

**APPENDIX A
STATEMENT OF WORK**

**FOR REMEDIAL INVESTIGATION, FEASIBILITY STUDY
AND/OR ENGINEERING EVALUATION/COST ANALYSIS AND
REMEDIAL DESIGN**

**AT THE TITTABAWASSEE RIVER DIOXIN SPILL SITE
IN MICHIGAN**

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Exhibit A – Schedule for Major Deliverables

Exhibit B – Partial List of Guidance

I. PURPOSE

This Statement of Work (SOW) sets forth the requirements for conducting evaluations of current conditions and assessments of response options to respond to releases or threats of releases of hazardous substances, pollutants, or contaminants at the Tittabawassee River Dioxin Spill Site in Michigan (Site) sufficient to protect human health and the environment. This SOW also sets forth requirements to design any response selected by the United States Environmental Protection Agency (EPA), in consultation with the Michigan Department of Environmental Quality (MDEQ), in a Record of Decision (ROD) for remedial action or Action Memorandum for a Non-Time Critical Removal Action (NTCRA).

More specifically, this SOW sets forth requirements for performing the following activities:

- Remedial Investigation (RI) – Any RI completed for the Site shall fully evaluate the nature and extent of hazardous substances, pollutants or contaminants at and/or from the Site, using multiple lines of evidence, as appropriate. For the Tittabawassee River, extensive data collection has already occurred through the MDEQ license. As such, any additional data collection efforts for the Tittabawassee River may be focused in nature. For the Saginaw River and Saginaw Bay, data collection efforts through the MDEQ license have been more limited in nature. As such, additional data collection efforts for the Saginaw River and Saginaw Bay will need to ensure that Saginaw River and Saginaw Bay are fully evaluated for the nature and extent of hazardous substances, pollutants or contaminants at and from the Site. Any RI completed for the Site shall provide sufficient data to develop and evaluate effective remedial alternatives.
- Feasibility Study (FS) and/or Engineering Evaluation/Cost Analysis (EE/CA) – For the Tittabawassee River and Saginaw River and Saginaw Bay, any FS and/or EE/CA shall evaluate alternatives for addressing the impact to human health and the environment from hazardous substances, pollutants or contaminants at the Site.
- Remedial and/or Response Design (RD) – No response actions have been selected for the Site, nor any RODs for remedial action or Action Memoranda for NTCRAs issued for the Site. However, RODs for remedial action and/or Action Memoranda for NTCRAs are expected to be issued in the future based on the site investigations, RIs, FSs, and/or EE/CAs. This SOW addresses the RD for any such future response decisions. Any RD shall result in a technical package with a complete design that addresses all elements of the response selected in the ROD and/or Action Memorandum.

The Administrative Settlement Agreement and Order on Consent (Settlement Agreement) and this SOW do not require implementation of any response actions. However, EPA and MDEQ anticipate that selected response actions will be timely implemented by the Respondent through separate legal agreements or orders. The Work performed pursuant to this SOW shall facilitate the seamless implementation of any ROD for remedial action and/or Action Memoranda for a

NTCRA, and shall ensure that the response actions are protective of human health and the environment.

The objectives of this SOW are to streamline studies, quickly initiate cleanup, and begin to reduce exposures and risks at the Site. The Respondent shall reduce redundancies and shall use work previously completed if it meets the functional equivalent requirements of the RI, FS, EE/CA, and/or RD, as determined by EPA, in consultation with MDEQ. The Work performed pursuant to this SOW shall facilitate the selection of response actions, the monitoring of the results of implemented response actions, and the development of future response actions that are informed by earlier results.

The Respondent shall prepare and complete the Work and all deliverables required in this SOW in compliance with the Settlement Agreement to which this SOW is attached, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 C.F.R. Part 300) as amended.

The Respondent shall prepare and complete the Work and all deliverables required in this SOW in accordance with all EPA requirements and guidance. EPA guidance related to the Work includes, but is not limited to, the guidance listed in Exhibit B.

The Respondent shall furnish all personnel, materials, and services necessary for, or incidental to, performing the Work at the Site under the Settlement Agreement, except as otherwise specified herein.

II. DOCUMENT REVIEW

In accordance with the Schedule in Exhibit A to this SOW, the Respondent shall submit all documents or deliverables required as part of this SOW to the EPA, with copies to the MDEQ, for review and approval by EPA, in consultation with MDEQ, in accordance with Section X of the Settlement Agreement. At EPA's request, with an invitation to MDEQ to participate, the Respondent shall meet or confer to discuss the Work and deliverables.

III. SCOPE OF GENERAL SITE-WIDE TASKS

In accordance with the Schedule in Exhibit A to this SOW, the Respondent shall complete the following tasks as part of the general site-wide Work for the Site:

- Task 1: Characterize and Assess Potential Acute or Near-Term Exposure Risks and/or Transport Risks
- Task 2: Community Involvement Support and Technical Assistance Plan
- Task 3: Long-Term Monitoring
- Task 4: Treatability or Pilot Studies
- Task 5: Progress Reports

Details regarding the aforementioned five tasks are specified below.

1. TASK 1: CHARACTERIZE AND ASSESS POTENTIAL ACUTE OR NEAR-TERM EXPOSURE RISKS AND/OR TRANSPORT RISKS

The Respondent shall develop and implement plans to characterize and assess potential acute or near-term exposure risks and/or transport risks. Each plan shall include a schedule for the Work. The Respondent shall submit the following plans and reports. Upon approval, the Respondent shall implement the plans.

1.1. Characterize and Assess Areas of Potential Acute or Near-Term Exposure Risks

The Respondent shall develop and implement a plan to characterize and assess potential acute or near-term exposure risks focusing on areas of current residential property use. The Respondent shall gather and analyze the existing Site information and identify any data gaps associated with completing the task and shall submit a plan to fill identified data gaps. At a minimum the plan shall include: Exposure Units 3, 7 through 15, 20 and 21 along the Tittabawassee River; and Exposure Units 16 through 19 along the Saginaw River. Other areas may be identified by EPA, in consultation with MDEQ, as the Work progresses.

1.2. Characterize and Assess Potential Acute or Near-Term Transport Risks

The Respondent shall develop and implement a plan to characterize and assess potential acute or near-term transport risks focusing on contaminant transport. The Respondent shall gather and analyze the existing Site information, identify any data gaps associated with completing this task and shall submit a plan to fill identified data gaps. At a minimum the plan shall include: contaminant erosion from banks along the Tittabawassee River; contaminant transport from the Tittabawassee River to the Saginaw River; contaminant transport from the Saginaw River to Saginaw Bay; and transport of contaminants within the Site.

1.3. Reporting and Planning on Potential Acute or Near-Term Exposure Risks and/or Transport Risks

The Respondent shall report on the characterizations and assessments of potential acute or near-term exposure risks and/or transport risks in accordance with the approved work plans. The reports shall identify potential mitigation measures for acute or near-term exposure risks and/or transport risks. In particular, potential mitigation measures for acute or near-term exposure risks shall, at a minimum, focus on exposure control. As appropriate, potential mitigation measures for acute or near-term transport risks shall include bank stabilization, sediment traps and/or other measures to control significant contaminant transport (e.g., removal).

EPA, in consultation with MDEQ, shall determine the process and timing to further plan and develop mitigation measures identified in the reports on the characterizations and assessments of

potential acute or near-term exposure risks and/or transport risks. If EPA, in consultation with MDEQ, determines that any mitigation measure should be further planned and developed to address an acute or near-term exposure risk and/or transport risk in advance of any Segment-Specific Response Proposal (Task 7), EPA shall direct the Respondent to modify and enhance the assessment of mitigation measures to meet the requirements of either an FS analysis consistent with Section VI.F or an EE/CA analysis consistent with Section VI.G, in accordance with the schedule in Exhibit A to this SOW. At any time during any activity under the Settlement Agreement and SOW, EPA may determine that a time critical removal action may be appropriate.

2. TASK 2: COMMUNITY INVOLVEMENT SUPPORT AND TECHNICAL ASSISTANCE PLANS

2.1. Community Involvement Support

EPA, in consultation with MDEQ, has the responsibility of developing and implementing community involvement activities for the Site. The critical community involvement planning steps performed by EPA, in consultation with MDEQ, include conducting community interviews and developing a Community Involvement Plan. EPA, in consultation with MDEQ, shall develop the Community Involvement Plan. Although implementing the Community Involvement Plan is the responsibility of EPA, the Respondent, if directed by EPA, shall assist by providing information regarding the Site's history; participating in public meetings; assisting in preparing fact sheets for distribution to the general public; or conducting other community involvement activities approved by EPA. All Respondent-conducted community involvement activities shall be planned and developed in coordination with EPA, in consultation with MDEQ.

2.2. Technical Assistance Plan (TAP)

In addition to any assistance with community involvement activities, if requested by EPA, the Respondent shall prepare a Technical Assistance Plan (TAP) that will provide and administer \$50,000 at the Site for a qualified community group to hire Technical Advisors, independent from the Respondent, to help interpret and comment on Site-related documents developed under this SOW and through EPA's issuance of the final Record of Decision for the site. After a request by EPA, in consultation with MDEQ, the Respondent shall submit to EPA and MDEQ, its TAP for the Site for EPA approval, in consultation with MDEQ, in accordance with the Schedule in Exhibit A to this SOW. EPA, in consultation with MDEQ, shall review and oversee Respondent's implementation of all requirements in the approved TAP. In particular, EPA, in consultation with MDEQ, shall review Respondent's selection of a community group to ensure the procedures and criteria used for the selection are consistent with the procedures and criteria contained in the approved TAP.

As part of the TAP, the Respondent shall propose methods, including an application process, minimum eligibility requirements and selection criteria for awarding, and administering the funds above.

Any eligible group shall be: 1) a group of people who may be affected by a release or threatened release at the Site; 2) able to demonstrate its ability to adequately and responsibly manage TAP responsibilities including but not limited to having the ability to manage and keep records of TAP expenses. Any group is ineligible if it is: 1) a potentially responsible party (PRP) at the Site or represents such a PRP or is a group whose ability to represent the interests of the affected individuals might be limited as a result of receiving money or services from a PRP; 2) affiliated with a national organization; 3) an academic institution; 4) a political subdivision, or tribal government; or 5) a group established or presently sustained by government entities, a PRP, or any ineligible entity. Selection criteria should be consistent with 40 C.F.R. §35.4155. Funds may be awarded to only one qualified group at a time.

As part of the TAP, the Respondent shall include a proposed plan for documenting the eligibility of the selected community group, and informing the group and EPA if it believes any individual member is ineligible (consistent with 40 C.F.R. §35.4030) to participate in the group. Respondent shall also include a plan for informing the selected group of the activities that can and cannot be undertaken with Respondent's funds. The lists of eligible and ineligible activities should be consistent with 40 C.F.R. §35.4070 and §35.4075, respectively. The TAP shall also include a proposal for offering and, if accepted, transferring up to \$5,000 to the selected group to cover its estimated need for funds for an initial start-up period.

Also as part of the TAP, Respondent shall include a plan for providing assistance to the selected community group in the solicitation for an independent Technical Advisor. As long as the group documents its selection and the advisor selected by the group satisfies the requirements specified in 40 C.F.R. §35.4190 and §35.4195, Respondent shall accept the group's choice. Finally, Respondent shall include a proposed plan for negotiating a contract with the selected community organization and the independent Technical Advisor. The contract shall specify the duties of the Respondent, community group, and Technical Advisor, respectively, and establish a dispute resolution process. Respondent shall submit a draft contract for approval by EPA, in consultation with MDEQ, prior to finalizing the contract with the selected community group.

The Respondent may hire a third party to coordinate and administer the TAP (hereinafter referred to as the TAP Coordinator). However, any such TAP Coordinator shall be approved by EPA. It is the Respondent's burden to demonstrate that the TAP Coordinator is qualified to perform this task. If the Respondent opts to hire a TAP Coordinator, then it shall submit in writing that person's name, title, and qualifications to EPA and MDEQ within 30 days after a request by EPA for submittal of a TAP for a Site. Additionally, as part of the TAP, Respondent shall designate an outreach coordinator who will be responsive to the public's inquiries and questions about the Site, including information about the application process and administration of the TAP. Respondent shall also propose a plan for arranging for and hosting meetings between its Outreach Coordinator, the community group, the Technical Advisor, and other interested individuals.

If the community group demonstrates, consistent with the criteria specified in 40 C.F.R. §35.4065, that it needs additional funds for TAP activity, Respondent will provide the additional

monies needed. The community group may apply for additional TAP assistance when \$ 40,000 of the \$ 50,000 provided has been spent. Any unobligated funds shall revert to the Respondent upon EPA's issuance of the final ROD for the site based upon any RI and FS and/or EE/CA to be conducted pursuant to this SOW.

In accordance with the schedule in the EPA approved TAP, the Respondent shall select the TAP recipient; release \$5,000 in start-up funds; confirm the selection of the Technical Advisor, and finalize an appropriate contract with the selected community representative and the Technical Advisor. In addition, the Respondent shall provide EPA and MDEQ with quarterly progress reports concerning the implementation of the TAP.

