological Engineering.
	> 40.0 X DAC	In-vivo and/or In-vitro sampling/analysis required by RS Dosimetry. See Note 10.
Rn-220 daughters	< 0.25 WL	None
	0.25 - 5.0 WL	Full-face air purifying respirator
	> 5.0 WL	Hooded air supplied respirator
Rn-222 daughters	< 0.075 WL	None
	0.075 - 1.65 WL	Full-face air purifying respirator
	1.65 - 33 WL	Hooded air supplied respirator
	> 33WL	SCBA and air supplied bubble suit

RADIO NUCLIDE	[5]1 DAC (uCi/ml)	10% DAC (uCi/ml)	25% DAC (uCi/ml)	[12]WITHDRAW (uCi/ml)
Th-230	3 E-12	3 E-13	7.5 E-13	1.5 E [illegible]
Th-232	5 E-13	5 E-14	1.25 E-13	2.5 E-12
U-238	2 E-11	2 E-12	5.0 E-12	1.0 E-10
Rn-220	8 E-09*	0.1 WL	0.25 WL	5.0 WL
Rn-222	3 E-08*	0.033 WL	0.0825 WL	1.65 WL

* Assumes 100% equilibrium with radon daughter products. If air sampling is performed for radon daughter concentrations (i.e., Working Level measurements), the DACs are:

Rn-220 (thoron) daughter activity: 1.0 WL
Rn-222 (radon) daughter activity: 0.33 WL

INDUSTRIAL HYGIENE ACTION LEVELS

Measurement	Levels	Actions
PID Detector	Detection to 10 ppm	See Note 2 &3
	10 - 25 ppm	Supplied Air Respirator
	>25 ppm	Withdraw
Asbestos	-	See Note 7
CGI	Lower Explosive 2% of the LEL or greater	Withdraw
	<20.5% or >21.5%,	See Note 8
	Sulfide >3 ppm, or	
	Carbon Monoxide >10 ppm	Withdraw
Oxygen Meter	Oxygen <20.1% or >21.9%	Withdraw

Notes on Radiological Safety and Industrial Hygiene Action Levels:

1. Area shall be posted as an **"Airborne Radioactivity Area"** by Radiological Safety. Full - face air purifying (magenta filter cartridge) respirator required until air monitoring data can be collected to verify < 25% DAC or the potential does not exist to exceed 25% DAC.

2. Combination particulate and organic vapor/acid gas filter (yellow and magenta) cartridge required.

3. 1 ppm above background.

4. See Job Analysis for job specifics.

5. Derived Air Concentrations (DAC) for radionuclides of interest.

6. Respiratory requirements based on a protection factor of 50 and airborne concentrations necessary to give 0.1 DAC inside the facepiece. Air sample results which indicate that individuals may have been exposed to 40 DAC-hours or more per week shall trigger internal dosimetry assessment.

7. If asbestos insulation is disturbed, Level C protection is required.

8. >25% LEL, explosion hazard. **NOTE:** Combustible Gas readings not valid in atmospheres with <19.5% oxygen.

9. The actions to be taken, based on removable surface contamination levels present in this table are based on the assumption that uranium is the radionuclide; see below for requirements.

10. Urine sampling and/or whole-body count may be required at levels less than 40 times the DAC, pending further Radiological Safety evaluation of conditions present.

11. Currently, real-time monitoring for long-lived (U-238, Th-230, and Th-232) airborne radioactivity, in the presence of short-lived radon/thoron daughter activity, is not always possible. Refer to "retrospective" seven day count (long-lived) data for the affected area, if this data is available. Otherwise, assigned respiratory protection shall be based on the potential to exceed the Action Levels, or on confirmation of the airborne radioactivity levels present by special counting methods.

12. The "Withdraw" values are based on 5.0 X DAC. A Hooded Air-Supplied Respirator is required at those levels. If airborne radioactivity levels can exceed 10.0 DAC, contact RS Engineering.

4.4 Internal Radiation Hazard

Any circumstances which could have resulted in an intake of radioactive materials by inhalation, ingestion, or absorption shall immediately be reported to a supervisor. The supervisor shall immediately report the circumstance of possible radioactive material intake to IRS&T Radiological Safety Section for evaluation. The involved employees shall report to the Urine Sampling Station at the end of their shift to complete an Incident Investigation Report (IIR) (Form FMPC-ES&H-1458), and submit an incident urine sample. The involved employees shall also report to the Urine Sampling Station at the start of their next shift to submit a follow-up urine sample. Employees are responsible for complying with additional requirements as specified by the Radiological Safety Section.

4.5 External Radiation Hazard

Personnel dosimetry programs shall be adequate to demonstrate compliance with the radiation protection standards and will be performed by the Dosimetry Department personnel. Personnel dosimeters shall be routinely calibrated and maintained.

4.5.1 Dosimeters are to be worn on the outside of clothing on the trunk of the body during sampling in support of this project.

5.0 PERSONAL PROTECTIVE EQUIPMENT

Established levels of protection for Personal Protective Equipment (PPE) are designated as Level A, B, C and D. Level A is the highest level of protection and Level D is the lowest. Media Sampling shall only occur in areas designated as Level B, C, or D. Protective clothing shall be tailored to the specific task being performed in order to provide the maximum protection against the suspected or known hazard. Level requirements are determined by IRS&T and IS&H. Comments and requirements are incorporated into the Radiation Work Permit (RWP).

5.1 PERSONAL PROTECTIVE EQUIPMENT (PPE) CHECKLIST

5.1.1 The attending Radiation Safety Technician shall place a check mark next to the appropriate PPE Level for the sampling/monitoring activity(ies) to be performed.

Level B: _____ **Level C**: _____ **Level D**: _____

5.1.2 All employees in the task exclusion area(s) designated for sampling for this project shall wear the following PPE while performing the required task(s). The attending Radiation Safety Technician or Industrial Hygiene Technician may add to or subtract from this list as appropriate:

Body Protection:	**Check if Required:**
Company-Issued Coveralls	X
Tyvek or Saranex Coveralls	
Chemical Resistant Suit	
Safety Harness	
Hand Protection:	
Latex Gloves	X
Rubber/Nitrile Gloves	
Leather Palm Gloves	

Foot Protection:

Safety Shoes	X
Rubber Boots	
Latex Booties	

Head and Eye Protection:

Hard Hat	
Face Shield	
Safety Glasses	X

Hearing Protection: _____

Respiratory Protection:

SCBA	
Supplied Air	
Full Face Air Purifying	
-w/ combination cartridges	
-Type: HEPA/Acid Gas	

Heat Protection: _____

Other: _____

6.0 SITE ACCESS

6.1 Access

Access to Building 39A is limited by FERMCO Security. All site personnel and visitors must register and be issued a pass to enter the DOE property.

