

SCOPE OF WORK FOR REMEDIAL DESIGN/REMEDIAL ACTION
PCB AREAS OPERABLE UNIT
CRAB ORCHARD NATIONAL WILDLIFE REFUGE
CARTERVILLE, ILLINOIS

I. PURPOSE

The purpose of this Remedial Action at the PCB Areas operable unit of the Crab Orchard National Wildlife Refuge Superfund site ("Site") is to protect human health, welfare and the environment in accordance with the Comprehensive Environmental Response, Compensation and Liability Act, as amended (CERCLA), and the National Contingency Plan (NCP). The Remedial Action Plan is embodied in the Record of Decision (ROD) for the PCB Areas operable unit which was signed by the United States Environmental Protection Agency (U.S. EPA) on August 1, 1990. This Scope of Work (SOW) describes the implementation of the Remedial Action Plan, and summarizes and describes the tasks to be completed by the Settling Defendant for the remedial design and remedial action for the PCB Areas operable unit. The U.S. EPA Superfund Remedial Design and Remedial Action Guidance, the final Record of Decision, the approved Remedial Design/Remedial Action Work Plan, any additional guidance timely provided by U.S. EPA, and this SOW shall be followed in designing and implementing this Remedial Action at the PCB Areas operable unit at the Refuge.

II. DESCRIPTION OF THE REMEDIAL ACTION

The selected remedy for the PCB Areas operable unit, as discussed in the ROD, is comprised of three major components: treatment; containment; and general operation and maintenance. The ROD called for incineration to be used as the treatment component for the PCBs and a RCRA Subtitle D landfill to be used as the containment component of the selected remedy. However, in order to respond to community concern, and to accommodate the revised NCP's emphasis on innovative technology, the selected remedy allows for the use of the alternative treatment and containment components of in-situ vitrification (ISV) and a RCRA Subtitle D cap, respectively, based on a stringent demonstration that the alternative treatment technology ISV meets the cleanup and performance standards.

If the Settling Defendant successfully performs a treatability test for ISV, as outlined in Section V, Task 1, the implemented remedy may include the major components outlined in Part B below. If the Settling Defendant does not perform the required treatability test, or if the test results do not demonstrate that the technology meets the cleanup and performance standards, the remedy will be implemented as outlined in Part A below, using incineration as the treatment technology.



APPENDIX 2

A. SELECTED REMEDY WITH INCINERATION

The major components of the remedial action for the PCB Areas operable unit at the Site are:

- Delineation of the full extent of contamination at the Job Corps Landfill (study site 17), the Water Tower Landfill (study site 28), and Area 9 (study sites 32 and 33);
- Excavation of soils and sediments contaminated above the stated cleanup standards (see Section III);
- Interim storage of the excavated contaminated materials in units compliant with RCRA and/or TSCA storage requirements, for the material for which such standards are applicable or relevant and appropriate requirements (ARARS);
- Construction, operation (including a trial burn), monitoring and maintenance of an on-Site mobile incinerator;
- Incineration of all PCB contaminated soil and sediment, and testing of the incinerator ash;
- Construction, operation (including treatability studies to establish reagent ratios), monitoring and maintenance of an on-Site stabilization/ fixation treatment process;
- Treatment by stabilization/ fixation of all soil, sediment and incinerator ash which is hazardous because of the characteristic to leach metals (EP Toxic or TCLP, whichever is the effective RCRA generator assessment procedure) to render the material non-hazardous;
- Selection of the most appropriate location for an on-Site landfill, including required studies such as a hydrogeologic assessment of potential sites;
- Construction, operation and maintenance of an on-Site RCRA Subtitle D compliant solid waste landfill;
- Disposal in the on-Site solid waste landfill of all stabilized metal-bearing waste, all debris which may be disposed of in such a landfill, all incinerator ash above the cleanup standards, and soil and sediment above the cleanup standards which is not required to be treated;

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- Backfill and capping of excavated areas. (If the excavation is more than two feet deep and above the water table, untreated soils and sediments containing less than 25 mg/kg PCBs, which otherwise meet the cleanup standards, may be consolidated as backfill in the excavated areas if those materials will be covered with at least 12 inches of clean soil. Also, soil and sediment which has been incinerated may be used as backfill provided it meets all of the cleanup standards.);
- Short-term monitoring of groundwater, surface water and air at the remediated study sites, in accordance with this SOW and the relevant approved plans; and
- Long-term monitoring of groundwater at the on-site solid waste landfill.

B. SELECTED REMEDY WITH ALTERNATIVE TREATMENT TECHNOLOGY ISV

If the Settling Defendant designs and successfully performs a treatability test for ISV, the implemented remedy may include the alternative treatment technology of ISV. If the Settling Defendant utilizes ISV, the major components of the remedial action are:

- Delineation of the full extent of contamination at the Job Corps Landfill (study site 17), the Water Tower Landfill (study site 28), and Area 9 (study sites 32 and 33);
- Studies to finalize the most appropriate location to consolidate the contaminated material, including a hydrogeologic assessment of the potential sites;
- Excavation of soils and sediments contaminated above the stated cleanup standards from study sites at which vitrification will not occur and consolidation within the area to be treated;
- Interim storage of the excavated contaminated materials in units compliant with RCRA and/or TSCA storage requirements, for the material for which such standards are ARARs;
- Construction, operation (including an acceptable field demonstration), monitoring and maintenance of an on-site mobile vitrification unit;
- In-situ vitrification of all contaminated soil and sediment above the stated cleanup standards;

- Construction, operation and maintenance of an on-Site RCRA Subtitle D compliant solid waste cap over the vitrified area;
- Backfill and capping of excavated areas. (If the excavation is more than two feet deep and above the water table, untreated soils and sediments containing less than 25 mg/kg PCBs, which otherwise meet the cleanup standards, may be consolidated as backfill in the excavated areas if those materials will be covered with at least 12 inches of clean soil.);
- Short-term monitoring of groundwater, surface water and air at the remediated study sites, in accordance with this SOW and the relevant approved plans; and
- Long-term monitoring of groundwater at the on-Site vitrified area.