2.3. Community Education and Outreach Support

The Agencies may undertake additional community education and outreach to inform the community of potential Site exposures and to educate the community on measures to reduce potential exposures until Work is complete. Such a program may include outreach provisions to the fishing population to educate the community on the existing fish consumption advisories and measures to reduce potential exposures from consumption of fish, and outreach provisions to the hunting population to educate the community on the existing game consumption advisories and measures to reduce potential exposures from consumption of game. The Respondent, if directed by EPA, shall assist by providing information; participating in public meetings; assisting in preparing fact sheets for distribution to the public; or conducting other community involvement activities approved by EPA. All Respondent-conducted community education and outreach activities shall be planned and developed in coordination with EPA, in consultation with MDEQ.

3. TASK 3: LONG-TERM MONITORING

The Respondent shall develop and implement a Long-Term Monitoring Program to assess and document baseline conditions, to provide a basis against which to compare response activities, and to evaluate actions taken. The Respondent shall submit a Long-Term Monitoring Plan in accordance with the Schedule in Exhibit A to this SOW. Upon approval, the Respondent shall implement the Plan. At a minimum, the Long-Term Monitoring Plan shall address:

3.1. Fish and Contaminant Uptake

The Respondent shall include provisions to assess specific species of fish from specific designated areas within the Site on a designated periodic basis (e.g., annually). Additionally, as appropriate, the monitoring may include caged fish, young-of-year fish, surrogate monitoring (such as semi-permeable membrane devices), and/or other elements to assess Site conditions over time.

3.2. Sediment and Contaminant Loading

The Respondent shall include provisions to measure sediment and contaminant transport within the Site on a designated periodic basis and, if possible, during and after particular high energy flow events. The monitoring shall include measurement of contaminants in both suspended solids and bed load.

4. TASK 4: TREATABILITY OR PILOT STUDIES

If EPA, in consultation with MDEQ, determines that treatability testing or pilot studies are necessary during the course of the Work, the Respondent shall conduct treatability studies or pilot studies as described herein. In addition, if applicable, the Respondent shall use the testing results and operating conditions in the detailed design of the selected remedial technology. The Respondent shall perform the following activities for any required treatability testing or pilot studies.

4.1. Determine Candidate Technologies and the Need for Testing

At the request of EPA, in consultation with MDEQ, and in accordance with the schedule in Exhibit A to this SOW, the Respondent shall submit a Candidate Technologies and Testing Needs Technical Memorandum that identifies candidate technologies for a treatability or pilot studies program. The Respondent shall determine and refine the specific data requirements for the testing program during Site characterization.

Within the Candidate Technologies and Testing Needs Technical Memorandum, the Respondent shall conduct a literature survey to gather information on the performance, relative costs, applicability, removal efficiencies, operation and maintenance (O&M) requirements, and implementability of candidate technologies. Respondent shall conduct treatability or pilot studies except where Respondent can demonstrate to EPA's satisfaction, in consultation with MDEQ, that they are not needed.

4.2. Treatability or Pilot Studies Work Plan

EPA, in consultation with MDEQ, will decide on the type of treatability testing to use (e.g., bench versus pilot). At the request of EPA, in consultation with MDEQ, and in accordance with the schedule in Exhibit A to this SOW, the Respondent shall submit a Treatability or Pilot Study Work Plan that describes the project background, the remedial technology(ies) to be tested, test objectives, experimental procedures, conditions to be tested, measurements of performance, analytical methods, data management and analysis, health and safety, residual waste management, and a schedule. The Respondent shall document the data quality objectives (DQOs) for treatability or pilot testing as well. If pilot scale treatability testing is to be performed, the Work Plan shall describe, as appropriate, 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, the plans shall address all permitting requirements.

4.3. Treatability or Pilot Study Evaluation Report

Following the completion of the treatability or pilot testing, the Respondent shall analyze and interpret the testing results in a technical report. Respondent shall submit the treatability or pilot study report according to the schedule in the Treatability or Pilot Study Work Plan. As approved by EPA, in consultation with MDEQ, this report may be a part of another report or submitted as a separate deliverable. The Treatability or Pilot Study Evaluation Report shall evaluate each technology's effectiveness, implementability and cost, and actual results as compared with predicted results. The report shall also evaluate full scale application of the technology, including a sensitivity analysis identifying the key parameters affecting full-scale operation.

5. TASK 5: PROGRESS REPORTS

5.1. Monthly Progress Reports

The Respondent shall submit monthly written progress reports to EPA and MDEQ concerning actions undertaken pursuant to the Settlement Agreement and this SOW, in accordance with the Schedule in Exhibit A to this SOW, unless otherwise directed in writing by EPA. These reports shall include, but not be limited to: a description of all significant developments during the preceding period, including the specific Work that was performed and any problems that were encountered; a summary of all data received during the reporting period; any analytical results and electronic copies (formatted according to EPA Region 5 specifications), and hard copies upon request, of the analytical and laboratory data that was received during the reporting period and not previously submitted; and the developments anticipated during the next reporting period, including a schedule of Work to be performed, anticipated problems, and actual or planned resolutions of past or anticipated problems. The monthly progress reports will summarize the field activities conducted each month including, but not limited to drilling and sample locations, depths and descriptions; boring logs; sample collection logs; field notes; problems encountered; solutions to problems; a description of any modifications to the procedures outlined in the Work Plans, with justifications for the modifications; and upcoming field activities.

5.2. Annual Progress Reports

In accordance with the Schedule in Exhibit A to this SOW, the Respondent shall submit Annual Progress Reports to EPA and MDEQ. These reports shall summarize overall progress in completing the Work required by this Settlement Agreement and SOW. The Annual Progress Reports are intended to be a concise summary of the progress of the Work at the Site. In addition, these reports shall present and assess the results of the year's long-term monitoring required under Task 3. These reports will continue until termination of The Settlement Agreement, unless otherwise directed in writing by EPA, in consultation with MDEQ.

5.3. Geodatabase and Periodic Data Updates

In accordance with the Schedule in Exhibit A to this SOW, the Respondent shall submit to EPA and MDEQ, its geographic information system (GIS) based geodatabase developed under the MDEQ license, with all existing data for the Site. In accordance with the Schedule in Exhibit A to this SOW, the Respondent shall update the geodatabase with all new Site data and shall submit the updated database to EPA and MDEQ.

IV. SCOPE OF TITTABAWASSEE RIVER TASKS

Because the Tittabawassee River is very dynamic, exposure reduction and risk reduction will be achieved best by applying a comprehensive set of remediation/response objectives that integrate the media, transport mechanisms, and exposure pathways. Exposure reduction and risk reduction will also be maximized by ensuring that the remediation/response objectives are used in an adaptive management approach. An adaptive management approach requires making response decisions, implementing response decisions, monitoring results, and informing future response decisions by the results. This type of approach also requires remediation to occur in an upstream to downstream fashion and that the river system is divided into manageable segments.

However, as remediation work progresses along the Tittabawassee River from upstream to downstream, it is possible that certain conditions might be identified within a segment that may warrant an acceleration of cleanup activities. Depending on the conditions presented, it may be appropriate to advance cleanup in an area out of sequence with the overall remediation strategy of upstream to downstream.

Because substantial work has been completed on the Tittabawassee River under the MDEQ license, the Work required by this SOW is intended to utilize and build on prior work, as appropriate, to meet the objectives of this Settlement Agreement. In accordance with the Schedule in Exhibit A to this SOW, the Respondent shall complete the following tasks as part of the Work for the Tittabawassee River portion of the Site:

- Task 6: Define Tittabawassee River Segments and Conduct Baseline Work
- Task 7: Segment-Specific Response Proposal
- Task 8: Segment-Specific RD
- Task 9: Segment-Specific Post-Response Residual Risk Demonstration

Details regarding the aforementioned four tasks are specified below.

6. TASK 6: DEFINE TITTABAWASSEE RIVER SEGMENTS AND CONDUCT BASELINE WORK

6.1. Define Segments

The Respondent shall develop a technical memorandum that defines segments within the Tittabawassee River that will be assessed and addressed in a general upstream to downstream

approach. The Respondent shall utilize, at a minimum, the following criteria when defining river segments: 1) hydrodynamics of the river system; 2) current and reasonably anticipated land use in adjacent floodplains; and 3) physical features (e.g., bridges, dams). The Respondent shall complete this task in accordance with the Schedule in Exhibit A to this SOW. The Respondent shall delineate segments of the Tittabawassee River that will be assessed and addressed in accordance with Tasks 7, 8, and 9, below. The technical memorandum shall provide a description of the rationale behind the segmenting scheme and provide the information and/or supporting documents used to define the segments. EPA, in consultation with MDEQ, shall make the final determination regarding how segments are delineated. The first segment consists of the Tittabawassee River starting _____ and continuing to _____.

6.2. Wetlands Inventory

The Respondent shall develop an inventory of wetlands in each segment and along the entire Tittabawassee River. The Respondent shall identify all wetlands, types and values of the wetlands, and the boundaries of the delineated wetlands. Complete mapping of the wetlands within the Tittabawassee River portion of the Site shall be completed in accordance with the Schedule in Exhibit A to this SOW. However, if work is planned that may alter the land or vegetation in a wetland area prior to the completion of the entire inventory, the Respondent shall complete an accelerated inventory for any such area, upon request by EPA, in consultation with MDEQ, in accordance with the Schedule in Exhibit A to this SOW.

6.3. Modeling and/or Holistic Assessment Tools

The Respondent shall develop a tool(s) that will allow potential and actual work and/or response actions in any segment to be evaluated holistically within the Tittabawassee River for potential effects in other areas. The Respondent, if approved by EPA, in consultation with MDEQ, may utilize site-specific hydrodynamic models, fate and transport models, a geomorphic river model, or other environmental modeling tools. To the extent that any response actions may change water levels in the river channel or floodway, the Respondent shall develop, calibrate, and validate a hydraulic model to evaluate such potential changes. Upon request, all model data and programming, including any proprietary programs (without waiver of any intellectual property rights), shall be made available to EPA and MDEQ, together with calibration and validation information, and a sensitivity analysis.

7. TASK 7: SEGMENT-SPECIFIC RESPONSE PROPOSAL

The Respondent shall develop and submit a Segment-Specific Response Proposal in accordance with the Schedule in Exhibit A of this SOW for each Tittabawassee River segment identified in Task 6. At a minimum, the Segment-Specific Response Proposal shall address:

7.1. Summary of Segment Conditions

7.1.1. Executive Summary of Existing Documents

If EPA, in consultation with MDEQ, determines that sufficient information to meet the requirements of an RI or to implement an early action under remedial authority exists in documents prepared or approved under the MDEQ license, the Respondent shall briefly present the existing information in an executive summary, identify the original documents that serve as the basis for the executive summary, and provide an analysis demonstrating that the existing documents meet the requirements of a RI report.

7.1.2. Reporting of Existing Data Not Available in Existing Documents

If EPA, in consultation with MDEQ, determines that existing data for the segment has not been included, reported, or adequately identified in documents prepared or approved under the MDEQ license in a manner sufficient to meet the requirements of an RI or to implement an early action under remedial authority, the Respondent shall report any such data in the Segment-Specific Response Proposal, in a manner that meets the requirements of an RI report, consistent with Section VI.E.

7.1.3. Segment Data Gaps

If EPA, in consultation with MDEQ, determines that there are data gaps in the existing data, the Respondent shall propose a plan to fill the data gaps to support the Segment-Specific Response Proposal. Upon approval, the Respondent shall implement the plan to fill segment data gaps. The Respondent shall report the results in accordance with the approved plan. If potential acute or near-term exposure risks and/or transport risks are identified by EPA, in consultation with MDEQ, while the Respondent is conducting this sub-task, the Respondent shall report on the characterization and assessment of any such potential risks in accordance with sub-task 1.3.

7.2. Assessment of Any Areas of Significant Contamination (ASCs)

The Respondent shall assess any Areas of Significant Contamination (ASCs) within the segment. An ASC could be defined as an area of a certain size or a particular geomorphic feature that represents a potential exposure risk or transport risk. An ASC may be an area of spatially associated elevated concentrations or mass of dioxin or other contaminant(s) of concern. The definition of ASC shall be approved by EPA, in consultation with MDEQ.

The Respondent shall evaluate the ASCs, considering whether response efforts should be accelerated for any of the ASCs. In making a proposal to accelerate response actions on an ASC, emphasis should be placed on evaluating whether the ASC presents a real, acute or near-term exposure or transport risk. If EPA, in consultation with MDEQ, determines that any ASC presents a real acute or near-term exposure risk and/or transport risk and needs an accelerated response in advance of the segment-wide response, EPA shall so notify the Respondent. EPA shall direct the Respondent to develop either an FS analysis in accordance with the requirements of Section VI.F or an EE/CA analysis in accordance with the requirements of Section VI.G, in accordance with the schedule in Exhibit A to this SOW, for the ASC(s) that needs accelerated

response. If EPA, in consultation with MDEQ, determines that any ASC does not need an accelerated response, the Respondent shall develop response objectives for each such ASC, consistent with sub-task 7.3 and shall address each such ASC in the response proposal, consistent with sub-task 7.4.

7.3. Segment Remedial and/or Response Action Objectives (RAOs)

A basic understanding of the media, transport mechanisms, exposure pathways and receptors impacted needs to serve as the baseline against which remediation objectives are developed. For the Tittabawassee River, the sediments, banks and floodplain soils are the primary media of concern. The interaction of the sediments, banks and floodplain soils allows for in situ exposure and for the transport of contaminants both in stream and from the erosion of banks and floodplain soils such that the exposure pathways (e.g., direct contact, fish and wildlife consumption) are completed.

