

STATEMENT OF WORK (SOW)  
FOR PRP-CONDUCTED  
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY  
AT  
**Lammers Barrel Site**  
Greene County, Ohio

**INTRODUCTION**

The purpose of this remedial investigation/feasibility study (RI/FS) is to investigate the nature and extent of affected media at the Lammers Barrel Site (Site), Greene County, in the vicinity of Beaver Creek, Ohio, as generally described at paragraph 1, Section I of the Administrative Order by Consent (AOC) and develop and evaluate potential remedial alternatives. The RI and FS are interactive and should be conducted concurrently so that the data collected in the RI influences the development of remedial alternatives in the FS.

The Respondents, as defined in the AOC, will conduct this RI/FS and will produce draft and final RI/FS reports that are in accordance with this statement of work as well as any additional requirements in the Order. The Respondents will follow the Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (U.S. EPA, Office of Emergency and Remedial Response, October 1988), and any other published guidance that the United States Environmental Protection Agency (U.S. EPA) uses in conducting a RI/FS (a list of the primary guidances is attached). The RI/FS Guidance describes the report format and the required report content. The Respondents will furnish all necessary personnel, materials, and services needed, or incidental to, performing the RI/FS, except as otherwise specified in the administrative order.

At the completion of the RI/FS, the U.S. EPA in consultation with the Ohio Environmental Protection Agency (Ohio EPA), will be responsible for the selection of a site remedy and will document this selection in a Record of Decision (ROD). The remedial action alternative selected by the U.S. EPA in consultation with Ohio EPA, will meet the cleanup standards specified in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121. That is, the selected remedial action will be protective of human health and the environment, will be in compliance with, or include a waiver of, applicable or relevant and appropriate requirements (ARARs) of other laws, will be cost-effective, will evaluate permanent solutions and alternative treatment technologies or resource recovery technologies, to the maximum extent practicable, and will address the statutory preference for treatment as a principal element. The final RI/FS report, the baseline risk assessment and ecological risk assessment, as adopted by the U.S. EPA in consultation with Ohio EPA, will, with the administrative record, form the basis for the selection of the site's remedy and will provide the information necessary to support the development of the ROD.

As specified in CERCLA Section 104(a)(1), as amended by Superfund Amendments and Reauthorization Act (SARA), the U.S. EPA will provide oversight of the Respondents' activities throughout the RI/FS. The Respondents will support the U.S. EPA's initiation and conduct of activities related to the implementation of oversight activities. Oversight activities will be conducted by U.S. EPA.

All correspondence, communication, documents or deliverables required as part of this SOW, shall be submitted to the U.S. EPA, with a copy to Ohio EPA, for review and approval by the U.S. EPA. All deliverables shall be reviewed and decisions made by the U.S. EPA, in consultation with the Ohio EPA. Addressees are as follows:.

Rosita Clarke-Moreno  
Remedial Project Manager  
United States Environmental Protection Agency  
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With copy to:  
Scott Glum  
Ohio Environmental Protection Agency  
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**RI/FS SCOPE:** The tasks to be completed as part of this RI/FS are:

- Task 1. RI/FS Scoping - Work Plan
- Task 2. Community Relations
- Task 3. Site Characterization - RI/Baseline Risk Assessment
- Task 4. Treatability Studies
- Task 5. Feasibility Studies (RI/FS Report)

#### **TASK 1 - SCOPING**

Scoping is the initial planning process of the RI/FS and is initiated by the U.S. EPA prior to issuing special notice. During this time, the site-specific objectives of the RI/FS, including the preliminary remediation goals (PRGs), are determined by U.S. EPA. Scoping is therefore initiated prior to negotiations between the PRPs and U.S. EPA, and is continued, repeated as necessary, and refined throughout the RI/FS process. In addition to developing the site specific objectives of the RI/FS, U.S. EPA, will determine a general management approach for the site. Consistent with the general management approach, the specific project scope will be planned by the Respondents and U.S. EPA. The Respondents will document the specific project scope in a work plan. Because the work required to perform a RI/FS is not fully known at the onset, and is phased in accordance with a site's complexity and the amount of available information, it may be necessary to modify the work plan during the RI/FS to satisfy the objectives of the study.

The remediation objectives for the Site have been determined preliminarily, based on available information, to be the following:

- ◆ Return usable ground water outside the former operational area to beneficial use wherever practicable, within a time frame that is reasonable given the particular circumstances of the Site;

- ◆ Remediate site affected soils, sediments and surface water from Little Beaver Creek as necessary to protect human health and the environment;
- ◆ Prevent further migration of contaminants at levels which adversely affect human health and the environment from source areas such as site soils, and potentially from sediments and surface water from Little Beaver Creek; and
- ◆ Prevent exposure to site-related contaminants, as necessary to protect human health and the environment, specifically in the drinking water source for residents in the Woodhaven Subdivision.
- ◆ Mitigate exposure to site-related contaminants, as necessary to protect human health and the environment, specifically from the indoor air migration pathway from groundwater in the Woodhaven Subdivision.