7.0 EXPOSURE SYMPTOMS

7.1 Ionizing Radiation

7.1.1 Low Level Ionizing Radiation

Exposure to low levels of ionizing radiation may be encountered during sampling for this project.
Exposure to low levels of radioactivity does not produce acute exposure symptoms. Such exposures may cause delayed effects such as cancer. Since biological effects from radiation exposures are cumulative, exposures are to be kept As Low As Reasonably Achievable.

7.1.2 High Level Ionizing Radiation

Exposure to high levels of ionizing radiation are not anticipated to be encountered for this sampling activity.

7.2 Chemical Contaminants

OU3 sampling personnel should be aware of the potentials of exposures to chemical contaminants and the associated symptoms which are listed on the Material Safety Data Sheets (MSDS) located throughout the work area(s). MSDSs for the FEMP are attached to the FEMP Site Health and Safety Plan. All MSDSs applicable to sampling for this project are attached at the end of Section 3.0 of this plan. Review of exposure symptoms of known or potential chemical contaminants that are listed below are required.

All known or potential chemical contaminants related to sampling for this project are listed below. If there are none, write "N/A".

N/A _____

_____

_____

7.3 Other Factors Which Could Cause Exposure

Other factors, such as heat, cold, and ultraviolet light, could cause harmful effects to OU3 Sampling Personnel. Pertinent factors which apply to this project, along with their associated exposure symptoms, include the following:

Sunburn: Caused by prolonged exposure to ultraviolet light (sunlight). Symptoms range from first degree to second degree burns.

Prolonged exposure to excessive heat during the time frame projected for the completion of this project can produce the following heat related problems:

Heat Rash: caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Decreases ability to tolerate heat as well as being a nuisance.

Heat Cramps: caused by profuse perspiration with inadequate fluid intake and chemical replacement (especially salts). Signs: muscle spasm and pain in the extremities and abdomen.

Heat Exhaustion: caused by increased stress on various organs to meet increased demands to cool the body. Signs: shallow breathing: pale , cool, moist skin: profuse sweating: dizziness and lassitude.

Heat stroke: the most severe form of heat stress. Can be fatal. Medical help must be obtained immediately. Body must be cooled immediately to prevent severe injury and/or death. Signs: red, hot dry skin: no perspiration; nausea; dizziness and confusion; strong, rapid pulse;coma.

To reduce heat stress problems SMS field personnel are encouraged to increase the intake of fluids, and take breaks as necessary.

Cold Weather Conditions

Persons working outdoors in temperatures at or below freezing may be frostbitten. Extreme cold for a short time may cause severe injury to exposed body surfaces, or result in profound generalized cooling, causing death. Areas of the body which have high surface area-to-volume ration such as fingers, toes, and ears, are the most susceptible. Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be categorized into:

Frost Nip or Incipient Frostbite - characterized by suddenly blanching or whitening of the skin.

Superficial Frostbite - the skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.

Deep Frostbite - tissues are cold, pale, and solid: extremely serious injury.

*The Lead Technician will alternate personnel and limit individual stay times in periods of extreme cold. Longer breaks are to be utilized as well as suitable clothing for protection under these conditions. IRS&T recommendations for work to be performed in extreme cold will be adhered to all times by OU3 Sampling Personnel during the course of this project. Adequate clothing will be addressed in the respective FEMP Safety Work Permit.

8.0 WORK SITE ENTRY PROCEDURES

8.1 Exclusion/Radiological Zones

Exclusion/Radiological zones shall be established where potential hazards are present from physical or chemical dangers. Access to an

Exclusion/Radiological zone is restricted to employees who are required to enter in order to perform their job functions. An Exclusion/Radiological zone will be marked with cones or other easily recognizable devices. Exclusion/Radiological zones may be expanded if airborne hazards are detected. All areas requiring the use of respiratory protection to be posted within these Exclusion/Radiological zones.

All personnel entering the Exclusion/Radiological zone(s) shall be trained and certified to perform their assigned task as defined by 29 CFR 1910.120.

Entrance to an Exclusion/Radiological zone(s) shall be controlled by the supervisor in charge at the work site. This may or may not be an OU3 Lead Technician.

8.1.1 Barricade tape and stanchions, with a control point, will be placed around sample extraction, sample containerization, and equipment decontamination areas. Radiological controls for exiting the area will be required as deemed necessary by Radiological Safety.

8.1.2 Summary of Radiological Posting Requirements:

<u>REGULATED AREAS:</u>
> 1,000 dpm/100 cm^2 (alpha, removable)
> 1,000 dpm/100 cm^2 (beta-gamma, removable)

<u>CONTAMINATION AREAS:</u>
> 10,000 dpm/100 cm^2 (alpha, removable)
> 10,000 dpm/100 cm^2 (beta-gamma, removable)

<u>AIRBORNE RADIOACTIVITY AREAS:</u>
> 10% DAC

<u>RESPIRATOR AREAS:</u>
> 25% DAC

<u>RADIATION AREAS:</u> > 5 mrem/hour effective dose equivalent

The above figures pertain to contamination from uranium only. Areas will be posted based on the levels present, or the potential to exceed these levels. Additional instructions specific to the area or sampling method will be posted as appropriate by Radiological Safety.

8.1.3 The following break area(s) has (have) been established for sampling for this project:
NAR Break Area _____

8.2 Medical Surveillance

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

- A baseline medical examination
- Annual medical examination
- Medical examinations may be required after exposures
- FERMCO respirator fit (clearance) for respirator users

8.3 Training Requirements

All FERMCO and FERMCO subcontractor personnel assigned to sampling for this project shall, as a minimum, meet the training requirements as outlined in the FEMP Site Health and Safety Plan.

8.4 Safety Meetings

Safety meetings are necessary to familiarize the team with specific hazards. A safety meeting shall be conducted prior to the start of individual component sampling; weekly during work periods; and when there is a change in work activities or implementation of safety plan amendments.

8.4.1 Safety Documentation

All safety meetings will be documented on form FMPC-IRS&T-470, "Minutes of Safety Meeting" (see form Attachment B). Meetings will cover the applicable subjects as outlined in the FEMP Site Health and Safety Plan. Completed forms will be retained in the Field Work Package.

8.4.2 Special Considerations and Checks

A pre-job briefing, which shall be documented, shall be conducted prior to the start of each days work. The briefing should cover the following applicable subjects:

task organization	personnel protective equipment
contamination control	monitoring tests/surveys and results

decontamination	Material Safety Data Sheets
physical stress	hazard communications
"buddy system"	emergency procedures
general safety	housekeeping

Radiation and Chemical Hazard work permit requirements

applicable procedures (SOPs etc.)