The Respondent shall develop Remedial and/or Response Action Objectives (RAOs) for each segment, considering:

7.3.1. General Objectives

General response objectives shall be formulated. These objectives shall focus on reducing exposures and transport of contaminated media. The short and long-term conditions in each segment shall be considered during the formulation of the objectives. As appropriate, key considerations in developing general response objectives shall be:

- Reducing erosion along contaminated banks.
- Reducing exposures associated with contaminated surface sediments, banks and floodplain soils such that fish consumption and wildlife consumption advisories are removed or relaxed.
- Reducing exposures at residential properties and other high use areas along the river by preventing direct contact with contaminated sediments, banks, and floodplain soils.
- Reducing exposures at agricultural properties along the river by preventing exposures, including food chain exposures, resulting from contaminated bank and floodplain soils.
- Reducing exposure to ecological receptors associated with contaminated media.
- Reducing transport of contaminated sediments onto banks and floodplains and into the Saginaw River.
- Reducing the potential for areas of significant contamination found buried in sediments, banks and floodplain soils to become available for future transport within the river system.
- Removing areas of significant contamination from sediments and banks.

7.3.2. Performance Objectives

The Respondent shall specify performance objectives to meet the general objectives developed for each segment. The performance objectives shall be defined to evaluate whether the response

objective is being achieved, and will continue to be achieved. An example performance objective would be to reduce contaminant loading from one river segment to the next by a specified percentage.

7.3.3. Measurable Metrics

The Respondent shall specify measurable metrics to evaluate whether the performance objectives are being achieved, and will continue to be achieved. Example measurable metrics include contaminant concentration in Total Suspended Solids and bed load samples as measures of loading.

7.4. Response Proposal

The Respondent shall propose a Segment-Specific Response Proposal based on the developed general objectives, performance objectives, and measurable metrics. The Proposal shall address:

7.4.1. Media Addressed

The Respondent shall identify specific response actions for sediment, bank and floodplain areas within the segment, based on the segment specific RAOs. If no action or no further action is proposed for one or more media, the basis for this must be presented and, if appropriate, the no action or no further action alternative shall be evaluated consistent with the requirements of sub-task 7.4.4.

7.4.2. Response Process

After consideration of all relevant EPA guidance, the Respondent shall propose the CERCLA response process most appropriate for the Segment-Specific Response. The Respondent shall consider:

- The remedial process, which would result in an EPA issued ROD;
- The NTCRA process, which would result in an EPA issued NTCRA Action Memorandum; or
- A combination of approaches.

EPA has the ultimate authority to determine which CERCLA response process is appropriate.

7.4.3. Response Options

Each Segment-Specific Response Proposal may combine the use of removal (e.g., dredging, excavation), containment (e.g., covering and capping), control (e.g., institutional controls), treatment (e.g., density separation, contaminant fixation) monitored natural recovery, and other appropriate options for sediments, banks and floodplains. Response options shall be developed to achieve the RAOs (sub-task 7.3). In developing response options, the Respondent shall consider

the need to demonstrate the risk-based performance objective of ensuring that residual risk associated with the segment falls within an acceptable risk range, as required by the Segment-Specific Post-Response Residual Risk Demonstration (Task 9).

When developing response options for inclusion in any Segment-Specific Response Proposal, the Respondent shall also consider whether developing response options that are river-wide, media specific, and/or address specific areas within other segments would be appropriate for inclusion in any Segment Specific Response Proposal. Any such response options shall be consistent with the over-arching goals of protection of human health and the environment, and on balance would benefit the Site as a whole (e.g. would result in an overall reduction in contaminated materials transport sooner rather than later; cost efficiencies would be achieved by performing work of a similar nature in multiple areas at the same time). Prior to including such response options in any Segment-Specific Response Proposal, Respondent shall obtain approval by EPA, in consultation with MDEQ.

The Respondent shall develop a sufficient number of options to allow comparison of the alternative, in accordance with the requirements of sub-task 7.4.4.

7.4.4. Assessment of Options

The Respondent shall assess the response options, using the evaluation requirements of the appropriate response process:

- For the remedial process, the Respondent shall produce an FS analysis in accordance with the requirements of Section VI.F.
- For the NTCRA process, the Respondent shall produce an EE/CA analysis in accordance with the requirements of Section VI.G.

Because actions in one segment may modify conditions in other segments, the assessment shall consider the potential affects that the different response options may have beyond the segment being addressed. For example, changes in the banks or floodplains in a segment may have effects further downstream, and this must be considered in the comparative assessment of response options.

8. TASK 8: SEGMENT-SPECIFIC RD

For each Tittabawassee River segment where EPA, in consultation with MDEQ, has signed a ROD for remedial action or an Action Memorandum for a NTCRA, the Respondent shall undertake the RD as set forth herein. Each RD shall address the timing and sequencing of the response actions in the relevant ROD or Action Memorandum. The objectives of the response actions at the Site are expected to be to protect human health and the environment and to comply with all applicable or relevant and appropriate state and federal laws and requirements. In accordance with the Schedule in Attachment A to this SOW, the Respondent shall submit all documents or deliverables required as part of this Task.

This SOW is intended to achieve an expedited, cost-effective RD that builds on prior work using iterative approaches, is protective of human health and the environment, is consistent with the National Contingency Plan, and complies with the ROD and/or Action Memorandum. If a ROD specifies that pre-design work will be required, the results may be used to establish or refine performance expectations and goals. The RD will be conducted so pertinent information will be taken into account as it becomes available.

Because specific response actions and/or the combination of response actions in and along the Tittabawassee River have the potential to modify conditions over other areas of the river and floodplains, the Respondent shall evaluate as part of the Segment-Specific RD the effects of the response actions on the overall Tittabawassee River and floodplain.

At a minimum, each RD shall address:

8.1. Remedial Design Planning

In accordance with the schedule in Exhibit A of this SOW, the Respondent shall submit a draft Remedial Design Work Plan (RD Work Plan). The RD Work Plan shall discuss how each component of the RD will be addressed; identify the phases, tasks and sequencing necessary to complete the RD; and provide an overall management strategy for completion of such tasks. The RD Work Plan shall include specific provisions to collect data necessary to complete the Segment-Specific Post-Response Residual Risk Demonstration (Task 9). The RD Work Plan shall also include a project schedule for major design activities and submissions. The plan shall document the responsibility and authority of the entities and key personnel involved in the RD and shall include a description of qualifications of key personnel directing the RD, including contractor personnel.

Some RDs may require pre-design studies to provide information necessary to fully implement the remedial design and remedial action. In such cases, the RD Work Plan shall include work tasks and a schedule to complete the pre-design work. The Respondent shall implement the pre-design work in accordance with the final RD Work Plan. The results of the pre-design studies shall be included with the preliminary design, or on another approved schedule.

8.2. Preparation of Remedial Design Documents

The goal of this sub-task is to develop a technical package (or packages) with a complete remedial design (which may include performance specifications) that addresses all elements of the remedy selected in the ROD and/or Action Memorandum. The Respondent may submit more than one set of design submittals reflecting different components of the response action. The Preliminary and Final Design Documents will be submitted as set forth in the schedule in Exhibit A of this SOW. At EPA's discretion, in consultation with MDEQ, Intermediate Design Documents may also be required, on a schedule to be developed in the RD Work Plan. Required elements for the RD phases are specified in Section VI.H.

9. TASK 9: SEGMENT-SPECIFIC POST-RESPONSE RESIDUAL RISK DEMONSTRATION

Each Segment-Specific Response Proposal is expected to identify specific response actions for sediment, bank and floodplain areas, as needed, based on the segment-specific RAOs. It is anticipated that monitoring data during and/or after construction will demonstrate that RAOs have been achieved. However, ultimately a risk-based performance objective shall be used to measure the acceptability of response efforts completed. This means that after a remedial action selected in a ROD and/or NTCRA selected in an Action Memorandum has been completed in a particular river segment, the residual risk associated with the segment shall be calculated based on post-response data, consistent with Section VI.D. In order for response efforts at a particular segment to be considered complete, the residual risk analysis shall demonstrate that residual human health and ecological risk falls within or below ranges considered by EPA, in consultation with MDEQ, to be acceptable.

For each segment where response actions have been constructed, the Respondent shall submit a Segment-Specific Post-Response Residual Risk Demonstration, in accordance with the schedule in Exhibit A to this SOW. This Demonstration shall include:

9.1. Summary of Post-Construction Conditions

The Respondent shall include a summary of conditions (e.g., extent of residual contamination, surface conditions, etc.) that remain in the segment after construction has been completed.

9.2. Demonstration of Attainment of RAOs

The Respondent shall demonstrate that the RAOs established in EPA's decision document for the segment (ROD for remedial action and/or Action Memorandum for a NTCRA) have been attained.

9.3. Post-Construction Risk Assessment

The Respondent shall conduct a human health and ecological risk assessment based on post-construction data in accordance with the requirements of Section VI.D. In order for response efforts at a particular segment to be considered complete, the residual risk analysis shall demonstrate that residual human health and ecological risk falls within or below ranges considered by EPA, in consultation with MDEQ, to be acceptable.

If EPA, in consultation with MDEQ, determines that the residual risk does not fall within an acceptable risk range, the Respondent shall submit a new Segment-Specific Response Proposal that addresses sub-tasks 7.3 and 7.4 in accordance with the schedule in Exhibit A of this SOW.

V. SCOPE OF SAGINAW RIVER AND SAGINAW BAY TASKS

Because Work expected to be performed earlier under the general Site-wide or Tittabawassee River tasks may reasonably be expected to influence conditions in the Saginaw River and Saginaw Bay, the Work required by this Section of the SOW is intended to use and build on that prior Work, as appropriate, to meet the objectives of this Agreement. As such, the Parties anticipate that some or all of the following tasks may be deferred until substantial cleanup of the Tittabawassee River has occurred. This SOW envisions that the Saginaw River and Saginaw Bay will be addressed comprehensively. However, if EPA, in consultation with MDEQ, approves, the area may be sub-divided into smaller segments. In accordance with the schedule in Exhibit A of this SOW, the Respondent shall complete the following tasks as part of the Work for the Saginaw River and Saginaw Bay portions of the Site:

- Task 10: Project Scoping and RI/FS Planning Documents
- Task 11: Site Characterization
- Task 12: Remedial Investigation Report
- Task 13: Development and Screening of Alternatives (Technical Memoranda)
- Task 14: Detailed Analysis of Alternatives (FS Report)
- Task 15: Remedial Design

Details regarding the aforementioned six tasks are specified below.

10. TASK 10: PROJECT SCOPING AND RI/FS PLANNING DOCUMENTS

10.1. Site Background

The Respondent shall gather and analyze the existing Site background information and shall conduct a Site visit to assist in planning the scope of the Saginaw River/Saginaw Bay RI/FS.

10.1.1. Previous Work

For portions of the Site where environmental clean up work has previously been conducted either voluntarily or under a local, State or federal program, the Respondent shall assess the previous work with respect to the extent to which the risk to human health and the environment from hazardous substances, pollutants or contaminants has been reduced or eliminated (considering EPA's Superfund goals to protect human health and the environment) and the need for additional work (either additional response actions and/or further investigation) to further eliminate or manage such risks. The Respondent shall summarize and document the previous clean up work in the Saginaw River/Saginaw Bay RI/FS Work Plan submitted pursuant to Task 10.2, and shall assess the adequacy of the previous work to meet the objectives of this Settlement Agreement and SOW.

10.1.2. Collect and Analyze Existing Data

Before planning the Saginaw River/Saginaw Bay RI/FS activities, the Respondent shall thoroughly compile and review all existing Site data. The Respondent shall summarize and

document the existing data in the RI/FS Work Plan submitted pursuant to Task 10.2, and shall assess the adequacy of the existing data to meet the objectives of this Settlement Agreement and SOW. Historical data, if not previously submitted, shall be submitted electronically according to EPA Region 5 specifications. Existing Site data includes presently available data relating to the varieties and quantities of hazardous substances, pollutants and contaminants at the Site, past disposal practices, the results of previous sampling activities, surface water hydrology and hydrodynamic data, ecological data (including biota and habitat information, and information about past response actions and residual contamination at the Site.

10.1.3. Conduct Site Visit

The Respondent shall visit the Site during the project scoping phase. The Respondent shall coordinate visits to the Site with EPA's project manager, and MDEQ shall be invited to attend.

10.2. RI/FS Work Plan

A RI/FS Work Plan shall be prepared to accomplish the following:

- A remedial investigation that fully determines the nature and extent of the release or threatened release of hazardous substances, pollutants, or contaminants at and from the Saginaw River and Saginaw Bay for the purposes set forth in 40 C.F.R 300.430(d). In performing this investigation, the Respondent shall gather sufficient data, samples, and other information to fully characterize the nature and extent of the contamination at the Site, to support the human health and ecological risk assessments, and to provide sufficient data for the identification and evaluation of remedial alternatives for the Saginaw River and Saginaw Bay.
- A feasibility study that identifies and evaluates alternatives for remedial action to protect human health and the environment and achieve RAOs by preventing, eliminating, controlling or mitigating unacceptable risks from the release or threatened release of hazardous substances, pollutants, or contaminants at and from the Saginaw River/Saginaw Bay. Different remedial alternatives or combinations of alternatives may be applicable to different areas of the Site.