The above actions, most of which are described in detail in the Feasibility Study (FS) and restated in the Record of Decision (ROD), shall be implemented to meet the following cleanup levels and performance standards.

III. CLEANUP STANDARDS

Cleanup standards have been set for the study sites comprising the PCB Areas operable unit. The standards are based on the risk assessment performed in the RI Report, which evaluates potential risk to human health and the environment. The standards were then further refined to reflect DOI's specific concerns for the protection of fish and wildlife at the Refuge, and U.S. EPA's policies in establishing cleanup standards. The cleanup standards for the study sites in the PCB Areas operable unit are discussed briefly below. Since some contaminants will remain at the Refuge, the effectiveness of the remedy will have to be re-evaluated at least every five years.

A. SOIL AND SEDIMENT

Contaminated soil and sediment at the study sites comprising the PCB Areas operable unit will be remediated to the following specific levels: lead to 450 milligrams (mg) per kilogram (kg) dry soil (1 mg per kg is equivalent to 1 part per million (ppm)); cadmium to 10 mg per kg dry soil; PCBs in the top foot (12 inches) of soil to 1 mg per kg dry soil; PCBs in soil below one foot depth to 25 mg per kg dry soil (untreated soils and sediments containing less than 25 mg/kg PCBs may be consolidated as backfill in the excavated areas if the soil and sediment otherwise meets the cleanup standards, the excavation is more than two feet deep, above the water table and if those materials

will be covered with at least 12 inches of clean soil); and PCBs in sediments to 0.5 mg per kg dry sediments. It is believed that these criteria will address all of the other contaminants at the study sites comprising the operable unit. However, the risk from all of the chemical contaminants present above naturally occurring background levels in the soil and sediment shall not exceed an excess life-time cancer risk greater than one in one million (10^{-6}) or shall not exceed a hazard index of 1.0 for any non-cancer chronic health effects.

In addition to the constituent-specific cleanup standards reviewed above (and stated in the ROD), the Settling Defendant shall calculate whether the contaminants remaining after remediation will, either by leaching or other method of transport, cause the concentrations of the constituents in the groundwater to exceed any of the levels stated in Part B, below. If the calculations indicate that the groundwater standards may be exceeded due to remaining soil contaminants, modifications to the constituent-specific soil cleanup standards will be evaluated.

The method for calculating the potential impact to groundwater shall be approved by U.S. EPA. Illustrative methods that may aid in the refinement of soil cleanup levels can be found in "Determining Soil Response Action Levels Based on Potential Contaminant Migration to Groundwater: A Compendium of Examples" (EPA, October, 1989). The method must be compatible with the soil conditions and contaminants present at the site.

B. GROUNDWATER

Before soil remediation begins, the groundwater at the study sites comprising the PCB Areas operable unit will be monitored to establish current concentrations of site-related contaminants. Groundwater at the remediated study sites, and groundwater and leachate at the containment unit will then be monitored during and after remediation of the sites. The monitoring results will be evaluated to see if any of the following levels of contaminants above naturally occurring background levels has been exceeded in groundwater:

- (1) any MCL or non-zero MCLG for carcinogens,
- (2) a cumulative, excess life-time cancer risk greater than 1.0×10^{-6} ; or
- (3) any MCL, non-zero MCLG, or a hazard index of 1.0, for noncarcinogens.

If, at any time following completion of the remedy, groundwater at a remediated study site exceeds any of the stated cleanup standards, the need for additional remedial work, as contemplated by Section VII of the Decree shall be evaluated. The risk assessment shall follow procedures established in the "Risk

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Assessment Guidance for Superfund Volume I Human Health Evaluation Manual" (RAGS) (EPA/540/1-89/002) or any amendments thereof. All of the assumptions used in the risk assessment calculations shall be subject to the review and approval by U.S. EPA prior to their use.

C. SURFACE WATER

Before soil or sediment excavation begins, the surface water at the study sites comprising the PCB Areas operable unit will be monitored to establish current concentrations of site-related contaminants. This monitoring data and the RI data will be used to establish baseline levels of contaminants in surface water. The surface water will then be monitored during and after remediation. The results will be evaluated to assure that after completion of the remediation of the contaminated soils and sediments the contaminants remaining at the study sites will not cause the risk from all of the contaminants in surface water above naturally occurring background levels to exceed an excess life-time cancer risk greater than one in one million (10^{-6}) or a Hazard Index of 1.0 for any non-cancer chronic health effects. In addition, after remediation the water in the Area 9 Embayment of Crab Orchard Lake and the Job Corps Pond (if it is in existence) shall show no degradation from baseline levels due to transport of contaminants remaining after remediation and shall meet all chemical specific applicable or relevant and appropriate requirements (ARARs) relating to contaminants from the remediated study sites.

IV. PERFORMANCE STANDARDS

The Settling Defendant shall meet or exceed all of the performance standards necessary for implementation of the selected remedy in the ROD for the PCB Areas operable unit. These performance standards include, but are not limited to those outlined below. In addition to the performance standards outlined below, all ARARs specified in the ROD shall be met by the Settling Defendant.

A. IN-SITU VITRIFICATION DEMONSTRATION TEST

If the Settling Defendant wishes to use the alternative treatment component of ISV, it must meet all of the conditions required in Section VIII.A.3 of the ROD. The Settling Defendant must submit a Treatability Test Work Plan as required by Section V and perform and report on the treatability test in accordance with the approved plan, Treatability Test Schedule and this SOW. The treatability test may include lab, bench and/or pilot scale tests combined with modeling (if appropriate) to demonstrate that the cleanup and performance standards will be met. The performance standards which must be demonstrated include, but are not limited

to those briefly discussed below.