9.0 DECONTAMINATION

9.1 Decontamination of Personnel and Equipment

When working in exclusion zones, equipment for decontamination of radiological or chemical hazards shall be available in the area surrounding the exclusion zone as determined necessary by IRS&T and/or Radiation Safety.

9.1.1 OU3 sampling personnel are required to contact Radiological Safety Technicians in the event of a personnel contamination incident. Detection of a count rate above background with a field portable GM monitoring instrument ("frisker") should alert personnel of possible contamination. Ambient background count rate is not to exceed 300 counts per minute (CPM) in the location of the personnel monitoring. If background levels exceed 300 CPM, proceed to an area of lower background to perform the personal monitoring of the potentially contaminated individual. Ideal background levels would be less than 100 CPM.

Responding RSTs are to follow the instructions given in IRS&T procedures **OSH-P-35-017, "Procedure for Personnel Decontamination"** and **SP-P-35-031, Event Notification and Reporting of Radiological Safety Occurrences"**. Personnel involved in the incident are to follow the instructions given in Section 4.3 of this Health and Safety Plan for bioassay evaluation of potential internal radiation hazard from possible inhalation, ingestion, or absorption of radioactive materials.

9.1.2 The following procedure(s) are used for decontamination of equipment: **EMON-OU3-004**, "EQUIPMENTDECONTAMINATION"

9.2 Location and Verification of Nearest Water

9.2.1 Location of the nearest water for decontamination and eye washing will be determined by the OU3 Lead Technician prior to any sampling activities. Location is_____

_____

_____

9.2.2 Operability of water source and eye wash station will be verified prior to start of work by the Lead Technician. Operability was verified on _____by_____.

10.0 WASTES

10.1 Derived Wastes

Derived wastes are wastes generated in the performance of OU3 Sampling Program activities. The wastes from sampling for this project will be as follows:

	YES	NO
Disposable PPE (Specify) - Used latex gloves, used respirator cartridges, paper towels, etc.	X	___
Decontamination Solutions/Rinsate	X	___
Excess Materials (Soil, Water, etc) (Specify) -	___	X
Other (Specify) - Used Plastic Sheeting	X	___

10.2 Disposal Collection Location

All potentially contaminated waste materials resulting from site project monitoring activities shall be collected and placed in drums or other containers.

10.2.1 Protective Clothing

Disposable Personal Protective Equipment shall be placed in plastic bags and disposed of as compactible, potentially contaminated waste through Waste Management.

10.2.2 Decontamination Solutions

Decontamination solutions will be contained in properly labeled drums or other suitable containers until they can be characterized in accordance with applicable regulatory and site requirements.

10.2.3 Other

Specify other items that require disposal. If there are none, write "N/A" in the space provided.
N/A _____

10.3 Final Disposal

Following the analysis of samples resulting from OU3 Sampling Program activities, FERMCO will be responsible for proper transport, shipment and/or disposal of these returned aliquots.

11.0 CONTINGENCY PLANS

11.1 Injuries

According to the FEMP Site Health and Safety Plan in the event of injuries, site personnel will try to reduce or eliminate the consequences whenever possible. The process of determining what is appropriate requires that each situation be evaluated on a case-by-case basis.

11.1.1 Reporting Injuries

All injuries shall be reported immediately to FERMCO Medical for treatment/evaluation. The employee's supervisor shall be notified as soon as possible after reporting to FERMCO Medical.

11.1.2 Types of Injuries

The following emergencies and their responses are addressed in Section 18.0 of the Environmental Media Sampling Program Health and Safety Plan.

- Minor Injuries
- Serious Injuries
- Injuries Complicated by Contamination
- Fire, Explosion, or Medical Emergency
- Chemical/Radiological Releases
- Chemical Splashes to the Eyes and Skin

11.2 Additional Information

Additional Information such as Hospitals, Emergency Telephone Numbers, and Routes to the Hospitals are found in the FEMP Site Health and Safety Plan.

11.3 Off-site Contingency Specific Information and Check List

Off-site Contingency specific information and check list are addressed in the FEMP Site Health and Safety Plan.

12.0 APPROVAL AND COMPLIANCE STATEMENT

According to the FEMP Site Health and Safety Plan, an approval and compliance statement is required.

The following page is the Approval and Compliance Statement format which shall be used for the Operable Unit 3 Remedial Investigation/Feasibility Study Field Characterization Program and any Project/Task Specific Health and Safety Plan. For each OU3 RI/FS Program Component, an Approval and Compliance Statement shall be completed and kept with the appropriate Health and Safety Plan.

APPROVAL AND COMPLIANCE STATEMENT

This OU3 RI/FS Program Component/Task Specific Health and Safety Plan was developed for the use of FERMCO employees and subcontractors. Its use is intended for OU3 RI/FS Field Characterization Projects.

Project/Task: Sampling of Media From Building 39A

The undersigned persons have read and understood the OU3 RI/FS Field Characterization Program Health and Safety Plan and agree to follow its provisions (See Note 1):

Name (printed)	Signature	Date

Note 1: Compliance with the provisions of this OU3 Sampling Project/Task Specific Health and Safety Plan may be audited through announced or unannounced site visits. Be sure that you are implementing the provisions of the safety plan and documenting the reasons for field actions/changes when they are necessary. Site visits may be performed:

X By FERMCO

X By DOE

X By OSHA

Section 5 Impacts to the RI/FS WPA Resulting from the Proposed Plan

Since the OU3 RI/FS WPA must represent the plan for the operable unit, it must reflect the current approach under development for the submittal of a Proposed Plan for Interim Action. The Proposed Plan will evaluate decoupling of the Decontamination and Dismantlement (D&D) of OU3 components from the waste treatment and disposition issues, thereby accelerating large-scale field activity. The D&D of the components is recognized as the only really viable option for the vast majority of the operable unit components, most of which have exceeded a reliable engineered design life.

At the current stage of development, the outline for the Proposed Plan has been transmitted to the EPAs for review and comment. Comments were discussed in a February 18th meeting between DOE, USEPA, and OEPA. Based on the utilization of the interim action approach, RI/FS WPA text sections will be affected in the following manner:

- In Section 1 of the Work Plan Addendum (WPA), minor modifications will need to be made to most of the Subsections. Section 1.2 (Justification and Objectives for Remedial Action for OU3) will need to be revised to generally reflect the need/justification for the Interim Action PP/ROD, focusing on this type of activity being consistent with EPA's expectations for taking "early action at sites where appropriate to eliminate, reduce or control the hazards posed by a site or to expedite the completion of total site cleanup." Section 1.3 (Purpose and Organization of the Work Plan) will be revised to highlight any new subsections dealing with the Interim Action PP/ROD, such as in Sections 3 and 5. Finally, Section 1.5 (Summary of Work Plan Approach) should factor the Interim Action PP/ROD into the discussion on assumptions/approach for the OU3 RI/FS.