The strategy for the RI/FS and general management of the Site will include the following:

- ◆ Conduct a remedial investigation, upon appropriate consideration of existing data, to determine fully the nature and extent of affected media at the Site and the release or threatened release of hazardous substances, pollutants, or contaminants of concern from the Site;
- ◆ Perform a feasibility study to identify and evaluate a streamlined list of alternatives for the appropriate extent of remedial action to prevent or mitigate the migration or the release or threatened release of hazardous substances, pollutants, or contaminants of concern from the site;
- ◆ Conduct appropriate actions to address priority areas pursuant to the AOC as necessary, to eliminate any identified threat to human health by the drinking water pathway if related to the Site; and
- ◆ Gather sufficient data, samples and other information in order to perform human health and ecological risk assessments for the Site.

When scoping the specific aspects of the project, the Respondents will meet with the U.S. EPA, to discuss all project planning decisions and special concerns associated with the site. The following activities shall be performed by the Respondents as a function of the project planning process.

**a. Site Background**

The Respondents will gather and analyze the existing site background information and will conduct a site visit to assist in planning the scope of the RI/FS.

Collect and analyze existing data and document the need for additional data

Before planning RI/FS activities, all existing site data will be thoroughly compiled and reviewed by the Respondents. Specifically, this will include presently available data relating to the varieties and levels of contaminants in soils and groundwater, and past disposal practices. This will also include evaluating and utilizing results from

previous sampling events that have been conducted for U.S. EPA, the U.S. Army Corps of Engineers, and Ohio EPA. The Respondents will refer to Table 2-1 of the RI/FS Guidance for a comprehensive list of data collection information sources. This information will be utilized in determining additional data needed to characterize the site, better define potential ARARs, and develop a range of preliminarily identified remedial alternatives. Data Quality Objectives (DQOs) will be established subject to U.S. EPA approval which specify the usefulness of existing data. Decisions on the necessary data and DQOs will be made collectively by the Respondents and by U.S. EPA.

#### Conduct Site Visit

The Respondents will conduct a site visit during the project scoping phase to assist in developing a conceptual understanding of sources and areas of affected media as well as potential exposure pathways and receptors at the site. During the site visit the Respondents should observe the site's physiography, hydrology, geology, and demographics, as well as ecological features. This information will be utilized to better scope the project and develop an overall understanding of the Site. This information will also be used to determine the extent of additional data necessary to characterize the site, better define potential ARARs, and narrow the range of preliminarily identified remedial alternatives.

### **b. Project Planning**

Once the Respondents have collected and analyzed existing data and conducted a site visit, the specific project scope will be planned. Project planning activities include those tasks described below as well as identifying data needs, developing a work plan, designing a data collection program, and identifying health and safety protocols. The Respondents will meet with U.S. EPA regarding the following activities and before the drafting of the scoping deliverables below. These tasks are described in Section **c (Scoping Deliverables)** of this task, since they result in the development of specific required deliverables.

#### Refine and document preliminary remedial action objectives and alternatives

Once existing site information has been analyzed and an understanding of the potential site risks has been determined by the U.S. EPA, the Respondents will review and, if necessary, refine the remedial action objectives that have been identified by the U.S. EPA, for each actually or potentially affected media. The revised remedial action objectives will be documented in the **Alternatives Screening Process Technical Memorandum** to be prepared as part of the feasibility study and are subject to the U.S. EPA approval. The Respondents will then identify a list of possible remedial alternatives for the site. The range of potential alternatives should encompass where appropriate, alternatives in which treatment significantly reduces the toxicity, mobility, or volume of the waste; alternatives that involve containment with little or no treatment; and a no-action alternative. In the alternative identification, the need for treatability studies should be identified and then followed through as in Task 4.

#### Begin preliminary identification of Potential ARARs

The U.S. EPA will provide the Respondents with a preliminary identification of potential state and federal ARARs (chemical-specific,

location-specific and action-specific) to assist in the refinement of remedial action objectives, and the initial identification of remedial alternatives and ARARs associated with particular actions. ARAR identification will continue as site conditions, contaminants of concern, and remedial action alternatives are better defined.

c. **Scoping Deliverables**

At the conclusion of the project planning phase, the Respondents will submit a RI/FS work plan, a sampling and analysis plan, and a site health and safety plan. The RI/FS work plan and sampling and analysis plan must be reviewed and approved by U.S. EPA, in consultation with Ohio EPA, prior to the initiation of field activities.