1. ISV must meet or exceed a destruction and removal efficiency of 99.9999% for the PCBs and other organic contaminants;
2. ISV must meet or exceed the remediation goal of 1 milligram of PCBs per kilogram of dry soil for the treated material;
3. ISV must immobilize all metal contaminants so that they are not RCRA hazardous due to the characteristic to leach metals;
4. A demonstration must be made to show that the groundwater or surface water cleanup standards will not be exceeded at or near the vitrified area;
5. A demonstration must be made to show that the air emission standards required in the ROD will not be exceeded; and
6. The testing must demonstrate that ISV will meet the requirements of 40 CFR 761.60(e) pertaining to performance of treatment alternatives to incineration under TSCA.

B. SOIL AND SEDIMENT REMEDIATION

1. PCB Contaminated Soil and Sediment

As discussed, if the Settling Defendant successfully performs a treatability test which meets the cleanup and performance standards outlined above, the treatment component of the remedial action may be modified from incineration of the contaminated soil and sediment to ISV. The performance standards for the soil and sediment remediation will depend on whether incineration or ISV is used as the treatment component of the remedy. In any case, PCB contaminated soil and sediment shall be tested for co-contamination with metals, including, but not limited to lead and cadmium. All soil and sediment contaminated with PCBs above the cleanup standard shall be treated by one of the following methods. The treatment process shall meet the stated performance standards.

a. Incineration: All soil and sediment contaminated with PCB levels above the cleanup standards shall be excavated and treated by incineration in an on-Site mobile incinerator. The material shall be treated to obtain 99.9999% destruction and removal efficiency of the PCBs and other organic co-contaminants, to obtain 99.9% combustion efficiency, and to allow no more than 1 ppm PCBs in the ash.

The incinerator ash shall be tested for the characteristic of leachability (40 CFR Section 261.24) using the currently approved testing methodology at the time of the analysis (i.e., TCLP) and to establish whether the ash exceeds any of the cleanup standards.

b. **In-Situ Vitrification:** If the alternative of in-situ vitrification is used for treatment rather than incineration, the material shall be treated to obtain 99.9999% destruction and removal efficiency of the PCBs and other organic co-contaminants and to allow no more than 1 ppm PCBs in the treated residue. Additionally, the vitrification process must successfully immobilize the metal constituents to render them non-hazardous for the characteristic of leachability (40 CFR 261.24). The treatment residue shall be tested to establish whether the residue exceeds any of the cleanup standards or performance standards.

2. Metal Contaminated Soil, Sediment and Incinerator Ash

Soil and sediment contaminated with metals (specifically lead and cadmium) above the cleanup standards outlined above shall be excavated. Excavated material shall be tested for the characteristic of leachability (40 CFR Section 261.24) using the currently approved testing methodology at the time of the analysis (i.e., TCLP).

All untreated soil or sediment and any incinerator ash found to be RCRA characteristic shall be remediated using stabilization/ fixation technologies in order to render it non-hazardous. Treatability studies shall be conducted in order to determine the most appropriate treatment process and reagent combination for these contaminants. Final approval of the specific treatment process will be made by the U.S. EPA.

C. RCRA SUBTITLE D LANDFILL/USED WITH INCINERATION

If the Settling Defendant implements incineration, it will design and construct an on-site solid waste landfill compliant with RCRA Subtitle D (40 CFR Part 241) and State of Illinois requirements (At the time of ROD signature, August 1, 1991, the Illinois solid waste landfill requirement were codified at 35 Illinois Administrative Code Part 807. Subsequently, additional requirements were promulgated (which are not ARARs, but which will be considered during design); such Illinois solid waste landfill requirements are currently codified at Parts 810 through 815.). The landfill would be constructed, at a minimum, with a single compacted soil liner and drainage layer. All metal-bearing waste which is treated by stabilization/ fixation, all soil and sediment above the cleanup standards which does not

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require treatment, any debris which may be disposed of in a solid waste landfill, and any incinerator ash which exceeds a cleanup standard shall be disposed in the on-Site landfill. After placement of the contaminated material, the landfill would be covered with a cap constructed, at a minimum, of compacted soil, a drainage layer, soil fill, a barrier to biota and topsoil. Upon completion, the landfill would be vegetated. Groundwater and leachate monitoring, and routine maintenance would be part of the long term requirements.

D. CAPS AND COVERS

1. RCRA Subtitle D Cap/Used With Vitrification

If the Settling Defendant implements in-situ vitrification rather than incineration/ thermal destruction, the vitrified area shall be covered with a cap which meets the requirements of RCRA Subtitle D (40 CFR Part 241) and State of Illinois (35 Illinois Administrative Code Part 807) requirements. The cap would be constructed, at a minimum, of compacted soil, a drainage layer, soil fill, and topsoil. Upon completion, the cap would be vegetated. Groundwater and leachate monitoring, and routine maintenance would be conducted in accordance with the approved Operation and Maintenance Plan.

2. Caps for the Remediated Study Sites

If an excavated and backfilled area meets all of the cleanup standards listed in Section III, soil alone may be used as the capping material. If the constituent-specific cleanup standards are met, but the non-specific cleanup standards are not met, the cap will be designed such that it is protective of public health, welfare and the environment.