- Section 2.5.1 (Introduction to Summary of Interim Actions) will require changes to indicate that, with the issuance of the Interim Action PP/ROD for D&D, removal actions will not generally be used for managing structures. The exceptions include the Plant 7 demolition under the EE/CA and the three Phase IV Removal Actions identified.

- Section 2.5.13 (Management of Contaminated Structures at the FEMP) will be revised to clarify that the Interim Action PP/ROD will generally replace the EE/CA in management of structures for decontamination and dismantlement.

- Section 3 (Evaluation of Data Needs) will require substantial additional information. Specifically, a subsection similar to that currently in Section 3 for the preparation of the Feasibility Study (Subsection 3.2) will be developed for the Interim Action Proposed Plan. See attached page for additional specific impacts to Section 3.

- Section 4.1 (Background for Strategy for Data Collection) will need minor modifications to reflect the addition of the Interim Action PP/ROD.

- Section 4.6.1 (Community Relations Plan) will be modified to reflect planning for an additional comment period for the Interim Action PP/ROD.

- Section 5.1 (Project Planning) will be modified to include the Interim Action PP/ROD as an item in the list contained therein.

- A new subsection will be added to Section 5 to discuss the Proposed Plan Report for the Interim Action ROD, possibly including an outline of the report.

- Minor modifications need to be made to Subsections 5.9, 5.10, 5.11, and 5.12 to reflect how the Interim Action PP/ROD will potentially affect the FS process and the documents developed through that process.

- Section 5.13 (Post RI/FS Support) will be modified to include some discussion on the Interim Action ROD.

- Section 6 (Schedule) will be revised to factor the Interim Action PP/ROD into the schedule.

- Section 7 (Project Management) will be modified to include the development of the Interim Action Proposed Plan and ROD in the list of task-specific responsibilities.

In addition to the revisions required to text in the OU3 RI/FS WPA, the approach to the RI/FS program is also affected. The RI/FS WPA will be revised to indicate the proposed replanning of milestone documents, based on the impacts of the Proposed Plan.

The Treatability Study Work Plan (TSWP) must be rescheduled to coincide with the Feasibility Study (FS) research supporting screening and further evaluation of alternatives. The current schedule identifies a Treatability Study Work Plan submittal date prior to completion of significant ISA/FS research and prior to availability of data from the RI/FS Field Program. The proposed date for submittal of the TSWP is January 15, 1994, which allows for incorporation of field program and research results.

For the Initial Screening of Alternatives (ISA) document, the document is proposed to be eliminated as a milestone. Since the Proposed Plan for Interim Record of Decision results in an early decision on the D&D portion of the scope, the original ISA content remaining after the decoupling of the D&D action from the treatment and waste disposition alternatives can more expediently be covered in the FS than in a separate ISA document (with associated review and approval cycles). The development of only five alternatives categories in the FS is likely as a result: No Action, Treatment and On-Site Disposal, Treatment and Off-Site Disposal, No Treatment and On-Site Disposal, and No Treatment and Off-Site Disposal.

The proposed changes to the milestone documents are reflected in the attached revised Section 6 and Figure 6.1 of the OU3 RI/FS WPA. Additional changes are required in Sections 5.7 through 5.15 of the WPA to adjust the document descriptions and outlines to coincide with the current approach.

PROPOSED MODIFICATIONS TO SECTION 3

REVISED APPROACH TO BE USED FOR THE BASELINE RISK ASSESSMENT FOR OU3 AS A RESULT OF THE PROPOSED PLAN FOR INTERIM ACTION

DOE proposes a staged approach to the baseline assessment for OU3. In the first-stage, the baseline risk assessment (BRA) would consider the potential for relatively short-term impacts associated with current conditions; the time period for the assessment would be some tens of years. Because of the proposed plan for interim action, conditions in OU3 will be changing and a long-term assessment would not reflect actual conditions. A second-stage assessment would also be presented in the BRA. This assessment would consider conditions in the near future after the interim action has been completed. This second-stage assessment would address potential impacts associated with no further action beyond the action that would be finalized on the basis of an interim record of decision (IROD) for OU3. The second-stage assessment would include consideration of the potential for impacts for the longer term (i.e., hundreds of years) that is more typical for baseline assessments, along with short-term impacts. The second-stage assessment provides the necessary analysis for the no-action alternative in the FS. Because of the interim action, the current-conditions case evaluated in the first-stage assessment of the BRA will not correspond to the no-action conditions in the FS. The no-action conditions of the FS are represented by post-interim action conditions. Addressing these post-interim action conditions will be necessary even if the BRA is prepared as discussed in the December, 1992 Work Plan Addendum.

DOE therefore proposes that the first-stage assessment of the BRA for OU3 consider only current land use conditions (with and without access controls) and address only two on-site receptors, namely visitors and trespassers. Off-site receptors would also be considered. Exposure scenarios involving residents living and/or working in OU3 components or future land use conditions involving OU3 components in their current state are highly unrealistic given that the design and preparation for, as well as the actual conduct of, component dismantlement and debris storage will be underway prior to completion of the baseline risk assessment. As noted above, a residential scenario and future land use conditions would be considered in the second-stage assessment.

If the general approach outlined here is acceptable, DOE will incorporate details on its implementation into the revised Work Plan Addendum prior to resubmitting the document.

BASELINE RISK ASSESSMENT

PROPOSED MODIFICATIONS TO THE BASELINE RISK ASSESSMENT FOR OU3

The table is provided to identify the proposed revisions to the baseline risk assessment approach provided by the December, 1992 WPA. The revision column identifies the major changes which will be further detailed in the revision to the WPA upon approval of the general approach.

Conditions	Land Use Scenario/Controls	Revision
Current*	Current Land Use	
	-With Access Controls	Unchanged
	-Without Access Controls	Eliminate Resident and Worker Evaluations
Current*	Future Land Use	Replaced by post-IROD Future Land Use Assessment
Post-IROD	Current Land Use	
	-With Access Controls	Added
	-Without Access Controls	Added
Post-IROD	Future Land Use	Added

* The current conditions are those representive of the site at the time of the performance of the baseline risk assessment.

6 SCHEDULE

The milestones for activities associated with the OU3 RI/FS are shown in the following bar chart (Figure 6.1). This schedule is consistent with the Amended Consent Agreement of September 19, 1991, except for modifications to the schedule for treatability studies and the proposal to eliminate the ISA Document.