RI/FS Work Plan

A work plan documenting the decisions and evaluations completed during the scoping process will be submitted to the U.S. EPA for review and approval. The work plan will be developed in conjunction with the sampling and analysis plan and the site health and safety plan, although each plan may be delivered under separate cover. The work plan will include a comprehensive description of the work to be performed, including the methodologies to be utilized, as well as a corresponding schedule for completion. In addition, the work plan must include the rationale for performing the required activities. Specifically, the work plan will present a statement of the problem(s) and potential problem(s) posed by the site and the objectives of the RI/FS. Furthermore, the plan will include a site background summary setting forth the site description including the geographic location of the site, and to the extent possible, a description of the site's physiography, hydrology, geology, demographics and ecological features; a synopsis of the site history and a description of previous responses that have been conducted at the site by local, state, federal, or private parties; a summary of the existing data in terms of physical and chemical characteristics of the contaminants identified, and their distribution among the environmental media at the site. The plan will recognize Respondents' preparation of the baseline human health and ecological risk assessment. In addition, the plan will include a description of the site management strategy developed by the U.S. EPA during scoping, a preliminary identification of remedial alternatives and data needs for evaluation of remedial alternatives. As per Task 4, the plan will reflect as needed, coordination with treatability study requirements. It will include a process for and manner of identifying Federal and state ARARs (chemical-specific, location-specific and action-specific).

Finally, the major part of the work plan is a detailed description of the tasks to be performed, information needed for each task and for the baseline human health and ecological risk assessment; information to be produced during and at the conclusion of each task, and a description of the work products that will be submitted to the U.S. EPA with copy to Ohio EPA. This includes the deliverables set forth in the remainder of this statement of work; a schedule for each of the required activities which is consistent with the RI/FS guidance; and a project management plan, including a data management plan (e.g., requirements for project management systems and software, minimum data requirements, data format and backup data management); monthly reports to U.S. EPA; and meetings and presentations to the U.S. EPA at the conclusion of each major phase

of the RI/FS. The Respondents will refer to Appendix B of the RI/FS Guidance for a comprehensive description of the contents of the required work plan. Because of the incomplete knowledge of the nature of the site and iterative nature of the RI/FS, additional data requirements and analyses may be identified throughout the process. The Respondents will submit a technical memorandum documenting the need for additional data, and identifying the DQOs. In any event, the Respondents are responsible for fulfilling additional data and analysis needs identified by the U.S. EPA in consultation with Ohio EPA consistent with the general scope and objectives of this RI/FS.

#### Sampling and Analysis Plan

The Respondents will prepare a sampling and analysis plan (SAP) to ensure that sample collection and analytical activities are conducted in accordance with technically acceptable protocols and that the data meet DQOs. The SAP provides a mechanism for planning field activities and consists of a field sampling plan (FSP) and a quality assurance project plan (QAPP).

The FSP will define in detail the sampling and data gathering methods that will be used on the project. It will include sampling objectives, sample location and frequency, sampling equipment and procedures, and sample handling and analysis. The QAPP will describe the project objectives and organization, functional activities, and quality assurance and quality control (QA/QC) protocols that will be used to achieve the desired DQOs. The DQOs will at a minimum reflect use of analytic methods to identify affected media and remediate affected media consistent with the levels for remedial action objectives identified for this site and consistent with the National Contingency Plan (NCP). In addition, the QAPP will address sampling procedures, sample custody, analytical procedures, and data reduction, validation, reporting and personnel qualifications. The Respondents will demonstrate, in advance to the U.S. EPA's satisfaction, that each laboratory it will use is qualified to conduct the proposed work. This includes use of methods and analytical protocols for the chemicals of concern in the media of interest within detection and quantification limits consistent with both QA/QC procedures and DQOs approved in the QAPP for the site by the U.S. EPA. The laboratory must have and follow an approved QA program. If a laboratory not in the Contract Laboratory Program (CLP) is selected, methods consistent with CLP methods that would be used at this site for the purposes proposed and QA/QC procedures approved by U.S. EPA will be used. If the laboratory is not in the CLP program, a laboratory QA program must be submitted for U.S. EPA review and approval. Non-CLP protocol may be required to obtain detection limits suitable for risk assessment purposes. The U.S. EPA may require that the Respondents submit detailed information to demonstrate that the laboratory is qualified to conduct the work, including information on personnel qualifications, equipment and material specifications. The Respondents will provide assurances that the U.S. EPA has access to laboratory personnel, equipment and records for sample collection, transportation and analysis.

#### Site Health and Safety Plan

A health and safety plan (HASP) will be prepared in conformance with the Respondents' health and safety program, and in compliance with OSHA regulations and protocols. The health and safety plan will include the 11 elements described in the RI/FS Guidance, such as a health and safety

risk analysis, a description of monitoring and personal protective equipment, medical monitoring, and site control. It should be noted that the U.S. EPA does not "approve" the Respondents' health and safety plan, but reviews it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and the environment.