E. MONITORING SYSTEMS

1. Groundwater

The purpose of groundwater monitoring is to ensure that the contained treatment residue remaining on-Site does not contaminate groundwater, to establish that the source removal from the contaminated study sites has been sufficient to prevent groundwater contamination and to measure the effectiveness of the remedial action. Groundwater monitoring will occur in three phases: pre-design, short-term and long-term.

a. Pre-Design Groundwater Monitoring: The purpose of pre-design groundwater monitoring is to establish current groundwater conditions at the unremediated study sites, against which groundwater monitoring post-remediation will

be compared. Another purpose is to provide necessary data supporting the recommended location of the containment unit. During pre-design sampling, the Settling Defendant shall evaluate the integrity of the existing groundwater monitoring wells. The Settling Defendant shall conduct sampling and analysis on the wells which are determined to be useful (or additional or replacement wells, if any) for the full hazard substance list contaminants (HSL) in order to characterize current groundwater conditions at the unremediated study sites. Samples shall be taken from the sampling sites twice per year at a minimum, starting with the entry of this Decree. In addition, the Settling Defendant shall conduct hydrogeologic assessments of the areas proposed as the location of the on-Site landfill and/or the area proposed to be the consolidation site if vitrification will be used. Such assessment, in conjunction with the Remedial Investigation data, shall include the establishment of background contaminant levels for naturally occurring constituents and current levels of indicator parameters. This information shall be used in accordance with the RAGS to determine indicator chemicals for the risk assessment and constituents for future groundwater monitoring.

b. **Short-Term Groundwater Monitoring:** The purpose of short-term groundwater monitoring is to ensure the effectiveness of the remedial action by establishing that the source removal from the contaminated study sites has been sufficient to halt any contribution to groundwater contamination and stabilize or abate, if necessary, existing conditions. The actual monitoring system(s) shall be determined during remedial design and shall be based on the results of the RI and pre-design groundwater sampling and analysis. Samples and measurements shall be taken from the monitoring network at a minimum of twice per year until the first five year review. Each sample shall be analyzed for a list of parameters that shall be determined during design. If, at any time following completion of the remedy, groundwater at any of the remediated study sites exceeds any of the standards stated in Section III.B, above, the need for additional remedial work (including additional monitoring), as contemplated by Section VII of the Decree, shall be evaluated.

c. **Long-Term Groundwater Monitoring:** Groundwater and leachate monitoring shall occur as appropriate, to monitor the effectiveness of the containment system including the integrity of the landfill or cap. The actual monitoring system(s) shall be determined during remedial design and shall be based on ARARs and the results of the RI and pre-design groundwater sampling and analysis. Samples shall be taken from the sampling sites twice per year at a minimum,

with the final frequency established during design. Each sample shall be analyzed for a list of parameters that shall be determined during design. The Operation and Maintenance Plan may allow provisions for the Settling Defendant or U.S. DOI to propose modifications to the frequency of sampling (including reductions) or the parameters for analysis, based on the existing data.

2. Air

Certain risks may be derived by the inhalation of contaminants from existing site conditions or the remedial action. Air emissions during excavation and treatment of the contaminated soil and sediment, and backfilling of the excavated areas shall be monitored to ensure that the levels do not exceed any of the ARARs established in the ROD. If air emissions exceed these levels, then the Settling Defendant shall take corrective measures, as developed in the Health and Safety Contingency Plan.

3. Surface Water

Surface water at the study sites comprising the operable unit will be monitored during and after remediation. The purpose of surface water monitoring is to ensure that the excavation of soil and sediment from the contaminated study sites does not adversely impact surface water, and to measure the effectiveness of the remedial action. The actual monitoring program(s) shall be determined during remedial design and shall be based on the results of the RI. Samples shall be taken from sampling locations approved during design, with the final frequency established during design. Each sample shall be analyzed for a list of parameters that shall be determined during design, which, at a minimum, shall include PCBs, lead and cadmium.

If, during remediation, surface water at any of the study sites exceeds any of the cleanup standards stated in Section III.C, above or any of the ARARs established in the ROD due to transport of contaminants from the study sites, the Settling Defendant shall take corrective measures, as developed in the Health and Safety Contingency Plan. If, after completion of the excavation and backfilling of the contaminated study sites, surface water exceeds any of the cleanup standards or ARARs due to transport of contaminants from the study sites, the need for additional remedial work as contemplated by Section VII of the Decree, shall be evaluated. The risk assessment shall follow procedures established in the RAGS or any amendments thereof. All of the assumptions used in the risk assessment calculations shall be subject to review and approval by U.S. EPA prior to their use.

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4. Remedial Action Construction/ Implementation

The purpose of monitoring during the construction and implementation of the remedial action is to ensure compliance with approved plans, and to determine that standards and ARARs are being met. The actual monitoring program(s) will depend on the specific component of the remedial action, and shall be determined during remedial design. Samples shall be taken from the appropriate remedy component, or effluent or emission stream from sampling locations approved during design, with the final frequency established during design. Each sample shall be analyzed for a list of parameters that shall be determined during design.

V. SCOPE OF REMEDIAL ACTION

Settling Defendant shall design, construct, operate and maintain remedial actions for the PCB Areas operable unit at the Crab Orchard National Wildlife Refuge facility by implementing each of the following tasks:

- Task 1: Pre-Design Work
 - A. Treatability Test
 - B. Delineation of the Extent of Contamination
 - C. Pre-Design Groundwater Monitoring
 - D. Landfill Siting Assessments
- Task 2: RD/RA Work Plan Development
 - A. Site Access
 - B. Quality Assurance Project Plan
 - C. Site Safety Plan
 - D. Sampling and Analysis Plan
- Task 3: Remedial Design
 - A. Design Phases
 - B. Operations and Maintenance Plan
 - C. Construction Quality Assurance Plan
 - D. Cost Estimate
- Task 4: Remedial Action Implementation
 - A. Preconstruction Inspection and Meeting
 - B. Remedy Construction and Implementation
 - C. Prefinal Inspection
 - D. Final Inspection
 - E. Long Term Operation and Maintenance

Task 5: Schedule and Reporting

- A. Monthly Progress Reports
- B. Operation and Maintenance Oversight Reports
- C. Schedule

Task 1 - Pre-Design Work

This Remedial Action will require additional studies to supplement the available technical data. In order to adequately design the selected remedy and to aid in the implementation of the remedial action, certain pre-design work is required. These additional studies and pre-design work shall include, at a minimum, the tasks outlined below.