The start date for ~~that~~ the Treatability Study Work Plan activity ~~has been delayed until~~ will now begin on ~~January 4, 1993,~~ May 3, 1993, with the delivery of the treatability studies work plan to EPA on ~~August 12, 1993~~ January 15, 1994. The program milestones for the treatability studies have been modified because of their ~~delay in approval of the OU3 Work Plan Addendum~~ relationship with the activities in developing FS and the research - required in the treatability studies cannot be well identified without consideration of information gaps in alternatives.

Elimination of the ISA is proposed due to the adoption of the proposed plan approach for accelerated D&D of components. The ISA would become more limited in scope (treatment options and waste disposition option only) and therefore the remaining scope could, very effectively, be combined with the FS document.

The following global assumptions have been incorporated into the schedule:

- Laboratory capacity exists to support OU3 sampling as proposed in this work plan;
- ~~No secondary sampling is envisioned;~~
- Sufficient data resulting from sampling/measurement activities are validated to complete the RI;
- Removal actions after completion of the OU3 sampling program will provide sufficient data to document any changes to component characterization;
- No additional drum sampling will occur.

Section D.8 of the SAP provides additional detailed assumptions used for schedule development.

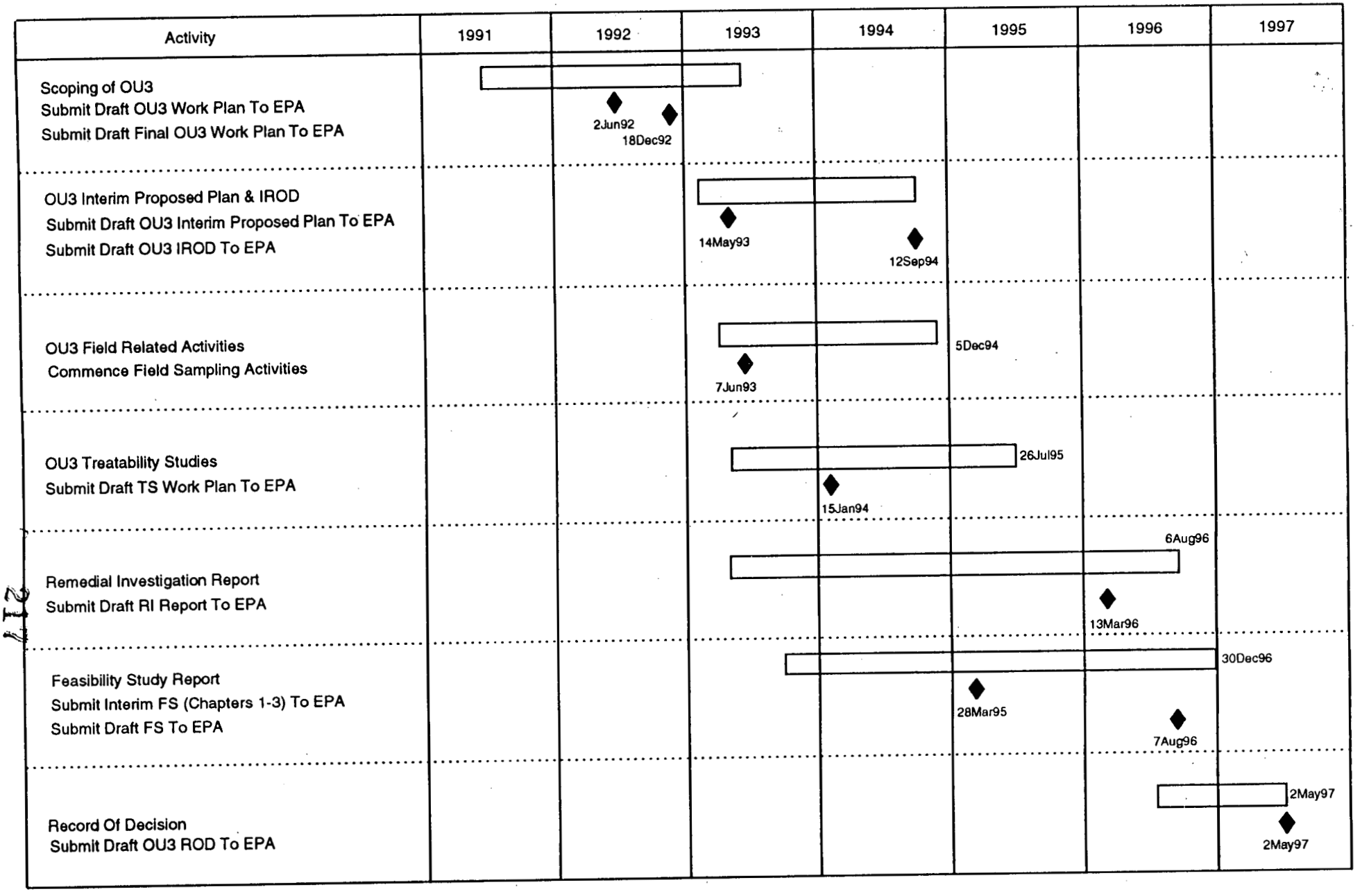

FIGURE [illegible] Milestone Chart For Operable Unit 3 RI/FS Activities

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Section 6 OU3 RI/FS WPA Procedures

In order to support the Operable Unit 3 RI/FS Field Investigation, specific procedures were developed for implementation of the RI/FS WPA protocols in the field. Twenty-six field sampling procedures (see attached list) have been developed to give field technicians the instructions necessary to operate the equipment and perform routine operations in a manner consistent with the requirements of the protocols of the WPA and the data protection requirements of the SCQ. Many of the procedures appear as methods in Appendix K of the current revision of the SCQ, however, additional matrices and/or additional methods were required to support the OU3 Field Investigation. Those procedures not already represented in the current SCQ revision are included in the attachment below in a format consistent with that utilized by the SCQ document.

The attachment below is intended for inclusion in the SCQ, and will be formally submitted with the planned revised draft of the SCQ document. The shaded entries represent revisions of the SCQ to be proposed for the OU3 Field Investigation. The brackets (}) represent paragraphs of the current SCQ text to be maintained as is (a short-hand notation to avoid repetition of unaltered text).

In addition to the field sampling procedures employed in the program, existing radiological survey procedures are employed to support screening for determination of component categorization and to identify specific sample locations. The procedures generally detail the proper operation of the respective field equipment to obtain valid readings, provide direction on documentation and recording of radiological conditions, and determine the frequency and density for performing radiological surveys.

The application of the radiological field survey equipment to the task of identifying levels of contamination and radiation doses, however, is controlled based on the training background of the radiological survey technicians at the site. The radiological survey technicians receive specific training in the correct application and operation of each piece of equipment as part of an overall program designed to provide comprehensive determination of radiological contamination zones and to institute health physics controls. Therefore, technicians are trained to identify locations in the field that will most likely exhibit the greatest levels of contamination based on physical geometry and visual clues.