The Respondent shall prepare the RI/FS Planning documents to be consistent with applicable portions of the "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," October, 1988 and *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (OSWER Directive #9355.0-85, December 2005).

The Saginaw River/Saginaw Bay RI/FS Work Plan shall include a detailed description of the tasks the Respondent shall perform, the information needed for each task, a detailed description of the information the Respondent shall produce during and at the conclusion of each task, and a description of the work products that the Respondent shall submit, including: the deliverables set forth in this SOW; a schedule for each of the required activities; and a project management plan

including a data management plan (e.g., requirements for project management systems and software, minimum data requirements, requirements for submittal of electronic data, data format and backup data management).

As provided in more detail below, the Saginaw River/Saginaw Bay RI/FS Work Plan shall include: DQOs; number and types of sampling locations; analytical, physical and/or biological tests; data and other information required to develop a site-specific conceptual site model (CSM); preliminary objectives for the remedial action at the Site; a description of the Site management strategy; and data needs for fully characterizing the nature and extent of the contamination at the Site, evaluating risks and developing and evaluating remedial alternatives. The Saginaw River/Saginaw Bay RI/FS Work Plan shall reflect coordination with treatability study requirements, if any. The Saginaw River/Saginaw Bay RI/FS Work Plan shall include the following:

10.2.1. Site Background

The Site Background section shall include a brief summary of the Site location, description, physiography, hydrology, geology, demographics, ecological, cultural and natural resource features, Site history, description of previous investigations and responses conducted at the Site by local, state, federal, or private parties, and Site data evaluations and project planning completed during the scoping process.

The Site Background section shall discuss areas of waste handling and disposal activities, the locations of existing relevant groundwater monitoring wells, if any, and previous relevant surface water, sediment, soil, groundwater, and air sampling locations. The Site Background section shall include a summary description of available data and identify areas where hazardous substances, pollutants or contaminants were detected and the detected levels. The Site Background section shall include tables and/or figures displaying the minimum and maximum levels of detected hazardous substances, pollutants or contaminants in Site areas and media.

10.2.2. Conceptual Site Model

The Respondent shall prepare a CSM that is applicable to the Site. The CSM shall show potential contaminant sources, fate and transport routes, and exposure pathways for the Site. In particular, based on available information, the CSM shall describe hydrodynamic and sediment transport behavior, the related transport of hazardous substances, pollutants and contaminants, ecological receptor and human exposure pathways, and other relevant information. New information will be used to refine the CSM, as it becomes available, and evaluation of the CSM will be done in an iterative fashion, starting with the RI planning documents and continuing through completion of the FS.

10.2.3. Data Gap Description/Data Acquisition

As part of the Saginaw River/Saginaw Bay RI/FS Work Plan, the Respondent shall analyze the currently available data. The Respondent shall identify those areas of the Site and nearby areas that require additional data and evaluation in order to define the extent of hazardous substances, pollutants or contaminants as needed to achieve the purposes of the RI and FS. The Saginaw River/Saginaw Bay RI/FS Work Plan shall include a description of the number, types, and locations of samples to be collected. Data acquisition pursuant to the Saginaw River/Saginaw Bay RI/FS Work Plan shall accurately establish the site characteristics such as media contaminated, extent of contamination, and the physical boundaries of the contamination as needed to fulfill the purposes of the RI and FS. Pursuant to this objective, the Respondent shall obtain only the amount of detailed data necessary to determine the key contaminants' movement and extent of contamination. The key contaminants must be selected based on persistence and mobility in the environment, degree of hazard and/or where they can be reasonably documented to be representative of other contaminants of concern. The Saginaw River/Saginaw Bay RI/FS Work Plan shall include a schedule for the submittal of analytical data results, based on sample priority and the need to use the information to conduct the RI in an iterative manner. As needed and deemed appropriate by EPA, in consultation with MDEQ, the Saginaw River/Saginaw Bay RI/FS Work Plan shall include an environmental program to accomplish the following:

- **Site Reconnaissance.** The Respondent shall conduct:
 - Site surveys including property, boundary, utility rights-of-way, topographic information and other easements
 - Land survey
 - Topographic mapping
 - Field screening

- **Geological Investigations (Soils and Sediments).** The Respondent shall conduct geological investigations to determine the extent of hazardous substances, pollutants or contaminants (including waste materials) in surface soils, subsurface soils and sediments at the Site. As part of this geological investigation Respondent shall:
 - Collect surface soil samples
 - Collect subsurface soil samples
 - Perform soil boring and permeability sampling
 - Collect sediment samples
 - Survey soil gases
 - Test pit
 - Identify real-world horizontal, vertical, and elevation coordinates for all samples and Site features in accordance with EPA Region 5 electronic data requirements

- **Air Investigations.** The Respondent shall conduct air investigations to determine the extent of atmospheric hazardous substances, pollutants or contaminants at and from the Site, which shall include:
 - Collect air samples
 - Establish air monitoring stations

- Site meteorology
- Hydrogeological Investigations (Groundwater). The Respondent shall conduct hydrogeological investigations of groundwater to determine the horizontal and vertical distribution of hazardous substances, pollutants or contaminants in the groundwater and the extent, fate and transport of any groundwater plumes containing hazardous substances, pollutants or contaminants. The hydrogeological investigation shall include:
 - Install well systems
 - Collect samples from upgradient, downgradient, private and municipal wells
 - Collect samples during drilling (e.g., HydroPunch or equivalent)
 - Perform hydraulic tests (such as pump tests, slug tests and grain size analyses)
 - Measure groundwater elevations and determine horizontal and vertical sample locations in accordance with EPA Region 5 electronic data requirements
 - Modeling
 - Determine the direction of regional and local groundwater flow
 - Identify the local uses of groundwater including the number, location, depth and use of nearby private and municipal wells
- Hydrogeological Investigations (Surface Water). The Respondent shall conduct hydrogeological investigations to determine the nature and extent of contamination of surface water from the Site. The hydrogeological investigation shall include:
 - Collect samples
 - Measure surface water elevation and depth
 - Evaluate flow and hydrodynamics
- Geophysical Investigation. The Respondent shall conduct geophysical investigations to delineate waste depths, thicknesses and volume; the elevations of the underlying natural soil layer and the extent of cover over fill areas including the following:
 - Magnetometer
 - Electromagnetic
 - Ground-penetrating Radar
 - Seismic refraction
 - Resistivity
 - Cone penetrometer survey
 - Remote sensor survey
 - Radiological investigation
 - Test pits, trenches and soil borings
- Ecological Investigation. The Respondent shall conduct ecological investigations to assess the risks to aquatic and terrestrial ecosystems from the disposal, release and migration of hazardous substances, pollutants or contaminants at the Site including:
 - Wetland and habitat delineation
 - Wildlife observations

- Community characterization
 - Endangered Species identification
 - Biota sampling and population studies
- Cultural Uses of Natural Resources
 - Historical sites
 - Native American burial sites
 - Dispose of Investigation-Derived Waste. The Respondent shall characterize and dispose of investigation-derived wastes in accordance with local, state, and federal regulations as specified in the FSP (see the Fact Sheet, *Guide to Management of Investigation-Derived Wastes*, 9345.3-03FS (January 1992)).
 - Evaluate and Document the Need for Treatability Studies. If the Respondent or EPA, in consultation with MDEQ, identify response actions that involve treatment, the Respondent shall include treatability studies unless the Respondent satisfactorily demonstrates to EPA, in consultation with MDEQ, that such studies are not needed. When treatability studies are needed, the Respondent shall plan initial treatability testing activities (such as research and study design) to occur concurrently with Site characterization activities.

11. TASK 11: SITE CHARACTERIZATION

Site characterization shall consist of five components: (1) field investigations (and associated laboratory analyses); (2) source characterization; (3) data analysis; (4) risk assessment; and (5) land use assessment. During this portion of the RI Work, data shall be collected and analyzed to provide information required to accomplish the objectives of the Saginaw River/Saginaw Bay RI/FS.

11.1. Field Investigations to Define Site Physical and Biological Characteristics

The Respondent shall implement the Saginaw River/Saginaw Bay RI/FS Work Plan and collect data on the physical and biological characteristics of the Site and its surrounding areas including, as needed, the physical physiography, geology, and hydrology, and specific physical characteristics. This information will be ascertained through a combination of existing data, and physical measurements, observations, and sampling efforts and will be utilized to define potential transport pathways, human and ecological receptor populations, and exposure pathways. In defining the Site's physical characteristics the Respondent will also obtain sufficient engineering data, and may undertake hydrodynamic modeling if approved by EPA, in consultation with MDEQ, in the work plan or subsequent technical memoranda, for the projection of contaminant fate and transport, and development and screening of response action alternatives, including information to assess candidate treatment technologies, if needed.

11.2. Define Sources of Contamination

As established in the Saginaw River/Saginaw Bay RI/FS Work Plan, the Respondent shall assess sources of hazardous substances, pollutants and contaminants to the Site. For each source location, Respondent shall characterize the contamination by sampling in accordance with the approved plans. Respondent shall determine the physical characteristics and chemical constituents and their concentrations for all known and discovered sources of contamination. The Respondent shall conduct sufficient sampling to define the boundaries of the contaminant sources to the level established in the QAPP and DQOs. Defining the source of contamination will include analyzing the potential for contaminant release (e.g., long term soil or sediment stability), contaminant mobility and persistence, and characteristics important for evaluating remedial actions, including information to assess treatment technologies.

11.3. Data Analysis to Describe the Nature and Extent/Fate and Transport of Contamination

The Respondent shall gather information to describe the nature and extent of contamination as a step during the field investigation. To describe the nature and extent of contamination, the Respondent will utilize the information on Site physical and biological characteristics and sources of contamination to give a preliminary estimate of the contaminants that may have migrated or be migrating. The Respondent will then implement an iterative monitoring program and any study program identified in the work plan or sampling plan such that by using analytical techniques sufficient to detect and quantify the concentration and mass of contaminants, the migration of contaminants through the various media at the Site can be determined. In addition, the Respondent shall gather data for calculations of contaminant fate and transport which, if approved by EPA, in consultation with MDEQ, may utilize site-specific hydrodynamic models, fate and transport models, or other environmental modeling tools. This process may be iterative and is continued until the Site conditions are characterized as needed to achieve the purposes of the RI and FS, as established in the QAPP and DQOs.

The Respondent shall analyze and evaluate the data to describe: (1) Site physical and biological characteristics; (2) contaminant source characteristics; (3) nature and extent of contamination; and (4) contaminant fate and transport. Results of the evaluation of Site physical characteristics, source characteristics, and extent of contamination analyses are utilized in the analysis of contaminant fate and transport. The Respondent shall evaluate the actual and potential magnitude of releases from the sources, and horizontal and vertical spread of contamination as well as mobility and persistence of contaminants. Where modeling is appropriate, such models shall be identified in the Saginaw River/Saginaw Bay RI/FS Work Plan or a technical memorandum prior to their use. Upon request, all model data and programming, including any proprietary programs (without waiver of any intellectual property rights), shall be made available to EPA and MDEQ together with a sensitivity analysis. The RI data shall be presented electronically according to EPA Region 5 format requirements. Analysis of data collected for Site characterization will meet the DQOs developed for the Site.

11.4. Baseline Risk Assessment

11.4.1. Baseline Human Health Risk Assessment

The Respondent shall conduct a baseline Human Health Risk Assessment (HHRA) Report, in accordance with the provisions of Section VI.D.1 of this SOW, to determine whether Site contaminants pose a current or potential risk to human health and the environment in the absence of any remedial action. The baseline HHRA will include contaminant identification, exposure assessment, toxicity assessment, and human health risk characterization. Based on contaminant identification, exposure assessment, toxicity assessment, and risk characterization, the Respondent shall reevaluate and update the CSM.

11.4.2. Baseline Ecological Risk Assessment

The Respondent shall conduct a Baseline Ecological Risk Assessment (BERA) Report that evaluates and assesses the risk to the environment posed by Site contaminants in accordance with the provisions of Section VI.D.2 of this SOW, to determine whether Site contaminants pose a current or potential risk. Based on information developed for the BERA, the Respondent shall reevaluate and update the CSM.

11.5. Preliminary Current and Future Land Uses Assessment

The Respondent shall conduct a preliminary evaluation of the current and reasonably anticipated future land uses at the Site and areas within the Site. The objective of the preliminary land use assessment is to identify current and reasonably anticipated future land uses that may be relevant to interpretation of RI results or to the development, assessment and comparison of remedial alternative in the FS

12. TASK 12: REMEDIAL INVESTIGATION (RI) REPORT

In accordance with the schedule in the approved final Saginaw River/Saginaw Bay RI/FS Planning Documents, the Respondent shall submit a Saginaw River/Saginaw Bay RI Report addressing the Site and nearby areas. The Saginaw River/Saginaw Bay RI Report shall be consistent with the Settlement Agreement and this SOW. The key contaminants identified in the RI shall be evaluated for receptor exposure and an estimate of the key contaminants level reaching human or environmental receptors must be made. In addition to the risk assessment results, existing standards and guidelines such as drinking-water standards, water-quality criteria, and other criteria accepted by the EPA, in consultation with MDEQ, as appropriate for the situation shall be used by the Respondent to evaluate potential effects on human receptors who may be exposed to the key contaminant(s) above appropriate standards or guidelines. The Respondent shall complete the RI Report in accordance with the requirements in Section VI.E. Additionally, the RI Report shall include as attachments the HHRA Report in accordance with the requirements in Section VI.D.1, the BERA Report in accordance with the requirements in Section VI.D.2, and the Preliminary Current and Future Land Use Assessment.