For the pre-design work outlined below, and the studies required, the Settling Defendant shall furnish all services, including field work as required, materials, supplies, plant, labor, equipment, investigations, studies and superintendence. Sufficient sampling, testing and analysis shall be performed to design the required treatment and/or disposal operations and systems. Except as otherwise noted, the results of the pre-design work with the recommended design parameter (including options) shall be presented on or before the deadline in the approved Pre-Design Schedule. Periodic meetings and review conferences will be held, as necessary, to review the progress of the pre-design work, discuss results and their impact on the remedial design, and identify and resolve issues.

With respect to the tasks outlined in paragraphs B, C, and D of Task 1, no later than ninety (90) days after lodging of the Consent Decree, the Settling Defendant shall submit to U.S. EPA for review and approval a plan which describes in detail the studies to be performed and the guidelines and procedures to be used for obtaining and assessing the required information (Pre-Design Work Plan). The plan shall include, as appropriate, a sampling and analysis plan (including data management procedures), quality assurance and quality control procedures, and health and safety provisions. A schedule for performance of the pre-design work (Pre-Design Schedule) shall be submitted along with the Pre-Design Work Plan. The schedule shall not require the Settling Defendant to implement the approved Pre-Design Work Plan prior to entry of the Consent Decree for this operable unit ("Consent Decree"), but the Settling Defendant may do so at its discretion once the Work Plan has been approved. The results of the pre-design work shall be submitted on or before the deadline established in the Pre-Design Schedule and shall include all data collected, a summary of the results of all such studies, and a discussion of the design parameters which will be effected as a result of the findings.

With respect to any Pre-Design Work to be carried out at Area 9, the health and safety provisions shall incorporate as much as feasible: (1) the zones of exclusion established considering, among other concerns, the quantity/distance limitations regarding munitions manufacturing applicable to Olin Corporation at the time of the work; (2) the pertinent substantive safety requirements set forth in Chapter 3 and, to the extent applicable, Chapter 10 of the DOD (Department of Defense) Contractors' Safety Manual for Ammunition and Explosives (DOD 4145.26-M); and (3) coordination with Olin Corporation safety personnel of any work in areas within the quantity/distance limitations.

A. TREATABILITY TEST

If the Settling Defendant wishes to use the alternative treatment of ISV, a successful treatability test must be preformed. This treatability test would be used to evaluate the performance of the treatment and to establish design parameters. In addition, treatability studies are required for the lead and cadmium contaminated soil, sediment and treatment residue to determine what type and reagent mix for the stabilization/ fixation process will treat the contaminants to levels that will render the contaminated material non-hazardous.

Within sixty (60) days after lodging of the Consent Decree, the Settling Defendant shall submit to U.S. EPA for review and approval a Treatability Test Work Plan which describes in detail the treatability studies to be performed and the guidelines and procedures to be used for obtaining and assessing the required information. The Treatability Test Work Plan shall be submitted to the other Parties named in this Decree. The Work Plan shall include, as appropriate, a sampling and analysis plan (including data management procedures), quality assurance and quality control procedures, and health and safety provisions. A schedule for performance of the treatability testing shall be submitted with the Treatability Test Work Plan (Treatability Test Schedule). The schedule shall not require the Settling Defendant to implement the approved Treatability Test Work Plan prior to entry of the Consent Decree, but the Settling Defendant may do so at its discretion once the Work Plan has been approved. The results of the testing with the recommended treatment or disposal system (including options) shall be presented as the Treatability Test Report, on or before the deadline in the approved Treatability Test Schedule. The final report of the testing shall include all data taken during the testing and summary of the results of the studies.

B. DELINEATION OF THE EXTENT OF CONTAMINATION

In order to properly design the excavation, treatment and handling of the contaminated soil and sediment, it is necessary

to conduct additional delineation of the extent of contamination at each of the study sites. This delineation should include the areal extent and depth of contamination, the volume of contaminated material, the approximate concentration of contaminants, a determination of the volume and location of metal contaminated soil and sediment, and a determination of the volume and location of the RCRA characteristic hazardous material.

C. PRE-DESIGN GROUNDWATER MONITORING

During pre-design sampling, the Settling Defendant shall conduct an evaluation of the integrity of the existing wells and sampling and analysis of the existing groundwater monitoring wells (or additional or replacement wells, if any) for the HSL in order to characterize current groundwater conditions at the unremediated study sites. Samples shall be taken from the sampling sites twice per year at a minimum, starting with the entry of this Decree. As noted above, sample analysis shall be in accordance with an approved quality assurance project plan.

D. LANDFILL SITING ASSESSMENTS

The ROD lists a number of ARARs for the solid waste landfill and the in-situ vitrification process. These ARARs include specific requirements for the assessment of proposed sites for their impact on the underlying hydrogeology, and other environmental impacts. The Settling Defendant shall conduct the appropriate assessments required by these ARARs, including hydrogeologic studies of the areas proposed as the location of the on-Site landfill and/or the area proposed to be the consolidation site if vitrification will be used. The hydrogeologic assessment shall include the establishment of background contaminant levels for naturally occurring constituents and indicator parameters. This information shall be used in accordance with the RAGS to determine indicator chemicals for the risk assessment and constituents for future groundwater monitoring.

Task 2 - RD/RA Work Plan Development

Within thirty (30) days of the entry date of the Consent Decree, or sixty (60) days of the final Treatability Test Report, whichever is later, the Settling Defendant shall submit a work plan detailing the following activities, and describing in detail the following plans to U.S. EPA for review and approval. In addition, the Work Plan shall be submitted to the other Parties named in this Decree.