For this reason, component radiological surveys are generally not conducted on a sampling grid, but rather are performed to identify and define the extent of anomalies exhibiting high activity (hot-spots) that will result in a conservative representation of the health risks to workers. The following criteria are typical drivers for the placement of swipes and surveys:

- Horizontal vs. vertical surfaces
- Stained areas
- Seams, cracks, and corners
- Process equipment areas
- Product/intermediates storage areas

The remaining key procedural area for the OU3 RI/FS Field Program has been the laboratory analytical support area. In order to support the requirements of the RI/FS WPA, a significant

number of matrix preparation and analysis methods were prepared for incorporation into the FEMP SCQ. It was later determined that the procedures would establish an unnecessary inflexibility on the program and directly impact the ability of the site to obtain the level of analytical support required for the FEMP programs. As a result, the proposal to adopt recognized industry standard methods (where available) and to specify performance criteria for the major analytical arena without overall recognized industry standard methods (radiochemistry) was advanced by DOE. Since a detailed proposal on this matter from the FEMP may not have occured until after the transmittal of this summary and since the OU3 program represents a significant volume of laboratory radiological analysis, an early draft of the radiological methods performace criteria has been submitted (see Section 1, General RI Comment 9 and General SAP Comment 1 comment responses, and Section 3 document change pages). Since this is an early draft and the review for technical content will occur with the formal submittal of the information for inclusion in the SCQ revision, the information is supplied to support the effective review of the OU3 RI/FS WPA.

ATTACHMENT

CERCLA/RCRA UNIT 3 FIELD INVESTIGATION PROGRAM

FIELD PROCEDURE LIST

CRU3 Procedure Number	Title	CRU3 Procedure Number	Title
001	Sampling Surface, Shallow, or Standing Liquids	015	PCB Oil Screening
002	Water Quality Testing	016	Sampling Loose Solids
003	Intrusive Sampling Field Logbook	017	Sampling Firm Solids
004	Equipment Decontamination	018	Sampling Surface and Sub-surface Soil
005	Conduct and Coordination of Field Operations	019	Sampling Soft Solids
006	Operation of XRF Analyzer	020	Sampling Hard Solids
007	Control and Transport of Instruments with Radioactive Sealed Sources	021	Sampling Metals
009	Sampling Deep Liquids	022	Sampling Shreddable Solids
010	Sampling Contained Liquids	023	Sampling Solids in Lines
011	Sampling Sub-Liquid Sediments	024	Non-Radiological Field Screening Logbook
012	Portable Flame-Ionization Detector (FID)	025	Radiological Field Screening Logbook
013	PCB Soil Screening	026	Operation of Portable Gas Chromatograph (In Development)
014	Field QA/QC Sampling	027	ASL A and B Sampling

NOTE: Number 008 was cancelled

ATTACHMENT

PROPOSED REVISION OF THE SCQ FOR OU3 FIELD INVESTIGATION

K.2 SCOPE

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- Solid Matrix Environmental Samples (subsection K.5)
  - Surface soil
  - Sediment
  - Subsurface soil
  - Drum sampling
  - Sludge
  - Residue
- Miscellaneous Samples (subsection K.8)
  - Paint chips
  - Wood
  - Concrete
  - Dust
  - Asphalt
  - Masonry
  - Shreddable Material: Fabrics and Plastic
  - Sheet Metal
  - Structural Steel
  - Transite

K.4 AQUEOUS SAMPLE COLLECTION METHOD

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Aqueous samples include natural and waste waters. For the purpose of this document ground water and surface water are referred to as natural waters. Water collected after use or in storm sewers will be treated as waste waters. Relating more specifically to the FEMP, waste water is any water found in the process area that has not previously been classified. Therefore, waste water would include water in pipes, sumps, containers, process equipment, water standing anywhere in buildings, etc. Specific matrices sampled at FEMP are as follows:

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- Other waste water, including water collected in the storm-water retention basins prior to discharge to Manhole 175. Also included in waste water is any water standing (on ground) in the process area.

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K.4.4 Waste-Water Sampling

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K.4.4.1 NPDES Permit Sampling

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K.4.4.2 Liquid Matrix Environmental Samples

Samples for the purpose of characterization are collected, preserved, and analyzed as specified in PSPs. Two different techniques are used for collecting samples: grab sampling and composite sampling.

1. Collect samples in accordance with the stability and volatility of parameters to be tested in the following order (U.S. Environmental Protection Agency, 1989b).

   - Field measurements (temperature, pH, and specific conductance)
   - Volatile organic compounds
   - Total organic halogens
   - Total organic carbon
   - Extractable organic compounds (acid and base neutral extractables, pesticides, PCBs)

- Total metals
- Dissolved metals
- Phenols
- Cyanide
- Sulfate and chloride
- Turbidity
- Nitrate and ammonia
- Radionuclides

2. For grab sampling, proceed as follows.

   a. Use clean sample containers and appropriate preservatives approved for specific parameters as specified in PSPs.

   b. Choose a point of sampling so that a representative sample is obtained. Choose the sampling point with respect for information desired and with local conditions.

   c. Avoid surface debris and artificial turbulence during sample collection.

NOTE

Sampling depth should be approximately 15 centimeters (6 inches) below water surface if possible.

   d. Use unpreserved containers (grab bottle, ladle, teflon bailer) to collect samples directly from a body of water where water depth is sufficient and access conditions permit. If depth is not sufficient, use a teflon or stainless-steel beaker, ladle, scoop, or bailer.

   e. Grasp grab bottle securely at the base with one hand and submerse it with the mouth down into the water, avoiding surface debris. Position bottle opening away from the collector's hand. Tip bottle slightly upwards to allow air to exit and the bottle to fill.

Collect a sufficient amount of sample to perform required analyses.

   f. After removal of grab bottle from water, transfer sample to the container with preservative.

   g. When more than one grab bottle volume of sample is required to fill necessary sample containers, distribute sample portions equally among individual sample containers to provide homogeneity of collected sample.

h. If a sample bottle is used for collection, cap bottle prior to removal from water. The grab bottle and the sample bottle should be of the same materials or approved equivalent.

i. Perform field measurements as specified in PSPs.

j. Preserve samples as specified in PSPs.

k. Complete specified field documentation.

l. Deliver samples to FEMP laboratory.

2. Composite samples may be collected as grab samples and composited. Procedures for collection of composite samples shall be included in PSPs. Samples for unstable parameters, such as volatile organic compound, radon, or TOX shall not be composited.