## **TASK 2 - COMMUNITY RELATIONS**

The development and implementation of community relations activities in accordance with EPA guidance and the NCP are the responsibility of the U.S. EPA. The critical community relations planning steps performed by the U.S. EPA include conducting community interviews and developing a community relations plan. Although implementation of the community relations plan is the responsibility of the U.S. EPA, the Respondents may assist by providing information regarding the site's history, participating in public meetings, assisting in the preparation of fact sheets for distribution to the general public, or conducting other activities approved by the U.S. EPA. The Respondents' responsibilities in U.S. EPA's community relations activities, if any, shall be specified in the community relations plan. All community relation activities initiated by Respondents will be subject to oversight by the U.S. EPA, in coordination with Ohio EPA.

## **TASK 3 - SITE CHARACTERIZATION**

As part of the RI, the Respondents will perform the activities described in this task, including the preparation of an RI report. The RI conducted by Respondents will include an evaluation and analysis of existing data available for the site and determine areas requiring additional investigation. Data gap collection shall focus on the extent of affected media (e.g., site soils, groundwater, and sediments and surface water in Little Beaver Creek) as a result of the Site related activities. Site affected residential wells shall also be defined and evaluated. The need to mitigate any threat to human health from exposure and ingestion of affected groundwater or from the indoor air migration pathway shall also be evaluated. The overall objective of site characterization is to describe areas of a site that may pose a threat to human health or the environment. This is accomplished by first determining a site's physiography, geology, and hydrology. Surface and subsurface pathways of migration will be defined. The Respondents will identify the sources of these contaminants and define the nature, extent, and volume of the affected media, including their physical and chemical constituents as well as their concentrations relative to background in the affected media. The Respondents will also investigate the extent of migration of these contaminants as well as their volume and any changes in their physical or chemical characteristics, to provide for a comprehensive understanding of the nature and extent of affected media at the site. Using this information, fate and transport of contaminants will then be determined and projected.

During this phase of the RI/FS, the work plan, SAP, and HASP are implemented. Field data are collected and analyzed to provide the information required to accomplish the objectives of the study. The Respondents will notify U.S. EPA at least two weeks in advance of the field work regarding the planned dates for any field activities including, but not limited to, ecological field surveys, field lay out of the sampling locations, excavation, installation of wells, initiating sampling, installation and calibration of equipment, pump tests, and initiation of analysis and other field investigation activities. The Respondents will demonstrate that the laboratory and type of laboratory analyses that will be utilized during site characterization meets the specific QA/QC requirements and the DQOs of the site investigation as specified in the SAP. In view of the incomplete knowledge regarding site conditions, activities are often iterative, and to satisfy the objectives of the RI/FS it may be necessary for the Respondents to supplement the work specified in the initial work plan. In addition to the deliverables below, the Respondents will provide a monthly progress report and participate in meetings at major points in the RI/FS.

**a. Field Investigation**

The field investigation includes the gathering of data to define site physical and ecological characteristics, sources of contaminants, and the nature and extent of affected media at the site. These activities will be performed by the Respondents in accordance with the approved work plan and SAP. At a minimum, this shall address the following:

Implement and document field support activities

The Respondents will initiate field support activities following approval of the work plan and SAP. Field support activities may include obtaining access to the site, scheduling, and procuring equipment, office space, laboratory services, and/or contractors. The Respondents will notify the U.S. EPA at least two weeks prior to initiating field support activities so that the U.S. EPA may adequately schedule oversight tasks. The Respondents will also notify U.S. EPA in writing upon completion of field support activities.

Investigate and define site physical and ecological characteristics

The Respondents will collect data on the characteristics of the site and its surrounding areas including the physiography, geology, and hydrology, and specific physical characteristics identified in the work plan. This information will be ascertained through a combination of physical measurements, observations, and sampling efforts and will be utilized to define potential transport pathways and human and ecological receptor populations. In defining the site's physical characteristics the Respondents will also obtain sufficient engineering data including, but not limited to pumping characteristics for the projection of fate and transport of contaminants of concern, and development and screening of remedial action alternatives, including information to assess treatment technologies.

Define sources of contaminants

The Respondents will locate each potential source of contaminants of concern. For each location, the areal extent and depth of affected media will be determined by sampling at incremental depths, as required by the U.S. EPA. The physical and chemical characteristics of contaminants and their concentrations will be determined for all known and discovered sources of contaminants of concern. The Respondents shall conduct sufficient sampling to define the boundaries of the contaminant sources to the level established in the QA/QC plan and DQOs.

Defining the source of these contaminants will include analyzing the potential for contaminant release (e.g., long term leaching from soil), contaminant mobility and persistence, and other characteristics important for evaluating remedial actions, including information to assess treatment technologies.