A. SITE ACCESS

All site access agreements required to implement the remedial action or additional studies shall be obtained by the Settling

Defendant prior to the initiation of remedial action or additional studies. Site access shall extend for the duration of the cleanup and include allowances for all operation and maintenance considerations in accordance with Paragraph X of the Consent Decree.

B. QUALITY ASSURANCE AND QUALITY CONTROL

The Settling Defendant shall attend a meeting with U.S. EPA and other appropriate Parties to discuss issues related to the development of the Quality Assurance Project Plan (QAPP). The Settling Defendant shall consider issues raised in this meeting and develop a site specific QAPP, covering all phases of future site work, based upon the Consent Decree and guidance provided by U.S. EPA. The QAPP shall at a minimum include:

- o Project description
- o Project organization
- o Project responsibilities
- o Sampling and custody procedures
- o Calibration procedures
- o Quality assurance objectives
- o Analytical procedures
- o Data analysis and reporting
- o Internal QC checks
- o Performance and system audits
- o Preventive maintenance
- o Method specific procedures for assessing data precision, accuracy and completeness
- o Corrective actions
- o QA reports

In addition, the Settling Defendant shall submit drafts of Construction and Operation and Maintenance QAPPs to U.S. EPA for review with the intermediate (60%) design document package. (See Task 3 below.) Settling Defendant shall incorporate required corrections in the final Construction and Operation and Maintenance QAPPs, to be submitted with the (95%) or prefinal design package. Document review shall be governed by Paragraph IX of the Consent Decree.

C. SITE SAFETY PLAN

The Settling Defendant shall develop a site specific safety plan which is designed to protect on-site personnel and area residents from physical, chemical and all other hazards posed by this remedial action.

With respect to any work to be carried out at Area 9, the site safety plan shall incorporate as much as feasible: (1) the zones of exclusion established considering, among other concerns, the quantity/distance limitations regarding munitions manufacturing

applicable to Olin Corporation at the time of the work; (2) the pertinent substantive safety requirements set forth in Chapter 3 and, to the extent applicable, Chapter 10 of the DOD (Department of Defense) Contractors' Safety Manual for Ammunition and Explosives (DOD 4145.26-M); and (3) coordination with Olin Corporation safety personnel of any work in areas within the quantity/distance limitations.

The safety plan shall develop the performance levels and criteria necessary to address the following areas.

- o General requirements
- o Personnel
- o Levels of protection
- o Safe work practices and safe guards
- o Medical surveillance
- o Personal and Environmental air monitoring
- o Personal protective equipment
- o Personal hygiene
- o Decontamination - personnel and equipment
- o Site work zones
- o Contaminant control
- o Contingency and emergency planning
- o Logs, reports and record keeping

The safety plan shall follow U.S. EPA guidance and all OSHA requirements as outlined in 29 C.F.R. 1910 (51 FR 45654). The Settling Defendant shall submit a draft safety plan for Agency review with the intermediate (60%) design package. The Settling Defendant shall incorporate all required corrections in the final safety plan submitted with the 95% design package. Document review shall be in accordance with the Consent Decree.

D. SAMPLING PLAN

The Settling Defendant shall develop a sampling and analysis plan (SAP) which will include specifications for sampling and analysis that will be conducted during and after the implementation of the Remedial Action.

Task 3 - Remedial Design

The Settling Defendant shall prepare final construction plans and specifications for the Remedial Design to accomplish the recommended remedial actions as defined in the ROD and this SOW. The plans and specifications shall meet the objectives, cleanup levels and performance and cleanup standards discussed in this Statement of Work and the ROD.

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A. DESIGN PHASES

Regular meetings shall occur between the Parties to the Consent Decree to which this SOW is attached to discuss remedial design issues. The Settling Defendant shall develop the plans and specifications in the phases outlined below. Document review shall be in accordance with Paragraph 14 of the Consent Decree, and dispute resolutions shall be governed by Section XIV of the Consent Decree.

With respect to Area 9, all design packages submitted by the Settling Defendant shall take into account as much as feasible: (1) the zones of exclusion established considering, among other concerns, the quantity/distance limitations regarding munitions manufacturing applicable to Olin Corporation at the time of the work; (2) the pertinent substantive safety requirements set forth in Chapter 3 and, to the extent applicable, Chapter 10 of the DOD (Department of Defense) Contractors' Safety Manual for Ammunition and Explosives (DOD 4145.26-M); (3) variances in the timing and phasing of work so as to take advantage of periods when the quantity/distance limitations do not apply or are less stringent; and (4) coordination with Olin Corporation safety personnel of any work in areas within the quantity/distance limitations.

1. Preliminary Design

The Settling Defendant shall submit the preliminary design concurrently with the RD/RA Work Plan or concurrently with the submission of the results of the Pre-Design Work, whichever is later. The design effort should be approximately 30% complete. This submittal shall consider the results and build upon the recommendations of the Pre-Design Work. The preliminary design shall reflect a level of effort such that the technical requirements of the project have been addressed and outlined so that they may be reviewed to determine if the final design will provide an operable and usable Remedial Action.

2. Intermediate Design

A design review shall be required at 60% completion of the design. This submittal shall adequately address all comments made on the preliminary design and shall include: the first draft of the construction and O&M QAPPs and SAPs, trial burn plan and/or other required treatability test plans; a generic O&M plan; the design analysis; and plans and specifications.

3. Prefinal/Final Design

Prefinal/final design documents shall be submitted in two parts. The first submission shall be at 95% completion of

design (i.e., prefinal). The prefinal submission shall adequately address all comments made on the intermediate design. After approval of the prefinal submissions, the required revisions, if any, shall be executed and the final documents shall be submitted 100% complete with the reproducible drawings and specifications ready for bid advertisement. This portion of the document package as submitted for prefinal/final design shall include but not be limited to the construction and O&M QAPPs, SAPs, O&M plan, the design analysis, final construction drawings and specifications and construction schedule (RA Schedule).