K.5 SOLID MATRIX ENVIRONMENTAL SAMPLES

Solid media is found in the form of soils, sediment, sludge, and residue. Solid samples are routinely taken at the FEMP for the purpose of characterization. Generally the method for sample collection is grab sampling. Composite samples may be used when specified in PSPs. Composite samples are collected as grab samples and composited.

Collect samples in accordance with the stability and volatility of parameters to be tested in the following order (U.S. Environmental Protection Agency, 1989b).

- Volatile organic compounds
- Total organic halogens
- Total organic carbon
- Extractable organic compounds (acid and base neutral extractables, pesticides, PCBs)
- Total metals
- Dissolved metals
- Phenols
- Cyanide
- Sulfate and chloride
- Nitrate and ammonia
- Radionuclides

K.5.6 Sludge Sampling

Sludge is defined as a muddy or slushy mass, deposit or sediment; precipitated solid matter produced by water and sewage treatment process. Sludge is found in process equipment, sumps, tanks, drums and similar structures. Sludge is being sampled for RI/FS and RCRA.

1. Prior to sampling sludge, decontaminate the sampling equipment as specified in subsection K.11. Equipment used shall be selected based on project objectives and specified in PSPs.

2. Using a trowel, scoop, auger, or shovel, collect the sludge in a stainless steel pan or tray.

3. Transfer samples with a stainless steel scoop from the pan or tray to the sample containers specified in Table 6-1 (Appendix A). Record deviations from these requirements and provide detailed justification.

4. Transfer VOC samples directly to standard 4-ounce wide mouth jars with teflon-lined caps. Fill containers as full as possible to minimize headspace.

5. Seal containers with custody tape, label samples and complete chain-of-custody records, field collection reports, and laboratory requests for analysis.

6. Store samples as specified in Table 6-1 (Appendix A).

7. Deliver completed samples to FEMP laboratory.

K.5.7 Residue Sampling

Residue is defined as material that remains after a part is taken, separated, or designated. Residue is found in process equipment, lines, tanks, drums and similar structures.

1. Prior to sampling residue, decontaminate the sampling equipment as specified in subsection K.11. Equipment used shall be selected based on project objectives and specified in PSPs.

2. Collect samples with a trowel, scoop, or coring device of inert material relative to material to be sampled and to analytes of interest in PSPs.

3. Transfer samples directly from sampling tool to the sample containers specified in Table 6-1 (Appendix A). Record deviations from these requirements and provide detailed justification.

4. Collect samples for VOC analysis from a depth of three inches or more when possible, so there is less chance for constituents of concern to volatilize or photo-degrade, except when sampling the location of a fresh spill.

5. Transfer VOC samples directly to standard 4-ounce wide mouth jars with teflon-lined caps. Fill containers as full as possible to minimize headspace.

6. Label samples and complete chain-of-custody records, field collection reports, and laboratory requests for analysis.

7. Store samples as specified in Table 6-1 (Appendix A).

8. Deliver completed samples to FEMP laboratory.

K.6.4 Monitoring for Organic and Inorganic Contaminants in the Field

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Field monitoring equipment shall be permanently labeled with a unique identification number. Calibration gases and calibration standards shall be in the approximate range of measured contaminants because most monitoring equipment response is not linear throughout the range of operation (Appendix I). Calibrations shall be checked daily or per-use. Instrument response shall be checked at each use and rechargeable batteries recharged after each day of use and checked prior to the start of each work day. The manufacturer, batch number, type, and response range shall be recorded for disposable materials used (e.g., air filters and CITs).

K.6.4.7 X-ray Fluorescence Analyzer (XRF). A portable multi-channel analyzer(MCA) with a Silicon-Lithium (SiLi) detector. The system identifies and quantifies chemical elements by means of energy dispersive x-ray spectroscopy. A basic system consist of the main cabinet which encloses the sample chamber, radioactive source(s), An LN_2 cooled SiLi detector, preamplifier, spectrometer electronics, multichannel analyzer, and power source.

A sample is placed in the sample chamber where it is bombarded with gamma rays from a radioactive source contained within the instrument. The sample can be a solid, liquid, slurry, or powder and normally requires no special preparation. The sample can be as small as a human hair or as large as a golf ball, as long as it can be placed in the sample chamber. The analysis is nondestructive and can be repeated with highly reproducible results.

After the sample has been bombarded with gamma rays and the data collected, the XRF produces a spectral distribution of the characteristic energy lines of all sample elements from sodium through uranium.

K.8 MISCELLANEOUS SAMPLES

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The following methodology shall be used to collect solid debris samples from construction, renovation and demolition (paint chip, wood, concrete, dust, asphalt, masonry, shreddable material, sheet metal, structural steel and transite) for radiological and chemical analyses. Grab sampling is the method used for collection of samples. Composite sample may be collected as defined in PSPs. Composite samples are collected as grab samples then composited.

Collect samples in accordance with the stability and volatility of parameters to be tested in the following order (U.S. Environmental Protection Agency, 1989b).

- Volatile organic compounds
- Total organic halogens
- Total organic carbon
- Extractable organic compounds (acid and base neutral extractables, pesticides, PCBs)
- Total metals
- Dissolved metals
- Phenols
- Cyanide
- Sulfate and chloride
- Nitrate and ammonia
- Radionuclides

K.8.5 Asphalt Samples

1. Place a clean, plastic sheeting on ground, concrete or floor surface within sample area.
2. Use rotary drill and coring bit, or hammer and chisel and collect asphalt cuttings in a stainless steel pan or tray.
3. Using hammer and chisel reduce size of cuttings to 9.5 millimeter (1/3 inch) pieces or less.
4. Transfer cuttings from pan or tray with a stainless steel scoop or spoon to appropriate sample container.
5. Collect samples for VOC analysis first, so there is less chance for constituents of concern to volatilize or photo-degrade. Fill containers as full as possible to minimize headspace.
6. Seal containers with custody tape, label samples and complete chain-of-custody records, field collection reports, and laboratory requests for analysis.
7. Store samples as specified in Table 6-1 (Appendix A).
8. Deliver completed samples to FEMP laboratory.

K.8.6 Masonry Samples

1. Place a clean, plastic sheeting on ground, concrete or floor surface within the sample area.

2. Using a hammer and chisel, or rotary drill and chisel attachment equipped with a dust collector and HEPA vacuum attachment, chisel the masonry and collect the chips in a stainless steel pan or tray.

3. Using hammer and chisel reduce size of chips to 9.5 millimeter (1/3 inch) or less pieces.

4. Transfer chips from pan or tray with a stainless steel scoop or spoon to appropriate sample container.

5. Collect samples for VOC analysis first, so there is less chance for constituents of concern to volatilize or photo-degrade. Fill container as full as possible to minimize headspace.