Describe the nature and extent of affected media

The Respondents will gather information to describe the nature and extent of affected media as a final step during the field investigation. To describe the nature and extent of affected media, the Respondents will utilize the information on site physical and ecological characteristics and sources of contaminants to give a preliminary

estimate of the contaminants that may have migrated. The Respondents will then implement an iterative monitoring program and any study program identified in the work plan or SAP such that by using analytical techniques sufficient to detect and quantify the concentration of contaminants, the migration of contaminants through the various media at the site can be determined. In addition, the Respondents will gather data for calculations of contaminant fate and transport. This process is continued until the area and depth of affected media are known to the level established in the QA/QC plan and DQOs. Respondents, and the U.S. EPA in consultation with Ohio EPA, will use the information on the nature and extent of affected media to determine the level of risk presented by the site. Respondents will use this information to help to determine aspects of the appropriate remedial action alternatives to be evaluated.

**b. Data Analyses**

Evaluate site characteristics

The Respondents will analyze and evaluate the data to describe: (1) site physical and ecological characteristics, (2) constituent source characteristics, (3) nature and extent of affected media and (4) fate and transport of contaminants of concern. Results of the site physical characteristics, source characteristics, and extent of affected media are utilized in the analysis of contaminant fate and transport of contaminants of concern. The evaluation will include the actual and potential magnitude of releases from the sources, and horizontal and vertical spread of contaminants of concern as well as mobility and persistence of contaminants of concern. Where modeling is appropriate, such models shall be identified to the U.S. EPA in a Technical Memorandum on Modeling of Site Characteristics prior to their use. All data and programming, including any proprietary programs, shall be made available to the U.S. EPA together with a sensitivity analysis. The RI data shall be presented in a format (i.e., computer disc or equivalent) to facilitate the U.S. EPA's evaluation of the baseline human health and ecological risk assessment. The Respondents shall discuss and then collect any data to fill data gaps identified by the U.S. EPA, in consultation with Ohio EPA, that are needed to complete the baseline human health and ecological risk assessment. (See "Guidance for Data Useability in Risk Assessment - OSWER Directive # 9285.7-05 - October 1990.) Also, this evaluation shall provide information relevant to site characteristics necessary for evaluation of the need for remedial action in the baseline human health and ecological risk assessment and for the development and evaluation of remedial alternatives. Analyses of data collected for site characterization will meet the DQOs developed in the QA/QC plan stated in the SAP (or revised during the RI).

**c. Data Management Procedures**

The Respondents will consistently document the quality and validity of field and laboratory data compiled during the RI.

Document field activities

Information gathered during site characterization will be consistently documented and adequately recorded by the Respondents in well maintained field logs and laboratory reports. The method(s) of documentation must be specified in the work plan and/or the SAP. Field logs must be utilized to document observations, measurements, and significant events

that have occurred during field activities. Laboratory reports must document sample custody, analytical responsibility, analytical results, adherence to prescribed protocols, nonconformity events, corrective measures, and/or data deficiencies.

Maintain sample management and tracking

The Respondents will maintain field reports, sample shipment records, analytical results, and QA/QC reports to ensure that only validated analytical data are reported and utilized in the development and evaluation of remedial alternatives. As appropriate, data collected in past investigation activities shall be used by Respondents to help steer the data gap collection events and develop site conceptual model in conjunction with new data. Analytical results developed under the work plan will not be included in any site characterization reports unless accompanied by or cross-referenced to a corresponding QA/QC report. In addition, the Respondents will establish a data security system to safeguard chain-of custody forms and other project records to prevent loss, damage, or alteration of project documentation.

**d. Baseline Risk Assessment**

The Respondents shall prepare a baseline risk assessment according to requirements of Section IX of the Administrative Order on Consent. The baseline risk assessment shall be included as part of the draft RI report.

**e. Remedial Investigation Report**

The Respondents will prepare and submit the draft RI report for review and approval by the U.S. EPA.

This RI Report will document and describe the investigative activities that have taken place, and describe and display site data documenting the location and characteristics of surface and subsurface features and contaminants of concern at the site including the affected medium, location, types, physical state, concentration of contaminants and quantity. In addition, the location, dimensions, physical condition and varying concentrations of each contaminant of concern throughout each source and the extent of contaminant migration through each of the affected media will be documented. Any modeling performed by the Respondents will also be presented in the RI Report. The report shall also include the baseline risk assessment. The RI Report shall provide the basis for evaluating the development and screening of remedial alternatives and the refinement and identification of ARARs.

**TASK 4 - TREATABILITY STUDIES**

If determined to be necessary by the U.S. EPA, in consultation with Ohio EPA, or the Respondents with U.S. EPA approval, treatability studies will be performed by the Respondents to assist in the analysis of alternatives. In addition, if applicable, testing results and operating conditions will be used in the detailed design of the selected remedial technology. The following activities will be performed by the Respondents, as appropriate.

