Quality Control Plan

Waste Water Treatment Plant #2 and Associated Sewer Lines Former Plum Brook Ordnance Works, Sandusky, Ohio

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This Quality Control Plan (QCP) was prepared by Shaw Environmental and Infrastructure, Inc. (Shaw) in support of the activities to be conducted for the Waste Water Treatment Plant #2 (WWTP2) and Associated Sewer Lines at the former Plum Brook Ordnance Works (PBOW) in Sandusky, Ohio, under Delivery Orders DX19 and DX20, IDIQ Contract W912QR-08-D-0013, for the Louisville A/E Environmental Services.

PROJECT OBJECTIVE AND SCOPE

The objective to the QCP is to provide guidance to the requirements remedial investigation at the Waste Water Treatment Plant 2 (WWTP2) and associated sewer lines. Results of this remedial investigation (RI) will be presented in a site characterization report for each area.

Following the RI and site characterization of the sewer lines associated with the WWTP2 and the TNTC area, a human health and ecological risk assessments will be performed for that specific area. A feasibility study (FS) will be prepared to evaluate possible alternatives for response to contamination found in soil and groundwater. Results of the FS will be used to prepare a Proposed Plan (PP) and Decision Document (DD) for these areas.

The structure of this QCP is based on the scope of work from two delivery orders (DO) DX19 Waste Water Treatment Plant 2 Area and TNTC Waste Water Sewer Line RI, BHHRA, SLERA, FS, PP, and DD; and DX20 the Waste Water Treatment Plant #2 Steel Sewer Line. Because of the similarity of the investigative activities, these have been combined under one QCP. Activities and details where the delivery orders differ are addressed identifying individual requirements per the separate SOWs. When similar activities are used in combination, they will be referred to as the WWTP2 and associated sewer lines. When the activities differ, the individual delivery order titles will be used.

PROJECT TASKS

This QCP presents the following tasks that will need to be completed in order to support the objective of this task order. :

- Task 1.0: Preparation and Submittal of Quality Control Plan (QCP)

- Task 2.0: Preparation and Submittal of a Site-Specific Safety and Health Plan (SSHP) and Site-Specific Sample and Analysis Plan (SSAP) Addenda;
- Task 3.0: Site Clearing and Survey
- Task 4.0 TNTC Waste Water Sewer Line Trenching
- Task 5.0: Test Pit Investigation;
- Task 6.0: Direct Push Investigation;
- Task 7.0: Monitoring Well Installation;
- Task 8.0: Monitoring Well Sampling;
- Task 9.0: Analytical Requirements;
- Task 10.0: Disposal of Investigation Derived Waste (IDW);
- Task 11.0: Geographic Information System (GIS) Deliverable;
- Task 12.0: Preparation and Submittal of the Site Characterization Report;
- Task 13.0 Baseline Human Health Risk Assessment
- Task 14.0: Screening Level Ecological risk Assessment;
- Task 15.0: Feasibility Study
- Task 16.0: Proposed Plan
- Task 17.0: Decision Document
- Task 18.0: Meetings
- Task 19.0: Project Management
- Task 20.0: Miscllanous Task Team Support

The following presents detailed information for each of the above mentioned tasks.

Task 1.0 – Preparation and Submittal of Quality Control Plan

Shaw prepared this QCP based on requirements described in ER 1110-1-12, Quality Management and CEORD 1110-1-9, Quality Control. As part of the QCP development, Shaw incorporated a criteria management process to ensure standard details appropriate for the USACE requirements are developed, updated, and made available to all project stake holders and reviewers. This QCP is an addendum to the Site-Wide Sample and Analysis Plan (SWSAP, prepared under contract No. W912DR-05-0026, (DX10) which defines the quality verification activities for specific professional disciplines. This verification process will be implemented to ensure that the work output is acceptable and meets all requirements detailed in the SOW from both delivery orders.

An independent review of documents and submittals, as well as other tasks presented in this QCP, shall be performed to verify that work is conducted in an acceptable manner

and meets all the requirements detailed in the SOW from both delivery orders presented in Shaw's proposal.