6. Seal containers with custody tape and label samples and complete chain-of-custody records, field collection reports, and laboratory requests for analysis.

7. Store samples as specified in Table 6-1 (Appendix A).

8. Deliver completed samples to FEMP laboratory.

K.8.7 Shreddable Samples

1. Place a clean, plastic sheeting on ground, concrete or floor surface within the sample area.

2. Use shears to shred the material in question and collect the shreds in a stainless steel pan or tray.

3. Transfer shreds from pan or tray with a stainless steel scoop, grippers or forceps to appropriate sample container.

4. Collect samples for VOC analysis first, so there is less chance for constituents of concern to volatilize or photo-degrade. Fill containers as full as possible to minimize headspace.

5. Seal containers with custody tape, label samples and complete chain-of-custody records, field collection reports, and laboratory requests for analysis.

6. Store samples as specified in Table 6-1 (Appendix A).

7. Deliver completed samples to FEMP laboratory.

K.8.8 Sheet Metal

1. Place a clean, plastic sheeting on ground, concrete or floor surface within the sample area.

2. Using a pair of metal shears or tin snips, cut metal slugs from the sample piece, collecting the slugs in a stainless steel pan or tray.

3. Transfer slugs from pan or tray with stainless steel scoop, grippers or forceps to appropriate sample container.

4. Collect samples for VOC analysis first, so there is less chance for constituents of concern to volatilize or photo-degrade. Fill containers as full as possible to minimize headspace.

5. Seal containers with custody tape, label samples and complete chain-of-custody records, field collection reports, and laboratory requests for analysis.

6. Store samples as specified in Table 6-1 (Appendix A).

7. Deliver completed samples to FEMP laboratory.

K.8.9 Structural Steel

1. Place a clean, plastic sheeting on ground, concrete or floor surface within sample area.

2. Using a hammer and chisel or scraper, remove coatings and oxides from structural steel.

3. Collect scrapings into a stainless steel tray or pan.

4. Repeat steps two (2) and three (3) until appropriate amount of media is collected in pan or tray.

5. Transfer media from pan or tray with stainless steel scoop or spoon to appropriate sample container.

6. Collect samples for VOC analysis first, so there is less chance for constituents of concern to volatilize or photo-degrade. Fill containers as full as possible to minimize headspace.

7. Seal containers with custody tape, label samples and complete chain-of-custody records, field collection reports, and laboratory requests for analysis.

8. Store samples as specified in Table 6-1 (Appendix A).

9. Deliver completed samples to FEMP laboratory.

K.8.10 **Transite**

1. Place a clean, plastic sheeting on ground, concrete or floor surface within sample area.

2. Wet the surface to be sampled.

3. Remove the sample utilizing a coring device or a disposable knife.

4. Immediately place the sample in the sample container.

5. Seal the disturbed area with an encapsulant, plastic tape, or an acceptable alternative.

6. Collect samples for VOC analysis first, so there is less chance for constituents of concern to volatilize or photo-degrade. Fill containers as full as possible to minimize headspace.

7. Seal containers with custody tape, label samples and complete chain-of-custody records, field collection reports, and laboratory requests for analysis.

8. Store samples as specified in Table 6-1 (Appendix A).

9. Deliver completed samples to FEMP laboratory.

Additions to definitions:

Representative Sample. A sample taken as a typical example of a group, class, or quality. For the purpose of characterization, representative samples may be an extreme example.

Composite Sample. A mixture of a number of samples to represent the average properties of the parameters of concern over the extent of the area sampled.

Grab Sample. Discrete samples that are representative of a specific location at a specific point in time.

I.4.12 X-Ray Fluorescence Analyzer (XRF) with SiLi Detector - Spectrace 9000

The unit is preset at the factory to allow adjustment of the unit for the matrices to be surveyed by the user.

I.4.12.1 **Calibration Verification** The following verification shall be performed prior to each days use of the unit to confirm that the unit is functioning within resolution and stability tolerances.

1. Place the pure iron element provided with the instrument over the window and run a 50 second analysis for each source. This operation should be performed with the instrument in the lab stand base only and using the sample safety cover.

2. Review the raw relative intensities for iron, manganese, and cobalt.

3. A relative intensity greater than 0.960 for iron and less than 0.003 for manganese and cobalt indicates that the system is working properly.

4. Maintain each days relative intensity measurements in a logbook to facilitate instrument troubleshooting.

I.4.12.2 **Energy Calibration** The following energy calibration shall be performed every time the unit's battery has been removed and/or when the unit has not been used for several days. Note that the unit performs one form of energy calibration each time an analysis is performed. The second calibration method is user selected to verfify the validity of the first.

1. Place the lead-lined safety cover over the probe unit.

2. Initiate the menu selection of the ENERGY CALIBRATION option. The unit will self-calibrate.

I.4.13 Gas Chromatograph (GC) - Photovac 10Splus

Two calibration methods are provided. Calibration should be performed: prior to each days use, after eight hours operation, and after any maintenance. Calibration should be tailored to target compounds and recalibration should be performed prior to sampling for an alternate set of target coumpounds.

I.4.13.1 **Calibration with Pressurized Calibration Gas** Perform calibration with pressurized calibration gas as follows or use I.4.13.2.

1. Fill an air sampling bag with certified calibration gas of known concentrations and connect it to the SAMPLE IN port.

2. Press RUN AUTO. Select sample to run an analysis and store results in the library.

3. Set the calibration gas delivery pressure to 5 psig maximum. Connect calibration gas to the SAMPLE IN port.

4. Again, run the sample, using the the direct feed from the pressurized cylinder. Obtain a printout of the screen results or hand record the results.

5. Open the Update window in the Library option. In the Cal Column enter the recorded compound concentrations from the Results Screen.

6. Ensure the delivery pressure is set to no more than 5 psig and connect the calibration gas cylinder to the CAL IN port.

7. Press RUN AUTO and select Cal. A calibration will now be performed by the unit. When complete, the Results Screen Alarm column will change to a Cal column. The compounds selected for calibration will be indicated by "-C<-".

I.4.13.2 <u>Calibration with Multi-Component Loop Inject</u> Perform calibration with multi-component loop injection as follows or use I.4.13.1.

1. Open the Method Window and then open the Library Option.

2. Select Update and move the cursor to the Cal Column. For each compound in the calibration gas, enter the calibration concentration. For compounds not contained in the calibration gas, enter zero.

3. Press EXIT to return to the Results Screen.

4. Connect a bag of calibration gas to the CAL IN port.

5. Press RUN AUTO and select Cal to do a calibration.

6. Upon completion, the Library information for each compound will be updated.