**a. Determination of Candidate Technologies and of the Need for Testing**

The Respondents will conduct a literature survey to gather information on performance, relative costs, applicability, removal efficiencies, operation and maintenance (O&M) requirements, and implementability of candidate technologies. If practical candidate technologies have not been sufficiently demonstrated, or cannot be adequately evaluated for this site on the basis of available information, a treatability study work plan will be prepared.

The Respondents will identify in the Identification of Candidate Technologies Memorandum, subject to the U.S. EPA review and approval, potentially applicable technologies that would require a treatability study program as early as possible. The specific data requirements for the testing program will be determined and refined during the development of the FS. The draft Identification of Candidate Technologies Memorandum shall be submitted for U.S. EPA review and approval within 60 days of the submittal of the draft RI Report. This memorandum shall include specific deliverables and schedules for completing such treatability studies.

**b. Treatability Study and Deliverables**

If treatability studies are determined by U.S. EPA or by the Respondents with U.S. EPA approval to be necessary, the deliverables that are required include a work plan, a SAP, and a final treatability evaluation report in addition to the Identification of Candidate Technologies Memorandum. The U.S. EPA may also require a treatability study HASP, where appropriate.

Treatability study work plan

The Respondents will prepare a treatability study work plan or amendment to the original site work plan for the U.S. EPA review and approval describing the site background, remedial technology(ies) to be tested, test objectives, experimental procedures, treatability conditions to be tested, measurements of performance, analytical methods, data management and analysis, health and safety, and residual waste management. The DQOs for treatability testing should be documented as well. If pilot scale treatability testing is to be performed, the pilot-scale work plan will describe pilot plant installation and start-up, pilot plant operation and maintenance procedures, operating conditions to be tested, a sampling plan to determine pilot plant performance, and a detailed health and safety plan. If testing is to be performed off-site, permitting requirements will be addressed.

Treatability study SAP

If the original QAPP or FSP is not adequate for defining the activities to be performed during the treatability tests, a separate treatability study SAP or amendment to the original site SAP will be prepared by the Respondents for review and approval by the U.S. EPA. Task 1, Item c. of this statement of work provides additional information on the requirements of the SAP.

Treatability study health and safety plan

If the original HASP is not adequate for defining the activities to be performed during the treatment tests, a separate or amended health and safety plan will be developed by the Respondents. Task 1, Item c. of this statement of work provides additional information on the requirements of the health and safety plan. The U.S. EPA does not

"approve" the HASP, but reviews it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and the environment.

#### Treatability study evaluation report

Following completion of treatability testing, the Respondents will analyze and interpret the testing results in a technical report to the U.S. EPA. Depending on the sequence of activities, this report may be a part of the FS report or a separate deliverable. The report will evaluate each technology's effectiveness, implementability, cost and actual results as compared with predicted results. The report will also evaluate full scale application of the technology, including a sensitivity analysis identifying the key parameters affecting full-scale operation.

### **TASK 5 - Feasibility Study**

The Respondents shall prepare and submit for U.S. EPA review and approval an Alternatives Screening Process Technical Memorandum and an FS report. The FS report will incorporate the findings of the U.S. EPA approved RI and Baseline Risk Assessment Report. The FS shall consist of development and screening of remedial alternatives and a detailed analysis of remedial alternatives. Within 2 weeks of Alternatives Screening Process Technical Memorandum submittal, Respondents shall make a presentation to U.S. EPA during which Respondents shall summarize the findings of the remedial investigation and remedial action objectives, and present the results of the nine criteria evaluation and comparative analysis, as described below.

The development and screening of remedial alternatives is performed to develop an appropriate range of waste management options that will be evaluated. This range of alternatives should include as appropriate, options in which treatment is used to reduce the toxicity, mobility, or volume of wastes, but varying in the types of treatment, the amount treated, and the manner in which long-term residuals or untreated wastes are managed; options involving containment with little or no treatment; options involving both treatment and containment; and a no-action alternative. The following activities will be performed by the Respondents as a function of the development and screening of remedial alternatives.

#### **a. Development and Screening of Remedial Alternatives**

The Respondents will begin to develop and evaluate a list of waste management options that at a minimum ensure protection of human health and the environment, concurrent with the RI site characterization task.

#### Refine and document remedial action objectives

Based on the baseline human health and ecological risk assessment, the Respondents will review and if necessary modify the site-specific remedial action objectives, specifically the Preliminary Remediation Goals (PRGs), that were established by the U.S. EPA, in consultation with Ohio EPA, prior to or during negotiations between the U.S. EPA and the Respondents. The revised PRGs will be documented in the Alternatives Screening Process Technical Memorandum that will be reviewed and approved by the U.S. EPA. These modified PRGs will specify the contaminants of concern and media of interest, exposure pathways and receptors, and an acceptable contaminant level or range of levels (at particular locations for each exposure route).

#### Develop general response actions

The Respondents will develop a list of alternatives to satisfy the remedial action objectives. This will be documented in the Alternatives Screening Process Technical Memorandum.