13. TASK 13: DEVELOPMENT AND SCREENING OF ALTERNATIVES

The Respondent shall develop and screen an appropriate range of site-specific remedial alternatives that will be evaluated in the Saginaw River/Saginaw Bay FS. The range of alternatives shall include, as appropriate, options in which treatment is used to reduce the toxicity, mobility, or volume of wastes, but which vary 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; removal and disposal; natural recovery processes; and a no-action alternative. The Respondent shall perform the following activities as a function of the development and screening of remedial alternatives.

The Respondent shall prepare and submit an Alternatives Screening Technical Memorandum in accordance with the Schedule in Exhibit A to this SOW. Comments on the Alternatives Screening Technical Memorandum shall be addressed in the draft FS, after EPA authorizes the Respondent to proceed with preparation of the FS pursuant to Task 14. For sediments, the range of technologies and the screening approach will be consistent with but not limited by EPA's *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (2005).

The Alternatives Screening Technical Memorandum shall summarize the Work performed and the results of each of the above tasks, and shall include an alternatives array summary. If required by EPA, in consultation with MDEQ, the Respondent shall modify the alternatives array to assure that the array identifies a complete and appropriate range of viable alternatives to be considered in the detailed analysis. The Alternatives Screening Technical Memorandum shall document the methods, the rationale and the results of the alternatives screening process, and shall include:

13.1. Remedial Action Objectives

The Respondent shall develop site-specific RAOs. Based on the baseline human health and ecological risk assessments, the Respondent shall document the site-specific RAOs which shall specify the contaminants and media of concern, potential exposure pathways and receptors, and contaminant level or range of levels (at particular locations for each exposure route) that are protective of human health and the environment. RAOs shall be developed by considering the factors set forth in 40 C.F.R. § 300.430(e)(2)(i) and pertinent EPA guidance.

13.2. Identify Areas or Volumes of Media

In the Alternatives Screening Technical Memorandum, the Respondent shall identify areas or volumes of media to which response actions may apply, taking into account requirements for protectiveness as identified in the remedial action objectives. The Respondent shall also take into account the chemical and physical characterization of the Site.

13.3. Identify, Screen, and Document Remedial Technologies

In the Alternatives Screening Technical Memorandum, the Respondent shall identify and evaluate applicable technologies and eliminate those that cannot be implemented at the Site. The Respondent shall evaluate process options 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 Respondent shall summarize and include the technology types and process options in the Alternatives Screening Technical Memorandum. Whenever practicable, the alternatives shall also consider the CERCLA preference for treatment over conventional containment or land disposal approaches.

13.4. Assemble and Document Alternatives

The Respondent shall assemble the selected representative technologies into alternatives for each affected medium or operable unit. Together, all of the alternatives shall represent a range of treatment and containment combinations that shall address either the Site or the operable unit as a whole. It is anticipated that alternatives to address contaminated sediment will represent a range of removal, capping, and monitored natural recovery combinations, as appropriate. All alternatives other than “no action” shall include institutional controls and monitoring, as appropriate. The Respondent shall prepare a summary of the assembled alternatives and their related ARARs. If necessary, the Respondent shall conduct the screening of alternatives to assure that only the alternatives with the more favorable composite evaluation of all factors are retained for further analysis. As appropriate, the screening shall preserve the range of treatment and containment alternatives that was initially developed. The Respondent shall specify the reasons for eliminating alternatives during the preliminary screening process.

14. TASK 14: DETAILED ANALYSIS OF ALTERNATIVES (FS REPORT)

The Respondent shall conduct a detailed analysis of remedial alternatives to provide EPA with the information needed to select a Site remedy, in consultation with MDEQ. In accordance with the Schedule in Exhibit A to this SOW, the Respondent shall prepare and submit a draft Saginaw River/Saginaw Bay FS. In accordance with the requirements of Section VI.F of this SOW, the FS report shall summarize the development and screening of the remedial alternatives and present the detailed analysis of remedial alternatives.

15. TASK 15: SAGINAW RIVER AND SAGINAW BAY RD

After EPA, in consultation with MDEQ, has signed a ROD for remedial action or an Action Memorandum for a NTCRA for the Saginaw River and/or Saginaw Bay, the Respondent shall undertake the RD as set forth herein. The RD will address the timing and sequencing of the selected response actions. The objectives of the response actions at the Site are expected to be to protect human health and the environment and to comply with applicable federal and state laws. In accordance with the Schedule in Exhibit A of this SOW, the Respondent shall submit all documents or deliverables required as part of this Task.

This RD is intended to build on prior Work, particularly from prior Work in the Tittabawassee River, and to be protective of human health and the environment, consistent with the National Contingency Plan, and to comply with the ROD and/or Action Memorandum. If a ROD specifies that pre-design work will be required, the results may be used to establish or refine performance expectations and goals. The RD will be conducted so pertinent information will be taken into account as it becomes available.

At a minimum, the RD shall address:

15.1. Remedial Design Planning

In accordance with the schedule in Exhibit A of this SOW, the Respondent shall submit a draft RD Work Plan. The RD Work Plan shall discuss how each component of the RD will be addressed; identify the phases, tasks and sequencing necessary to complete the RD; and provide an overall management strategy for completion of such tasks. The RD Work Plan shall also include a project schedule for major design activities and submissions. The plan shall document the responsibility and authority of the entities and key personnel involved in the RD and shall include a description of qualifications of key personnel directing the RD, including contractor personnel.

The RD may require pre-design studies to provide information necessary to fully implement the remedial design and remedial action. In such cases, the RD Work Plan shall include work tasks and a schedule to complete the pre-design work. The Respondent shall implement the pre-design work in accordance with the final RD Work Plan. The results of the pre-design studies shall be included with the preliminary design, or on another approved schedule.

15.2. Preparation of Remedial Design Documents

The goal of this sub-task is to develop a technical package (or packages) with a complete remedial design (which may include performance specifications) that addresses all elements of the remedy selected in the ROD and/or Action Memorandum. The Respondent may submit more than one set of design submittals reflecting different components of the response action.

The Preliminary and Final Design Documents will be submitted as set forth in the schedule in Exhibit A of this SOW. At EPA's discretion, in consultation with MDEQ, Intermediate Design Documents may also be required, on a schedule to be developed in the RD Work Plan. Required elements for the RD phases are specified in Section VI.H.

VI. GENERAL DOCUMENT REQUIREMENTS

Several of the tasks required in this SOW require similar supporting plans (e.g., Health and Safety Plans) and/or multiple submittals of the same type of documents (e.g., RD documents). The following section specifies the requirements for such plans and documents. It is the intent of this SOW to reduce redundancies and streamline document preparation. With EPA's approval,

previously approved plans may be amended for subsequent work phases. The Respondent shall meet the following general requirements for the relevant documents:

A. Field Sampling and/or Sampling and Analysis Plans

All data obtained by the Respondent under this SOW shall be taken in accordance with an approved Field Sampling Plan (FSP) or Sampling and Analysis Plan (SAP). The Respondent shall prepare the FSP and/or SAP portion of any documents to ensure that sample collection and analytical activities are conducted in accordance with technically acceptable protocols and that the data meet DQOs as established in the Quality Assurance Project Plan (QAPP) and FSP and/or SAP. All sampling and analyses performed shall conform to EPA direction, approval, and guidance regarding sampling, quality assurance/quality control (QA/QC), data validation, and chain of custody procedures. This document shall provide standard operating procedures (SOPs) for sampling activities.

The FSP shall incorporate elements of dynamic field activities, to the extent appropriate, based on site-specific conditions and data needs. Dynamic field activities shall be used to streamline Site activities with real-time data and real-time decisions in accordance with site specific QA/QC requirements. This approach, sometimes called the Triad approach, involves systematic planning, a dynamic work plan strategy, and real time field measurements. Dynamic field activities will be conducted consistent with OSWER No. 9200.1-40, *Using Dynamic Field Activities for On-Site Decision Making: A Guide for Project Managers*.

B. Quality Assurance Project Plan (QAPP)

The Respondent shall prepare a QAPP that covers sample analysis and data handling for all samples collected under this SOW, based on the Settlement Agreement and guidance provided by EPA. The Respondent shall prepare the QAPP in accordance with the Uniform Federal Policy for Implementing Environmental Quality Systems (UFP-QS), the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP) Manual, the UFP-QAPP Workbook, and the UFP-QAPP Compendium. The EPA Office of Solid Waste and Emergency Response approved the UFP-QS (Final, Version 2, March 2005). The QAPP may include Field-Based Analytical Methods, if appropriate and scientifically defensible. Information on the UFP-QAPP can be found at <http://www.epa.gov/fedfac/documents/qualityassurance.htm>.

The Respondent shall demonstrate, in advance to EPA's satisfaction, that each laboratory it may use is qualified to conduct the proposed work. This includes use of methods and analytical protocols for the chemicals of concern in the media sampled within detection and quantification limits consistent with both QA/QC procedures and DQOs approved in the QAPP. 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 the Site for the purposes proposed and QA/QC procedures approved by EPA shall be used. The Respondent shall only use laboratories which have a documented QA program which complies with ANSI/ASQC E-4 1994, *Specifications and Guidelines for Quality Systems for*

Environmental Data Collection and Environmental Technology Programs, (American National Standard, January 5, 1995) and *EPA Requirements for Quality Management Plans (QA/R-2)* (EPA/240/B-01-002, March 2001) or equivalent documentation as determined by EPA.

Upon request by EPA, the Respondent shall have its laboratory analyze samples submitted by EPA for quality assurance monitoring. The Respondent shall provide EPA with the QA/QC procedures followed by all sampling teams and laboratories performing data collection and/or analysis. The Respondent shall also ensure the provision of analytical tracking information consistent with OSWER Directive No. 9240.0-2B, *Extending the Tracking of Analytical Services to PRP-Lead Superfund Sites*.

The Respondent shall participate in a pre-QAPP meeting or conference call with EPA. The purpose of this meeting or conference call is to discuss QAPP requirements and obtain any clarification needed to prepare the QAPP.

C. Health and Safety Plan

The Respondent shall prepare a Health and Safety Plan (HSP) for all Work conducted under this SOW. The HSP shall conform to the Respondent's health and safety program and comply with the Occupational Safety and Health Administration (OSHA) regulations and protocols outlined in 29 C.F.R. Part 1910. The HSP shall be prepared in accordance with EPA's Standard Operating Safety Guide (PUB 9285.1-03, PB 92-963414, June 1992). The HSP shall 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. EPA does not "approve" the Respondent's HSP, but rather EPA reviews it to ensure that all the necessary elements are included, and that the plan provides for the protection of human health and the environment, and after that review provides comments as may be necessary and appropriate. The safety plan must, at a minimum, follow the EPA's guidance document *Standard Operating Safety Guides* (Publication 9285.1-03, PB92-963414, June 1992).

D. Risk Assessments

The Respondent shall conduct each risk assessment to determine whether Site contaminants pose an unacceptable current or potential risk to human health and the environment in the absence of any remedial action (for the Saginaw River/Saginaw Bay baseline assessment) or after response actions are complete (for the Tittabawassee River Segment-Specific Post-Response Residual Risk Demonstrations).

D.1. Baseline or Post-Construction Human Health Risk Assessment

As required in this SOW, the Respondent shall submit Human Health Risk Assessment (HHRA) Reports. The HHRA's will include contaminant identification, exposure assessment, toxicity assessment, and human health risk characterization.

The Respondent shall conduct the HHRAs to focus on actual and potential risks to persons who may be exposed to Site hazardous substances, pollutants or contaminants as well as risks to the nearby residential, recreational, agricultural and industrial worker populations from exposure to hazardous substances, pollutants or contaminants in groundwater, soils, sediments, surface water, air, and ingestion of contaminated organisms in nearby, impacted ecosystems and agricultural settings (to the extent such pathways are applicable). The HHRAs shall define central tendency and reasonable maximum estimates of exposure for current land use conditions and reasonably anticipated future land use conditions. The HHRAs shall use data from the Site and nearby areas to identify the contaminants of concern (COCs), provide an estimate of how and to what extent human receptors might be exposed to these COCs, and provide an assessment of the health effects associated with these COCs. At EPA's direction, in consultation with MDEQ, the Saginaw River/Saginaw Bay baseline HHRA shall propose RAOs, which may include target action levels for COCs (carcinogenic and non-carcinogenic).

The Respondent shall conduct the HHRAs in accordance with applicable or relevant EPA guidance including, at a minimum: "Risk Assessment Guidance for Superfund (RAGS), Volume I - Human Health Evaluation Manual (Part A)," Interim Final (EPA-540-1-89-002)," OSWER Directive 9285.7-01A; December 1, 1989; and "Risk Assessment Guidance for Superfund (RAGS), Volume I - Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments)," Interim, (EPA 540-R-97-033), OSWER 9285.7-01D, January, 1998 or subsequently issued guidance.