Coordination shall be consistent with the submission requirements of the drawing and specifications through prefinal/final design. The final design shall reflect a level of effort such that the technical requirements of the project have been addressed and outlined so that they may be reviewed to determine if the final design shall meet the applicable requirements for the project. Supporting data and documentation shall be provided with the design documents defining the functional aspects of the project. Construction drawings shall reflect organization and clarity. Technical specifications shall be outlined in a manner reflecting the final specifications. Design analyses and calculations shall be included with the submission.

The technical specifications governing all treatment systems shall include contractor requirements for providing: appropriate service visits by experienced personnel to supervise the installation, adjustment, startup and operation of the system; and appropriate operational procedures training once the startup has been successfully accomplished.

All design packages submitted by the Settling Defendant shall be in accordance with CERCLA procedures on compliance with other environmental laws. Refer to "CERCLA Compliance with Other Environmental Statutes," Appendix to Preamble of the National Oil and Hazardous Substances Pollution Contingency Plan, Final Rule, (50 FR 2892.6) November 20, 1985, for additional information. All applicable or relevant and appropriate requirements identified in the ROD and FS shall be analyzed and incorporated into the design.

In accordance with CERCLA Section 121(e), no permits shall be required for Work carried out entirely on-Site. For any Work which requires a permit, the following shall be identified and included in the intermediate, prefinal and final design submittals: (1) the permitting authority(ies); (2) construction/operating permits required; (3) time required by the permitting agency(ies) to process the application(s); (4) monitoring and/or compliance testing requirements; and (5) actual agency regulations governing applications, exemptions, variances, etc. For Work on-Site, which otherwise would require a permit,

the substantive requirements identified as ARARs shall be identified and included in the intermediate, prefinal and final design submittals.

The Settling Defendant shall obtain, complete, and provide all required application forms to the appropriate permitting authority. Copies of all correspondence from permitting agencies which either describe permit requirements or indicate that no permits are necessary, shall be furnished to the U.S. EPA.

B. OPERATION AND MAINTENANCE PLAN

The Settling Defendant shall develop and submit to U.S. EPA for approval an Operation and Maintenance (O&M) Plan to ensure the safe and effective implementation of this remedy. The basic elements of the Plan shall include:

1. Normal Operation and Maintenance
 - Describe tasks for operation
 - Describe tasks for maintenance
 - Describe optimum treatment conditions
 - Present schedule
2. Potential Operating Problems
 - Describe potential sources of problems or failure
 - Present common remedies or alternatives
 - Describe information sources
3. Routine Monitoring and Testing
 - Present description of monitoring tasks detailed in the Sampling Plan
 - Present required Laboratory testing detailed in the Sampling Plan
 - Present required QA/QC to ensure proper system operation
 - Maintain daily operating logs and maintenance records
4. Long Term Operation and Maintenance
 - Present tasks necessary to identify system repairs
 - Describe monitoring and testing results necessary for landfill repair or other work to maintain the performance standards
 - Describe equipment replacement contingencies
 - Maintain daily operating logs, periodic inspection logs and maintenance records
 - Describe responses to problems identified at inspections
 - Retain all laboratory data and testing results

- Present mechanism for reporting emergencies
- Schedule reports to Agencies.

As part of the O&M Plan, the Settling Defendant shall establish a monitoring network in order to assess the compliance of the remedial activities and to assess whether new or further corrective measures need to be taken at the site. This monitoring network shall include groundwater, surface water, and soil sampling and analysis. The Settling Defendant shall submit the sampling plan with the 60% design package. The parameters for analysis of groundwater samples shall be based on the results of the pre-design groundwater sampling and analysis.

The Settling Defendant shall develop an initial draft O&M Plan during the Remedial Design Phase. To ensure correlation with all design activities the initial draft O&M Plan shall be submitted with the 60% intermediate design package. The Settling Defendant shall submit the final O&M plan with the prefinal (95%) and final (100%) design documents for Agency review and approval.

C. CONSTRUCTION QUALITY ASSURANCE PLAN

The Settling Defendant shall develop a construction quality assurance program including, but not limited to the following: responsibility and authority; personnel qualifications; inspection activities; sampling requirements; data management and interpretation; corrective measures; and documentation.

D. COST ESTIMATE

The Settling Defendant shall develop cost estimates for the purpose of assuring that the Settling Defendant has the financial resources necessary to construct and implement the Remedial Action. The cost estimate developed in the FS shall be refined to reflect the more detailed and accurate design plans and specifications being developed. The cost estimate shall include both capital and operations and maintenance costs and shall follow the procedures in "Remedial Action Costing Procedures Manual" (U.S. EPA, September 1985). An Initial Cost Estimate shall be submitted with the Prefinal (95%) Design Document and the Final Cost Estimate shall be submitted with the Final (100%) Design Document.

Task 4 - Remedial Action Implementation

Following U.S. EPA approval of the final design, the Settling Defendant shall implement the Remedial Actions in accordance with the approved final design plans, specifications and schedule. The implementation of the Remedial Action shall, at a minimum, include the following activities:

A. PRECONSTRUCTION INSPECTION AND MEETING

After the remedial action contractor has been secured and before the implementation, a preconstruction meeting and inspection should be held at the site. The purpose of this inspection and meeting is to identify and resolve any potential problems with implementation of the approved design documents. This meeting and inspection will involve at a minimum, U.S. EPA and the Settling Defendant's project coordinator and remedial action contractors.