#### Identify areas or volumes of media

The Respondents will identify areas or volumes of media to which general response actions may apply, taking into account requirements for protectiveness as identified in the remedial action objectives. The chemical and physical characterization of the site will also be taken into account, and documented in the Alternatives Screening Process Technical Memorandum.

#### Identify, screen, and document remedial technologies

The Respondents will identify and evaluate technologies applicable to each general response action to eliminate those that cannot be implemented at the site. General response actions will be refined to specify remedial technology types. Technology process options for each of the technology types will be identified either concurrent with the identification of technology types, or following the screening of the considered technology types. Process options will be evaluated on the basis of effectiveness, implementability, and cost factors to select and retain one or, if necessary, more representative processes for each technology type. The technology types and process options will be summarized for inclusion in the Alternatives Screening Process Technical Memorandum. The reasons for eliminating alternatives must be specified.

#### Assemble and document alternatives

The Respondents will assemble selected representative technologies into a list of alternatives for each affected medium or operable unit. Together, all of the alternatives will represent a range of treatment and containment combinations that will address either the site or the operable unit as a whole. A summary of the assembled alternatives and their related action-specific ARARs will be prepared by the Respondents for inclusion in the Alternatives Screening Process Technical Memorandum. The reasons for eliminating alternatives during the preliminary screening process must be specified.

#### Refine alternatives

Sufficient information will be collected for an adequate comparison of alternatives. PRGs for each chemical in each medium will also be modified as necessary to incorporate any new human health and ecological risk assessment information presented in Respondent's baseline human health and ecological risk assessment report. Additionally, action-specific ARARs will be updated as the remedial alternatives are refined. This will be documented in the Alternatives Screening Process Technical Memorandum.

#### Conduct and document screening evaluation of each alternative

The Respondents may perform a final screening process based on short and long term aspects of effectiveness, implementability, and relative cost. Generally, this screening process is only necessary when there are many feasible alternatives available for detailed analysis. If necessary,

the screening of alternatives will be conducted to assure that only the alternatives with the most favorable composite evaluation of all factors are retained for further analysis. As appropriate, the screening will preserve the range of treatment and containment alternatives that was initially developed. The range of remaining alternatives will include options that use treatment technologies and permanent solutions to the maximum extent practicable. The Alternatives Screening Process Technical Memorandum will summarize the results and reasoning employed in screening, arraying alternatives that remain after screening, and identifying the action-specific ARARs for the alternatives that remain after screening.

**b. Alternatives Development and Screening Deliverables**

The Respondents will prepare an Alternatives Screening Process Technical Memorandum summarizing the work performed in and the results of each task above, including an alternatives array summary. These will be modified by the Respondents if required by the U.S. EPA's comments to assure identification of a complete and appropriate list of viable alternatives to be considered in the detailed analysis. This deliverable will document the methods, rationale, and results of the alternatives screening process.

The detailed analysis will be conducted by the Respondents to provide the U.S. EPA with the information needed to allow for the selection of a site remedy. This analysis is the final task to be performed by the Respondents during the FS.

**c. Detailed Analysis of Alternatives**

The Respondents will conduct a detailed analysis of alternatives which will consist of an analysis of each option against a set of nine evaluation criteria and a comparative analysis of all options using the same evaluation criteria as a basis for comparison.

Apply nine criteria and document analysis

The Respondents will apply nine evaluation criteria to the assembled remedial alternatives to ensure that the selected remedial alternative will be protective of human health and the environment; will be in compliance with, or include a waiver of, ARARs; will be cost-effective; will evaluate permanent solutions and alternative treatment technologies, or resource recovery technologies, to the maximum extent practicable; and will address the statutory preference for treatment as a principal element. The evaluation criteria include: (1) overall protection of human health and the environment; (2) compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume; (5) short-term effectiveness; (6) implementability; (7) cost; (8) state (or support agency) acceptance; and (9) community acceptance. (Note: criteria 8 and 9 are considered after the RI/FS report has been released to the general public.) For each alternative the Respondents should provide: (1) a description of the alternative that outlines the waste management strategy involved and identifies the key ARARs associated with each alternative, and (2) a discussion of the individual criterion assessment. If the Respondents do not have direct input on criteria (8) state (or support agency) acceptance and (9) community acceptance, these will be addressed by the U.S. EPA, in consultation with Ohio EPA.

Compare alternatives against each other and document the comparison of

## alternatives

The Respondents will perform a comparative analysis between the remedial alternatives. That is, each alternative will be compared against the others using the evaluation criteria as a basis of comparison. Identification and selection of the preferred alternative are reserved by the U.S. EPA, in consultation with Ohio EPA.