As appropriate, the Respondent shall also conduct the HHRAs in accordance with the following additional guidance found in the following OSWER directives and other guidance listed in Exhibit B to this SOW:

- 1) "Clarification to the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities," OSWER Directive 9200.4-27; August, 1998,
- 2) "Implementation of the Risk Assessment Guidance for Superfund (RAGS) Volume I - Human Health Evaluation Manual, (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments) (Interim)," OSWER Directive 9285.7-01D-1; December 17, 1997,
- 3) "Soil Screening Guidance: Technical Background Document," OSWER Directive 9355.4-17A; May 1, 1996 and "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER Directive 9355.4; March 24, 2001,
- 4) "Soil Screening Guidance: User's Guide," Publication 9355.4-23; April, 1996,
- 5) "Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities," OSWER Directive 9355.4-12; July 14, 1994,

- 6) "Guidance Manual for the Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children," Publication 9285.7-15-1; February, 1994, and associated, clarifying Short Sheets on IEUBK Model inputs, including but not limited to OSWER 9285.7-32 through 34, as listed on the OSWER lead internet site at www.epa.gov/superfund/programs/lead/prods.htm,
- 7) "Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children," Version 0.99D, NTIS PB94-501517, 1994 or "Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children," Windows© version, 2001,
- 8) "Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual: (Part B, Development of Risk-based Preliminary Remediation Goals)," Interim, OSWER Directive 9285.7-01B; December, 1991,
- 9) "Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors," OSWER Directive 9285.6-03; March 25, 1991, and
- 10) "Exposure Factors Handbook," Volumes I, II, and III; August 1997 (EPA/600/P-95/002Fa, b, c).

To the extent applicable, the Respondent shall also comply with the guidance on assessing human health risk associated with adult exposures to lead in soil as found in the following document: "Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil," December, 1996. This document may be downloaded from the Internet at the following address: www.epa.gov/superfund/programs/lead/prods.htm.

With regard to dose-response in human health assessment, EPA does not develop or evaluate probabilistic approaches for dose-response in human health assessment and, further, discourages undertaking such activities on a site-by-site basis. Such activities require contaminant specific national consensus development and national policy development. (Risk Assessment Guidance for Superfund; Process for Conducting Probabilistic Risk Assessment; December 31, 2001).

Additional applicable or relevant guidance other than the guidance and literature listed in Exhibit B or otherwise issued by EPA may be used for the HHRAs only if approved by EPA, in consultation with MDEQ.

The Respondent shall prepare the Human Health Risk Assessment Reports according to the guidelines outlined below:

- **Hazard Identification.** The Respondent shall review available information on the hazardous substances present at the Site and identify the contaminants of concern. The contaminant list may be refined as provided in relevant guidance.

- Dose-Response Assessment. The Respondent shall select contaminants of concern based on their intrinsic toxicological properties.
- Conceptual Exposure/Pathway Analysis. The Respondent shall identify and analyze critical exposure pathways (e.g., consumption of fish or homegrown vegetables, soil ingestion). The proximity of contaminants to exposure pathways and their potential to migrate into critical exposure pathways shall be assessed.
- Characterization of Site and Potential Receptors. The Respondent shall identify and characterize human populations in the exposure pathways.
- Exposure Assessment. The exposure assessment will identify the magnitude of actual or potential human exposures in various areas of the Site, the frequency and duration of these exposures, and the routes by which receptors are exposed. The exposure assessment shall include an evaluation of the likelihood of such exposures occurring and shall provide the basis for the development of acceptable exposure levels. In developing the exposure assessment, the Respondent shall develop central tendencies and reasonable maximum estimates of exposure for both current land use conditions and reasonably anticipated future land use conditions at the Site.
- Risk Characterization. During risk characterization, Respondent shall compare chemical-specific toxicity information, combined with quantitative and qualitative information from the exposure assessment, to measured levels of contaminant exposure and the levels predicted through environmental fate and transport modeling (if performed). These comparisons shall be used to determine whether concentrations of contaminants at or near the Site are affecting or could potentially affect human health.
- Identification of Limitations/Uncertainties. The Respondent shall identify critical assumptions (e.g., background concentrations and conditions) and uncertainties in the report.
- CSM. Based on contaminant identification, exposure assessment, toxicity assessment, and risk characterization, the Respondent shall reevaluate and update the CSM.

D.2. Baseline or Post-Construction Ecological Risk Assessment

As required by this SOW, the Respondent shall submit Ecological Risk Assessment Reports. In the Ecological Risk Assessment Reports, the Respondent shall evaluate and assess the risk to the environment posed by Site contaminants. Respondent shall prepare the Ecological Risk Assessment Reports in accordance with EPA guidance including, at a minimum: "Ecological Risk Assessment Guidance for Superfund, Process for Designing and Conducting Ecological Risk Assessments, (EPA-540-R-97-006, June 1997), OSWER Directive 9285.7-25 and as appropriate, shall follow the guidelines outlined below:

- **Hazard Identification.** The Respondent shall review available information on the hazardous substances present at the Site and identify the contaminants of concern. The contaminant list may be refined as provided in relevant guidance.
- **Dose-Response Assessment.** The Respondent must select contaminants of concern based on their intrinsic toxicological properties.
- **Conceptual Exposure/Pathway Analysis.** Critical exposure pathways (e.g., food items, surface water) shall be identified and analyzed. The proximity of contaminants to exposure pathways and their potential to migrate into critical exposure pathways shall be assessed.
- **Characterization of Site and Potential Receptors.** The Respondent shall identify and characterize environmental exposure pathways.
- **Selection of Chemicals, Species, and End Points.** In preparing the assessment, the Respondent will select representative chemicals, representative species, and end points on which to concentrate.
- **Exposure Assessment.** In the exposure assessment, the Respondent must identify the magnitude of environmental exposures, the frequency and duration of these exposures, and the routes by which receptors are exposed. The exposure assessment shall include an evaluation of the likelihood of such exposures occurring and shall provide the basis for the development of acceptable exposure levels. In developing the exposure assessment, the Respondent shall develop central tendencies and reasonable maximum estimates of exposure for both current land use conditions and reasonably anticipated future land use conditions at the Site. Given the size of the Site, if certain exposures are reasonably expected to vary significantly among sub-areas of the Site, the Ecological Risk Assessment may assess exposure on the basis of sub-areas.
- **Toxicity Assessment/Ecological Effects Assessment.** The toxicity and ecological effects assessment will address the types of adverse environmental effects associated with chemical exposures, the relationships between magnitude of exposures and adverse effects, and the related uncertainties for contaminant toxicity, using multiple lines of evidence as appropriate.
- **Risk Characterization.** During risk characterization, the Respondent shall compare chemical-specific toxicity information, combined with quantitative and qualitative information from the exposure assessment, to measured levels of contaminant exposure and the levels predicted through environmental fate and transport modeling (if performed), along with observed effects in Site receptors and comparisons to receptors at reference locations, to estimate risks to ecological receptors. These comparisons shall determine whether concentrations of contaminants at or near the Site are affecting or could potentially affect the environment.

- Identification of Limitations/Uncertainties. The Respondent shall identify critical assumptions (e.g., background concentrations and conditions) and uncertainties in the report.
- CSM. Based on information developed for the Ecological Risk Assessment Reports, the Respondent shall reevaluate and update the CSM.

E. Remedial Investigation Report

Each RI Report shall accurately establish the site characteristics such as media contaminated, extent of contamination, and the physical boundaries of the contamination, as needed to fulfill the purposes of the RI. Pursuant to this objective, the Respondent shall obtain only the amount of detailed data necessary to determine the key contaminants' movement and extent of contamination. The key contaminants must be selected based on persistence and mobility in the environment, degree of hazard and/or where they can be reasonably documented to be representative of other contaminants of concern. The Respondent shall complete each RI Report to include site-specific findings, and which addresses the following:

- Executive Summary
- Site Background. The Respondent shall assemble and review available facts about the regional conditions and conditions specific to the Site under investigation.
- Investigation (as applicable)
 - Site Reconnaissance
 - Field Investigation & Technical Approach
 - Chemical Analysis & Analytical Methods
 - Field Methodologies
 - Biological
 - Surface Water
 - Sediment
 - Soil Boring
 - Soil Sampling
 - Monitoring Well Installation
 - Groundwater Sampling
 - Hydrogeological Assessment
 - Air Sampling
 - Waste Investigation
 - Geophysical Investigation
- Site Characteristics (as applicable)
 - Geology
 - Hydrogeology

- Meteorology
- Demographics and Land Use
- Ecological Assessment
- Cultural Uses of Natural Resources
- Hydrodynamics
- Nature and Extent of Contamination
 - Contaminant Sources
 - Contaminant Distribution and Trends
- Fate and Transport
 - Contaminant Characteristics
 - Transport Processes
 - Contaminant Migration Trends
- Summary and Conclusions

F. Feasibility Study Report

Each FS report shall summarize the development and screening of the remedial alternatives and present the detailed analysis of remedial alternatives. In addition, the FS Reports shall also include the information EPA will need to prepare relevant sections of the Record of Decision (ROD) for the Site [see Chapters 6 and 9 of EPA’s *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (EPA 540-R-98-031, July 1999) for the information that is needed]. Each FS will include the following analysis:

F.1. Detailed Analysis of Alternatives

The Respondent shall conduct a detailed analysis of the remedial alternatives for the relevant Site component. The detailed analysis shall include an analysis of each remedial option against each of the nine evaluation criteria set forth in 40 C.F.R. § 300.430(e)(9)(iii) and a comparative analysis of all options using the same nine criteria as a basis for comparison.

F.1.1. Apply Nine Criteria and Document Analysis

The Respondent shall apply the nine evaluation criteria to the assembled remedial alternatives to ensure that the selected remedial alternative will protect human health and the environment and meet remedial action objectives; will comply with or include a waiver of ARARs; will be cost-effective; will utilize 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 and how the alternative meets each of the remedial action objectives; (2) compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume through treatment; (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 Respondent shall 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 Respondent does not have direct input on criteria (8) state (or support agency) acceptance and (9) community acceptance, EPA will address these criteria.

F.1.2. Compare Alternatives Against Each Other and Document the Comparison of Alternatives

The Respondent shall perform a detailed comparative analysis between the remedial alternatives. That is, the Respondent shall compare each alternative against the other alternatives using the nine evaluation criteria as a basis of comparison. EPA, in consultation with MDEQ, will identify and select the preferred alternative.

F.2. Alternatives Analysis for Institutional Controls

For any Alternative that relies on Institutional Controls, the Respondent shall include an evaluation of the following: 1) *Overall Protection of Human Health and the Environment* including what specific institutional control components will ensure that the alternative will remain protective and how these specific controls will meet remedial action objectives; 2) *Compliance with ARARs*; 3) *Long Term Effectiveness* including the adequacy and reliability of institutional controls and how long the institutional control must remain in place; 4) *Short Term Effectiveness* including the amount of time it will take to impose the Institutional Control; 5) *Implementability* including research and documentation that the proper entities (e.g., potentially responsible parties, state, local government entities, local landowners conservation organizations) are willing to enter into any necessary agreement or restrictive covenant with the proper entities and/or that laws governing the restriction exist or allow implementation of the institutional control; 6) *Cost* including the cost to implement, maintain, monitor and enforce the institutional control; and 7) *State and Community Acceptance* of the Institutional Control.

F.3. Current and Future Land Uses and Reuse Assessment

As an attachment to the FS Reports, the Respondent shall submit a memorandum that evaluates the current and reasonably anticipated future land uses at areas within the Site potentially subject to response under the remedial alternatives in the FS. The memorandum shall identify: 1) past uses at the areas including title and lien information; 2) current uses of the areas and neighboring areas; 3) the owner's plans for the area following cleanup and any prospective purchasers; 4) applicable zoning laws and ordinance; 5) current zoning; 6) applicable local area land use plans, master plans and how they affect the Site and/or area; 7) existing local and recorded restrictions on property; 8) property boundaries; 9) groundwater use determinations, wellhead protection areas, recharge areas and other areas identified in the state's Comprehensive Ground Water

Protection Program, if relevant to any remedial alternative; 10) floodplains, wetland, or endangered or threatened species; and 11) utility rights of way and other easements.

If EPA, in consultation with MDEQ, determines that a Reuse Assessment is necessary, the Respondent will perform the Reuse Assessment in accordance with EPA guidance, including, but not limited to: "Reuse Assessments: A Tool To Implement The Superfund Land Use Directive, OSWER 9355.7-06P, June 4, 2001 upon request of EPA. The Reuse Assessment should provide sufficient information to develop realistic assumptions of the reasonably anticipated future uses for the Site and/or area.