B. REMEDY CONSTRUCTION AND IMPLEMENTATION

The Settling Defendant shall construct and implement the approved Remedial Actions in accordance with the approved remedial design documents, plans, and schedules.

C. PREFINAL INSPECTION

When the Settling Defendant believe that they have completed the operation of the treatment technologies and have constructed the containment system, and prior to their submission of the Certification of Completion of Remedial Action in accordance with Section XXII of the Consent Decree, a prefinal inspection should be held at the site. This inspection will involve at a minimum, U.S. EPA and the Settling Defendant's project coordinator and remedial action contractors.

D. FINAL INSPECTION

If any deficiencies in the Remedial Action implementation are identified in the prefinal inspection, the Settling Defendant shall correct the deficiencies prior to the final inspection. This inspection will involve at a minimum, U.S. EPA and the Settling Defendant's project coordinator and remedial action contractors. If the final inspection demonstrates that no deficiencies in the Remedial Action implementation remain, the Settling Defendant may submit the Certification of Completion of Remedial Action in accordance with Section XXII of the Consent Decree.

E. LONG TERM OPERATION AND MAINTENANCE

U.S. DOI shall continue to perform post-certification long term operation and maintenance of the contained waste residuals and excavated areas in accordance with the approved plans, specifications and schedules.

Task 5 - Schedule and ReportingA. MONTHLY PROGRESS REPORTS

The Settling Defendant shall, at a minimum, provide the U.S. EPA, DOI and IEPA with signed monthly progress reports during the design and construction phases. These reports shall contain:

1. A description and estimate of the percentage of the RD/RA completed;
2. Summaries of all unforeseen field conditions, sampling and test results, and all other data or pertinent information received during the month that has not been previously submitted;
3. Summaries of all changes made in the RD/RA during the reporting period;
4. Summaries of all significant contacts with representatives of the local community, public interest groups or State government during the reporting period;
5. Summaries of all problems or potential problems encountered during the reporting period;
6. Actions being taken to rectify problems;
7. Changes in key personnel during the reporting period;
8. Projected work for the next reporting period; and
9. Copies of daily reports, inspection reports, laboratory and monitoring data that has not been previously submitted.

B. OPERATION AND MAINTENANCE OVERSIGHT REPORTS

At a minimum, the Settling Defendant before certification, and U.S. DOI after certification, shall provide the U.S. EPA and IEPA with signed semi-annual progress reports for operation and maintenance activities. These reports shall contain:

1. Summaries of all inspections;
2. Summaries of all unforeseen field conditions, sampling and test results, and all other data or pertinent information received during the reporting period;
3. Summaries of all problems or potential problems encountered during the reporting period;
4. Actions taken or being taken to rectify problems;

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5. Summaries of all significant contacts with representatives of the local community, public interest groups or State government during the reporting period;
6. Changes in key personnel during the reporting period;
7. Projected work for the next reporting period; and
8. Copies of inspection reports, laboratory and monitoring data.

C. SCHEDULE

The Settling Defendant shall develop schedules demonstrating the time for conduct of the pre-design work, development of the remedial design and implementation of this remedial action. The Treatability Test Schedule shall be submitted to U.S. EPA for review and approval with the Treatability Test Work Plan. The Pre-Design Schedule shall be submitted to U.S. EPA for review and approval with the Pre-Design Work Plan. The RD Schedule shall be submitted to U.S. EPA for review and approval with the RD/RA Work Plan. The RA Schedule shall be submitted to U.S. EPA for review and approval with the pre-final (95%) design. Review and approval of the schedules will be in accordance with paragraph 14 of the Consent Decree.

The schedules shall include time frames, durations, and specific dates (month, day and year), where appropriate, for: submittal of all documents for agency review and approval, initiation and completion of specific tasks, and meetings to discuss submittals as provided for in the Consent Decree and this Scope of Work. The schedules, to the extent practicable, shall provide for the timing and phasing of work so as to take advantage of periods when the munitions manufacturing quantity/distance limitations applicable to Olin Corporation do not apply or are less stringent. The schedules shall also, to the extent feasible, take into account the need to coordinate work with Olin Corporation safety personnel in areas within the quantity/distance limitations. The schedule shall also include planned sampling and monitoring activities. The Settling Defendant shall account for any multiple submittals of a deliverable and other contingencies and plan the schedule accordingly.

A key milestone for the Treatability Test Schedule is:

- Submit Treatability Test Work Plan - no later than sixty (60) days after lodging of the Consent Decree.

Key milestones for the Pre-Design Schedule are:

- Submit Pre-Design Work Plan - ninety (90) days after lodging of the Consent Decree.

- Submit Results of Pre-Design Work - on or before the deadline in the approved Pre-Design Schedule.

Key milestones for the RD Schedule are:

- Submit RD/RA Work Plan - no later than thirty (30) days after entry of the Consent Decree, or sixty (60) days after completion of the final Treatability Test Report, whichever is later. All revisions shall be submitted in accordance with paragraph VI (14)(c) of the Consent Decree.
- Complete and submit preliminary (30%) design plans and specifications - concurrent with the RD/RA Work Plan or concurrently with the submission of the results of the Pre-Design Work, whichever is later.
- Complete and submit intermediate (60%) design plans and specifications - ninety (90) calendar days after receipt of approval or comment on the preliminary design plans and specifications.
- Complete and submit prefinal (95%) design plans and specifications - ninety (90) calendar days after receipt of approval or comment on the intermediate design plans and specifications.
- Complete and submit final design plans and specifications - thirty (30) calendar days after receipt of comment on the prefinal design plans and specifications. If the prefinal design plans and specifications are approved without comment, they shall function as the final design.

Key milestones for the RA Schedule are:

- Secure Remedial Action Contractor - Ninety (90) calendar days after approval of final design plans and specifications.
- Begin implementation of remedial action - thirty (30) calendar days after award of remedial action contract.