### **d. Feasibility Study Report**

The Respondents will prepare a draft FS report for review and approval by the U.S. EPA. This report shall summarize results of field activities to characterize the site, sources of affected media, nature and extent of affected media, the fate and transport of contaminants of concern and the analysis of remedial alternatives. The draft FS report will also include the results of the Alternatives Screening Process Technical Memorandum. This report may include the results of the baseline human health and ecological risk assessment. The Respondents will refer to the RI/FS Guidance for an outline of the report format and contents. Following comments by the U.S. EPA, the Respondents will prepare a final FS report which satisfactorily addresses the U.S. EPA's comments.

The FS report and the RI Report, as ultimately adopted or amended by the U.S. EPA, in consultation with Ohio EPA, provides a basis for remedy selection by the U.S. EPA and documents the development and analysis of remedial alternatives. The Respondents will refer to the RI/FS Guidance for an outline of the report format and the required report content.

### **SCHEDULE OF TASKS AND MAJOR DELIVERABLES**

The schedule for Deliverables is specified in the Administrative Order.

A Table with Schedule for Deliverables will be inserted once AOC is agreed upon.

## REFERENCES FOR CITATION

The following list, although not comprehensive, comprises many of the regulations and guidance documents that may apply to the RI/FS process:

The (revised) National Contingency Plan

"Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," The U.S. EPA, Office of Emergency and Remedial Response, October 1988, OSWER Directive No. 9355.3-01.

"Interim Guidance on Potentially Responsible Party Participation in Remedial Investigation and Feasibility Studies," The U.S. EPA, Office of Waste Programs Enforcement, Appendix A to OSWER Directive No. 9355.3-01.

"Guidance on Oversight of Potentially Responsible Party Remedial Investigations and Feasibility Studies," The U.S. EPA, Office of Waste Programs Enforcement, OSWER Directive No. 9835.3

"A Compendium of Superfund Field Operations Methods," Two Volumes, The U.S. EPA, Office of Emergency and Remedial Response, EPA/540/P-87/001a, August 1987, OSWER Directive No. 9355.0-14.

"EPA NEIC Policies and Procedures Manual," May 1978, revised November 1984, EPA-330/9-78-001-R.

"Data Quality Objectives for Remedial Response Activities," The U.S. EPA, Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, EPA/540/G-87/003, March 1987, OSWER Directive No. 9335.0-7B.

"Guidelines and Specifications for Preparing Quality Assurance Project Plans," The U.S. EPA, Office of Research and Development, Cincinnati, OH, QAMS-004/80, December 29, 1980.

"Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans," The U.S. EPA, Office of Emergency and Remedial Response, QAMS-005/80, December 1980.

"Users Guide to the EPA Contract Laboratory Program," The U.S. EPA, Sample Management Office, August 1982.

"Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements," The U.S. EPA, Office of Emergency and Remedial Response, July 9, 1987, OSWER Directive No. 9234.0-05.

"CERCLA Compliance with Other Laws Manual," Two Volumes, The U.S. EPA, Office of Emergency and Remedial Response, August 1988 (draft), OSWER Directive No. 9234.1-01 and -02.

"Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites," The U.S. EPA, Office of Emergency and Remedial Response, (draft), OSWER Directive No. 9283.1-2.

"Draft Guidance on Preparing Superfund Decision Documents," The U.S. EPA, Office of Emergency and Remedial Response, March 1988, OSWER Directive No. 9355.3-02

"Risk Assessment Guidance for Superfund - Volume I Human Health Evaluation

Manual (Part A)," December 1989, EPA/540/1-89/002

"Risk Assessment Guidance for Superfund - Volume II Environmental Evaluation Manual," March 1989, EPA/540/1-89/001

"Guidance for Data Useability in Risk Assessment," October, 1990, EPA/540/G-90/008

"Performance of Risk Assessments in Remedial Investigation /Feasibility Studies (RI/FSs) Conducted by Potentially Responsible Parties (PRPs)," August 28, 1990, OSWER Directive No. 9835.15.

"Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions," April 22, 1991, OSWER Directive No. 9355.0-30.

"Health and Safety Requirements of Employees Employed in Field Activities," The U.S. EPA, Office of Emergency and Remedial Response, July 12, 1981, EPA Order No. 1440.2.

OSHA Regulations in 29 C.F.R. 1910.120 (Federal Register 45654, December 19, 1986).

"Interim Guidance on Administrative Records for Selection of CERCLA Response Actions," The U.S. EPA, Office of Waste Programs Enforcement, March 1, 1989, OSWER Directive No. 9833.3A.

"Community Relations in Superfund: A Handbook," The U.S. EPA, Office of Emergency and Remedial Response, June 1988, OSWER Directive No. 9230.0#3B.

"Community Relations During Enforcement Activities And Development of the Administrative Record," The U.S. EPA, Office of Programs Enforcement, November 1988, OSWER Directive No. 9836.0-1A.

"The U.S. EPA Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments." EPA540-R-97-006. Office of Ecological and Remedial Response, Washington, D.C. 1997.