G. Engineering Evaluation/Cost Analysis (EE/CA)

The Respondent shall complete each EE/CA to include the following elements, if the information is not available in other documents:

G.1. Executive Summary

G.2. Site Characterization

- **Site Description and Background**
 - Site Location and Physical Setting
 - Geology/Hydrology/Hydraulics
 - Surrounding Land Use and Populations
 - Sensitive Ecosystems
 - Meteorology
- **Previous Removal Actions**
- **Source, Nature and Extent of Contamination**
- **Analytical Data**

G.3. Identification of Removal Action Objectives

- **Determination of Removal Scope**
- **Determination of Removal Schedule**
- **Identification and Compliance with ARARs**
- **Planned Remedial Activities**

G.4. Identification and Analysis of Removal Action Alternatives

G.5. Detailed Analysis of Alternatives

- **Effectiveness**

- Overall Protection of Public Health and the Environment
- Compliance with ARARs and Other Criteria, Advisories, and Guidance
- Long-term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short-term Effectiveness
- **Implementability**
 - Technical Feasibility
 - Administrative Feasibility
 - Availability of Services and Materials
 - State and Community Acceptance
- **Cost**
 - Direct Capital Costs
 - Indirect Capital Costs
 - Long-term Operation and Maintenance

G.6. Comparative Analysis of Removal Action Alternatives

G.7. Schedule for EE/CA Submission

H. Remedial Design Documents

All design plans and specifications will be developed consistent with EPA's Superfund Remedial Design and Remedial Action Guidance (OSWER Directive 9355.0-4A). The Respondent shall complete each RD to meet the following requirements:

H.1. Preliminary Design Documents

The Preliminary Design Documents will include or discuss the following:

- Preliminary plans, drawings and sketches, including design calculations;
- Results of studies and additional field sampling and analysis, if any, not discussed in previous submissions;
- Design assumptions and parameters, including design restrictions, process performance criteria, appropriate unit processes for the treatment train(s), and expected removal or treatment efficiencies for both the process and waste (concentration and volume), as applicable;
- Proposed cleanup verification methods, including compliance with Applicable and Relevant and Appropriate Requirements (ARARs);

- Outline Construction Quality Assurance Plan (CQAP);
- Outline of required specifications;
- Proposed siting/locations of processes/construction activities;
- Real estate, easement, and substantive permit equivalency (or permit) requirements;
- Expected long-term monitoring and operation requirements; and
- Preliminary construction schedule (anticipated durations), including contracting strategy.

H.2. Intermediate Design Documents

If EPA, in consultation with MDEQ, requires an Intermediate Design phase, the Respondent shall submit the Intermediate Design when the design effort is approximately 60 % complete. The Intermediate Design shall fully address all comments made to the preceding design submittal. The Intermediate Design submittal shall include those elements listed for the Preliminary Design, as well as, the following:

- Draft Performance Standard Verification Plan; and
- Draft Construction Quality Assurance Plan (CQAP).

H.3. Final Design Documents

The Final Design Documents will build on those elements listed for the Preliminary Design Documents, and will address comments on the Preliminary or Intermediate Design provided by EPA. The Final Design will also include¹:

- Final Performance Standard Verification Plan;
- Reproducible drawings and specifications suitable for bid advertisement;
- CQAP which describes the Site specific components of the quality assurance program which shall ensure that the completed project meets or exceeds all design criteria, plans, and specifications. The CQAP shall contain, at a minimum, the following elements:
 - Responsibilities and authorities of all organizations and key personnel involved in the design and construction of the Remedial Action

¹ It is expected that the Final Design can support a revised Capital and Operation and Maintenance Cost Estimate that may be requested by EPA separately.

- .Qualifications of a Quality Assurance Official to demonstrate he possesses the training and experience necessary to fulfill his identified responsibilities
 - Protocols for sampling and testing to monitor construction of the remedial action;
 - Identification of proposed quality assurance sampling activities including the sample size, locations, frequency of testing, acceptance and rejection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation; and
 - Reporting requirements for CQAP activities, including such items as daily summary reports, inspection data sheets, problem identification and corrective measures reports, design acceptance reports, and final documentation.
- Draft Operation, Maintenance and Monitoring Plan (OMMP)²;
 - Draft Institutional Control (IC) Plan². ICs will be needed to restrict uses of areas at the Site where on-site hazardous substances remain above levels that allow for unlimited used and unrestricted exposure. ICs may also be necessary to prevent interference with remedy components. A description of EPA's IC initiative may be found in "Strategy to Ensure Institutional Control Implementation at Superfund Sites," OSWER No. 9355.0-106 (2004), <http://www.epa.gov/superfund/action/ic/strategy.htm>. The IC Plan shall include the following:
 - Map of Expected Restricted Areas: Provide map(s) that identify the expected boundaries of the restricted areas (e.g., areas that will require a cover or cap; area of groundwater contamination that exceeds performance standards), boundaries of areas covered by existing ICs (if any), boundaries of the Site, streets, easements, encumbrances, property ownership, assessor's parcel number or other recorded plat or survey information;
 - Survey of unrestricted areas: Provide a survey of any areas that may be available for unrestricted use and unlimited access;
 - GIS Information: Provide Geographic Information System (GIS) coordinates that shows the expected boundaries of restricted areas, areas covered by existing ICs (if any), boundaries of the Site, easements and other encumbrances. Identify the accuracy of the GIS coordinates that describe these locations. Please format the coordinates of the restricted areas, areas covered by existing ICs and Site boundaries into an ESRI polygon-shape file. The shape file shall be projected into the UTM, NAD 83 projection system (or other system specified by EPA). Please identify the UTM zone. Provide an attribute name in the shape file for each

² The draft OMMP and IC Plan will be finalized following completion of remedial construction. However, certain work, such as well closure, may be conducted in advance of the final OMMP, following EPA's written direction.

polygon submitted. For example: “site boundary”, “no restrictions”, “recreational only”, “industrial only”;

- Documentation of Existing Controls: If any ICs currently exist, provide documentation of the ICs and an assessment of those controls. Discuss whether existing controls achieve the IC objectives for the Site.
- Recommendations: Propose ICs that will ensure that the use restrictions are correctly implemented, are maintained and will be protective in the short term and the long term. Propose controls for remaining areas that do not support unlimited use and unrestricted exposure but are not covered by existing controls. Include a title commitment for any proposed proprietary control. Propose subrogation agreements for any encumbrance that negatively impacts restricted areas. Include a draft restrictive covenant and environmental easement that is enforceable under the laws of Michigan and that prohibits interference of the soil cover and underlying soils on the site and prohibits groundwater use until performance standards are met. Demonstrate that the proposed signer of the restrictive covenant and easement currently owns the property. Demonstrate that the proposed restrictive covenant and easement is free and clear of prior liens and encumbrances via a current title insurance commitment or other evidence of title acceptable to EPA.
- Propose a schedule for implementation of the ICs after review and approval;
- Propose a monitoring plan to ensure that ICs are maintained, complied with in the short term and in the long term, and remain in place. The monitoring plan must include a schedule and an annual certification to EPA that ICs are in place and remain effective.
- Propose a schedule for the construction and implementation of the Remedial Action which identifies timing for initiation and completion of all critical path tasks. The final project schedule, which may be developed as part of the Remedial Action Work Plan that is anticipated to be developed under a future Consent Decree, shall include specific dates for completion of the project and major milestones.; and
- The following supporting plans:
 - *Health and Safety Plan (HSP)*
The final Remedial Action HSP will be submitted prior to the start of construction, in accordance with the approved construction schedule.
 - *Contingency Plan*

The final Contingency Plan will be submitted prior to the start of construction, in accordance with the approved construction schedule. The Contingency Plan will include, at a minimum, the following:

- Name of the person or entity responsible for responding in the event of emergency incident;
- Plan and date to meet with the local community, including local, State and Federal agencies involved in the remedial action, as well as local emergency squads and hospitals; and
- First-aid information.

EXHIBIT A
SCHEDULE FOR MAJOR DELIVERABLES

The following schedule shall apply to the plans, reports, and documents required by this SOW and Settlement Agreement. The schedule may be modified when: 1) a different schedule is approved by EPA, in consultation with MDEQ, in a Work Plan or other EPA approved document; or 2) the Respondent submits in writing a request for a specific extension or schedule modification, including justification and good cause for the extension or modification, and EPA, in consultation with MDEQ, approves any such request.

Task/Deliverable	Due Date
General Site-wide Tasks	
Task 1.1 Work Plan to assess potential acute or near-term exposure risks	Due 45 days after the effective date of the Settlement Agreement.
Task 1.2 Work Plan to assess potential acute or near-term transport risks	Due 45 days after the effective date of the Settlement Agreement.
Task 1.3 Report on assessment of potential acute or near-term exposure or transport risks, and potential mitigation measures	In accordance with the schedule in the final Work Plan.
Task 1.3 Modification of report to enhance planning and development of mitigation measures consistent with an FS or EE/CA, pursuant to EPA's direction	Due 75 days after direction from EPA
Task 2.2 Technical Assistance Plan (TAP)	Due 45 days after a request from EPA.
Task 3 Long-term Monitoring Plan	Due 90 days after the effective date of the Settlement Agreement.
Task 4.1 Candidate Technologies and Testing Needs Technical Memorandum	Due 21 days after a request from EPA
Task 4.2 Treatability or Pilot Study Work Plan	Due 45 days after a request from EPA.
Task 4.3 Treatability or Pilot Study Evaluation Report	In accordance with the schedule in the final Work Plan.
Task 5.1 Monthly Reports	On the 15 th day of each month or the first business day after the 15 th of the month commencing 30 days after the effective date of the Settlement Agreement.
Task 5.2 Annual Progress Reports	Due one year after the effective date of the Settlement Agreement and annually thereafter.
Task 5.3 Geodatabase and periodic updates	Due 90 days after the effective date of the Settlement Agreement and every three months thereafter, or on another schedule approved by EPA, in consultation with MDEQ.
Tittabawassee River Tasks	
Task 6.1 Segment Delineation technical memorandum	Meeting between parties within 15 days of the effective date of the Settlement Agreement.

Task/Deliverable	Due Date
	Technical memorandum due 30 days after the effective date of the Settlement Agreement.
Task 6.2 Wetlands Inventory	Due 2 years after the effective date of the Settlement Agreement.
Task 6.2 Accelerated Wetlands Inventory for a portion of the river	Due 30 days after a request from EPA.
Task 6.3 Modeling and/or Holistic Assessment tools	Due 90 days after the effective date of the Settlement Agreement.
Task 7 Segment-specific remediation proposal for the first segment	Due 90 days after the effective date of the Settlement Agreement.
Task 7 Segment-specific remediation proposal for subsequent downstream segments	Due 90 days after EPA's notice to proceed.
Task 7.2 FS or EE/CA required by EPA's direction to develop an accelerated response for any ASC	Due 45 days after a request from EPA.
Task 8.1 RD Work Plan	Due 45 days after EPA's signature of a ROD or NTCRA Action Memorandum
Task 8.2.1 Preliminary design	In accordance with the schedule in the final RD Work Plan
Task 8.2.2 Intermediate design	In accordance with the schedule in the final RD Work Plan
Task 8.2.3 Final design	In accordance with the schedule in the final RD Work Plan
Task 9 Segment-specific post-response residual risk demonstration	Due 45 days after the completion of construction, or on a schedule otherwise approved by EPA.
Task 9.3 Submittal of a new segment-specific response proposal	Due 90 days after receipt of EPA's determination that the segment-specific post-response residual risk demonstration does not demonstrate acceptable risk.
Saginaw River and Bay Tasks	
Task 10.2 RI/FS Work Plan	Due 90 days after EPA's notice to proceed.
Task 12 RI Report	In accordance with the schedule in the final RI/FS Work Plan.
Task 13 Alternatives Screening Technical Memorandum	In accordance with the schedule in the final RI/FS Work Plan.
Task 14 FS Report	In accordance with the schedule in the final RI/FS Work Plan.
Task 15.1 RD Work Plan	Due 45 days after EPA's signature of a ROD
Task 15.2.1 Preliminary design	In accordance with the schedule in the final RD Work Plan
Task 15.2.2 Intermediate design	In accordance with the schedule in the final RD Work Plan

Task/Deliverable	Due Date
Task 15.2.3 Final design	In accordance with the schedule in the final RD Work Plan
General Documents	
FSP and/or SAP	To be included in any plan that requires data collection
QAPP	Due 45 days after the effective date of the Settlement Agreement.
HSP	Due 45 days after the effective date of the Settlement Agreement.

EXHIBIT B PARTIAL LIST OF GUIDANCE

The following list, although not comprehensive, comprises many of the regulations and guidance documents that apply to the RI/FS process. The majority of these guidance documents, and additional applicable guidance documents, may be downloaded from the following websites:

<http://www.epa.gov/superfund/pubs.htm> (General Superfund)
<http://clu.in.org> (Site Characterization, Monitoring and Remediation)
<http://www.epa.gov/ORD/NRMRL/Pubs> (Site Characterization and Monitoring)
http://www.epa.gov/quality/qa_docs.html#guidance (Quality Assurance)
<http://www.epa.gov/superfund/programs/dfa/index.htm> (Dynamic Field Activities)
<http://www.epa.gov/superfund/programs/risk/toolthh.htm> (Risk Assessment - Human)
<http://www.epa.gov/superfund/programs/risk/tooleco.htm> (Ecological Risk Assessment)
<http://www.epa.gov/superfund/programs/lead> (Risk Assessment - Lead)
<http://cfpub.epa.gov/ncea> (Risk Assessment - Exposure Factors/Other)
<http://www.epa.gov/nepis/srch.htm> (General Publications Clearinghouse)
<http://www.epa.gov/clariton/clhtml/pubtitle.html>
<http://www.epa.gov/superfund/programs/lead/products.htm> (General Publications Clearinghouse)
<http://www.epa.gov/fedfac/documents/qualityassurance.htm> (UFP_QAPP)

1. The (revised) National Contingency Plan;
2. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, U.S. EPA, Office of Emergency and Remedial Response, OSWER Directive No. 9355.3-01, EPA/540/G-89/004, October 1988.
3. *Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites*, U.S. EPA, Office of Emergency and Remedial Response, EPA/540/P-91/001, February 1991.
4. *Implementing Presumptive Remedies*, U.S. EPA, Office of Emergency and Remedial Response, EPA-540-R-97-029, October 1997.
5. *Presumptive Remedy for CERCLA Municipal Landfill Sites*, U.S. EPA, OSWER Directive No. 9355.0-49FS, EPA-540-F-93-035, September 1993.
6. *Presumptive Remedies: CERCLA Landfill Caps RI/FS Data Collection Guide*, U.S. EPA, OSWER 9355.3-18FS, EPA/540/F-95/009, August 1995.
7. *Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites*, OSWER 9283.1-12, EPA-540-R-96-023, October 1996.

8. *Field Analytical and Site Characterization Technologies Summary of Applications*, U.S. EPA, EPA-542-F-97-024, November 1997.
9. *CLU-IN Hazardous Waste Clean-Up Information World Wide Web Site*, U.S. EPA, EPA-542-F-99-002, February 1999.
10. *Field Sampling and Analysis Technology Matrix and Reference Guide*, U.S. EPA, EPA-542-F-98-013, July 1998.
11. *Subsurface Characterization and Monitoring Techniques: A Desk Reference Guide, Volumes 1 and 2*, U.S. EPA, EPA/625/R-93/003, May 1993.
12. *Use of Airborne, Surface, and Borehole Geophysical Techniques at Contaminated Sites: A Reference Guide*, U.S. EPA, EPA/625/R-92/007(a,b), September 1993.
13. *Innovations in Site Characterization: Geophysical Investigation at Hazardous Waste Sites*, U.S. EPA, EPA-542-R-00-003, August 2000.
14. *Innovative Remediation and Site Characterization Technology Resources*, U.S. EPA, OSWER, EPA-542-F-01-026b, January 2001.
15. *Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells*, U.S. EPA, EPA/600/4-89/034, 1991.
16. *Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers*, U.S. EPA, EPA-542-S-02-001, May 2002.
17. *Ground Water Issue: Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*, U.S. EPA, EPA/540/S-95/504, April 1996.
18. *Superfund Ground Water Issue: Ground Water Sampling for Metals Analysis*, U.S. EPA, EPA/540/4-89/001, March 1989.
19. *Resources for Strategic Site Investigation and Monitoring*, U.S. EPA, OSWER, EPA-542-F-010030b, September 2001.
20. *Region 5 Framework for Monitored Natural Attenuation Decisions for Groundwater*, U.S. EPA Region 5, September 2000.
21. *Ground Water Issue: Suggested Operating Procedures for Aquifer Pumping Tests*, U.S. EPA, OSWER, EPA/540/S-93/503, February 1993.
22. *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water*, U.S. EPA, EPA/600/R-98/128, September 1998.

23. *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action and Underground Storage Tank Sites*, U.S. EPA, OSWER Directive 9200.4-17P, April 21, 1999.
24. *Ground Water Issue: Fundamentals of Ground-Water Modeling*, U.S. EPA, OSWER, EPA/540/S-92/005, April 1992.
25. *Assessment Framework for Ground-Water Model Applications*, U.S. EPA, OSWER Directive #9029.00, EPA-500-B-94-003, July 1994.
26. *Ground-Water Modeling Compendium - Second Edition: Model Fact Sheets, Descriptions, Applications and Cost Guidelines*, U.S. EPA, EPA-500-B-94-004, July 1994.
27. *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*, U.S. EPA, Office of Solid Waste and Emergency Response, OSWER Directive No. 9200.1-23P, EPA 540-R-98-031, July 1999.
28. *Region 5 Instructions on the Preparation of A Superfund Division Quality Assurance Project Plan Based on EPA QA/R-5, Revision 0*, U.S. EPA Region 5, June 2000.
29. *Guidance for the Data Quality Objectives Process (QA-G-4)*, U.S. EPA, EPA/600/R-96/055, August 2000.
30. *Guidance for the Data Quality Objectives Process for Hazardous Waste Sites (QA/G-4HW)*, U.S. EPA, EPA/600/R-00/007, January 2000.
31. *Guidance for the Preparation of Standard Operating Procedures (QA-G-6)*, U.S. EPA, EPA/240/B-01/004, March 2001.
32. *EPA Requirements for Quality Management Plans (QA/R-2)*, U.S. EPA, EPA/240/B-01/002, March 2001.
33. *EPA Requirements for QA Project Plans (QA/R-5)*, U.S. EPA, EPA/240/B-01/003, March 2001.
34. *Guidance for Quality Assurance Project Plans (QA/G-5)*, U.S. EPA, EPA/600/R-98/018, February 1998.
35. *Users Guide to the EPA Contract Laboratory Program*, U.S. EPA, Sample Management Office, OSWER Directive No. 9240.0-01D, January 1991.
36. *Technical Guidance Document: Quality Assurance and Quality Control for Waste Containment Facilities*, U.S. EPA, EPA/600/R-93/182, 1993.

37. *Risk Assessment Guidance for Superfund - Volume I Human Health Evaluation Manual (Part A)*, U.S. EPA, EPA/540/1-89/002, December 1989.
38. *Risk Assessment Guidance for Superfund - Volume I Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals)*, U.S. EPA, EPA/540/R-92/003, OSWER Publication 9285.7-01B, December 1991.
39. *Risk Assessment Guidance for Superfund - Volume I Human Health Evaluation Manual (Part C - Risk Evaluation of Remedial Alternatives)*, U.S. EPA, Office of Emergency and Remedial Response, Publication 9285.7-01C, October, 1991.
40. *Risk Assessment Guidance for Superfund - Volume I Human Health Evaluation Manual (Part D - Standardized Planning, Reporting, and Review of Superfund Risk Assessments)*, U.S. EPA, Office of Emergency and Remedial Response, Publication 9285.7-47, December 2001.
41. *Risk Assessment Guidance for Superfund: Volume III - Part A, Process for Conducting Probabilistic Risk Assessment*, U.S. EPA, OSWER Publication 9285.7-45, EPA-540-R-02-002, December 2001.
42. *Policy for Use of Probabilistic in Risk Assessment at the U.S. Environmental Protection Agency*, U.S. EPA, Office of Research and Development, 1997.
43. *Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors*, U.S. EPA, OSWER Directive 9285.6-03, March 25, 1991.
44. *Exposure Factors Handbook*, Volumes I, II, and III, U.S. EPA, EPA/600/P-95/002Fa,b,c, August 1997.
45. *Supplemental Guidance to RAGS: Calculating the Concentration Term*, U.S. EPA, OSWER Publication 9285.7-08I, May 1992.
46. *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities*, U.S. EPA, OSWER Directive 9355.4-12, EPA/540/F-94/043, July 14, 1994.
47. *Clarification to the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities*, U.S. EPA, OSWER Directive 9200.4-27, EPA/540/F-98/030, August 1998.
48. *Guidance Manual for the Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children*, U.S. EPA, OSWER Publication 9285.7-15-1, February 1994; and associated, clarifying Short Sheets on IEUBK Model inputs, including but not limited to OSWER

9285.7-32 through 34, as listed on the OSWER lead internet site at www.epa.gov/superfund/programs/lead/prods.htm,

49. *Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children, Version 0.99D*, NTIS PB94-501517, 1994 or *Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children, Windows© version*, 2001,
50. *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions*, U.S. EPA, OSWER Directive 9355.0-30, April 22, 1991.
51. *Performance of Risk Assessments in Remedial Investigation /Feasibility Studies (RI/FSS) Conducted by Potentially Responsible Parties (PRPs)*, OSWER Directive No. 9835.15, August 28, 1990.
52. *Supplemental Guidance on Performing Risk Assessments in Remedial Investigation Feasibility Studies (RI/FSS) Conducted by Potentially Responsible Parties (PRPs)*, OSWER Directive No. 9835.15(a), July 2, 1991.
53. *Role of Background in the CERCLA Cleanup Program*, U.S. EPA, OSWER 9285.6-07P, April 26, 2002.
54. *Soil Screening Guidance: User's Guide*, U.S. EPA, OSWER Publication 9355.4-23, July 1996.
55. *Soil Screening Guidance: Technical Background Document*, U.S. EPA, EPA/540/R95/128, May 1996.
56. *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (Peer Review Draft)*, U.S. EPA, OSWER Publication 9355.4-24, March 2001.
57. *Ecological Risk Assessment Guidance for Superfund: Process for Designing & Conducting Ecological Risk Assessments*, U.S. EPA, OSWER Directive 9285.7-25, EPA-540-R-97-006, February 1997.
58. *Guidelines for Ecological Risk Assessment*, U.S. EPA, EPA/630/R-95/002F, April 1998.
59. *The Role of Screening-Level Risk Assessments and Refining Contaminants of Concern in Baseline Ecological Risk Assessments*, U.S. EPA, OSWER Publication 9345.0-14, EPA/540/F-01/014, June 2001.
60. *Ecotox Thresholds*, U.S. EPA, OSWER Publication 9345.0-12FSI, EPA/540/F-95/038, January 1996.

61. *Issuance of Final Guidance: Ecological Risk Assessment and Risk Management Principles for Superfund Sites*, U.S. EPA, OSWER Directive 9285.7-28P, October 7, 1999.
62. *Guidance for Data Usability in Risk Assessment (Quick Reference Fact Sheet)*, OSWER 9285.7-05FS, September, 1990.
63. *Guidance for Data Usability in Risk Assessment (Part A)*, U.S. EPA, Office of Emergency and Remedial Response, Publication 9285.7-09A, April 1992.
64. *Guide for Conducting Treatability Studies Under CERCLA*, U.S. EPA, EPA/540/R-92/071a, October 1992.
65. *CERCLA Compliance with Other Laws Manual, Two Volumes*, U.S. EPA, Office of Emergency and Remedial Response, OSWER Directive No. 9234.1-01 and -02, EPA/540/G-89/009, August 1988.
66. *Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites*, U.S. EPA, Office of Emergency and Remedial Response, (Interim Final), OSWER Directive No. 9283.1-2, EPA/540/G-88/003, December 1988.
67. *Considerations in Ground-Water Remediation at Superfund Sites and RCRA Facilities - Update*, U.S. EPA, OSWER Directive 9283.1-06, May 27, 1992.
68. *Methods for Monitoring Pump-and-Treat Performance*, U.S. EPA, EPA/600/R-94/123, June 1994.
69. *Pump-and-Treat Ground-Water Remediation A Guide for Decision Makers and Practitioners*, U.S. EPA, EPA/625/R-95/005, July 1996.
70. *Ground-Water Treatment Technology Resource Guide*, U.S. EPA, OSWER, EPA-542-B-94/009, September 1994.
71. *Land Use in the CERCLA Remedy Selection Process*, U.S. EPA, OSWER Directive No. 9355.7-04, May 25, 1995.
72. *Reuse Assessments: A Tool To Implement The Superfund Land Use Directive*, U.S. EPA, OSWER 9355.7-06P, June 4, 2001.
73. *Reuse of CERCLA Landfill and Containment Sites*, U.S. EPA, OSWER 9375.3-05P, EPA-540-F-99-015, September 1999.
74. *Reusing Superfund Sites: Commercial Use Where Waste is Left on Site*, U.S. EPA, OSWER 9230.0-100, February 2002.

75. *Covers for Uncontrolled Hazardous Waste Sites*, U.S. EPA, EPA/540/2-85/002, 1985.
76. *Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments*, U.S. EPA, OSWER, EPA/530-SW-89-047, July 1989.
77. *Engineering Bulletin: Landfill Covers*, U.S. EPA, EPA/540/S-93/500, 1993.
78. *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites*, U.S. EPA OSWER Directive 9285.6-08, February 12, 2002.
79. *Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups*, U.S. EPA, OSWER 9355.0-74FS-P, EPA/540-F-00-005, September 29, 2000.
80. *Health and Safety Requirements of Employees Employed in Field Activities*, U.S. EPA, Office of Emergency and Remedial Response, EPA Order No. 1440.2, July 12, 1981.
81. *OSHA Regulations in 29 CFR 1910.120*, Federal Register 45654, December 19, 1986.
82. *Standard Operating Safety Guides*, PB92-963414, June 1992.
83. *Community Involvement in Superfund: A Handbook*, U.S. EPA, Office of Emergency and Remedial Response, OSWER Directive No. 9230.0#3B June 1988; and OSWER Directive No. 9230.0-3C, January 1992.
84. *Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA* (August 1993)
85. *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites*, U.S. EPA, Office of Emergency and Remedial Response, OSWER Directive No. 9355.0-85, December 2005
86. *Superfund Remedial Design and Remedial Action Guidance*, U.S. EPA, Office of Emergency and Remedial Response, OSWER Directive No. 9355.0-4A