Task 2.0 – Preparation and Submittal of Site-Specific Safety and Health Plan and Site-Specific Sampling and Analysis Plan Addenda

Shaw will develop and submit a Site-Specific Safety and Health Plan (SSHP) addendum specific to the investigation of WWTP2 and associated sewer lines. The SSHP addendum required by 29 CFR 1910.120(b) (4) shall be prepared and submitted to CELRN-EC-E. This addendum will describe the health and safety procedures, practices to be implemented and equipment utilized to protect affected personnel from the potential hazards associated with the site-specific tasks. The level of detail provided in the addendum will be tailored to the type of work, complexity of operations being accomplished, hazards anticipated and the extent new conditions or procedures affecting the need to supplement the updated *Site-Wide Safety and Health Plan.*

Shaw will also develop a Site-Specific Sampling and Analysis Plan (SSAP) addendum specific to the investigation of WWTP2 and associated sewer lines. The Site-Wide Sampling and Analysis Plan (SWSAP, prepared under Contract No W912DR-05-D-0026, and DX10) will be used as the base document. The SSAP will be prepared as an addendum to the SWSAP and will present details regarding the investigative work as described in the both SOWs. The SSAP addendum will identify sampling standard operating procedures, analytical methods and data quality objectives specific to the investigation of the WWTP2 and associated sewer lines. In addition, it will identify sampling locations for WWTP2 and associated sewer lines, rationale underlying the choice of locations and any expected variations from the SWSAP.

Task 3.0 – Site Clearing and Survey

Clearing and grubbing operations will be conducted along the TNTA waste water sewer line to allow unobstructed access to excavation, soil boring and monitoring well locations. A subcontractor will be used to remove trees, brush and debris along the sewer line. Tree removal will be minimized to the extent possible in order to allow access needed for large drill rigs to install bedrock monitoring wells. Clearing and grubbing will also be conducted at the WWTP2 area which is heavily overgrown with trees and brush. In addition, demolition debris (concrete and metal) currently at the site will be moved to allow for sampling as needed. The debris will be left on site.

Task 4.0 – TNTC Waste Water Sewer Line Trenching and WWTP2 Steel Sewer Line Test Pit Investigation

Representative soil samples will be collected from immediately below the WWTP2/TNTC waste water sewer line. A total of 20 test pits will be excavated along the sewer line and soil samples will be collected within each test pit at a location immediately below each sewer line, or interpreted to be below the former sewer line in areas where it has been removed. These 20 samples will be analyzed or nitroaromatics only.

At the WWTP2 steel sewer line, existing historical figures will be used to determine the approximate location prior to site clearing/grubbing. Because the line has been previous located using geophysics and appears to be intact, a combination of GPS equipment will be used to initially locate the approximate location of the sewer line, and a magnetometer to determine the exact location of the steel sewer line.

Representative soil samples will be collected from immediately below the WWTP2 steel sewer line. A total of 30 test pits will be excavated along the sewer line and soil samples will be collected within each test pit at a location immediately below each sewer line, or interpreted to be below the former sewer line in areas if it has been removed. These 30 samples will be analyzed or nitroaromatics only.

Upon completion of the test pit excavations and soil sampling, Shaw will breach the WWTP2 steel sewer line, if still intact, to determine if waste material is present within the sewer line. The steel sewer line will be breached in up to five (5) locations. Shaw will seal each breached area with a pipe collar or other suitable means.

No raw explosive material is expected to be encountered during soil sampling activities. Should sampling personnel encounter raw explosives, Shaw will stop sampling and will contact CELRN to discuss procedures for disposal of the raw explosive material. Shaw will obtain all necessary utility clearances and permits from NASA.

All test pit locations will be sketched and surveyed to the nearest 1 foot; land elevations will be surveyed to within + 0.01 foot referenced to the National Geodetic Vertical Datum of 1929. Any site clearing that may be necessary for equipment access will be coordinated with NASA.

Task 5.0 – Direct-Push Investigation

At the WWTP2/TNTC sewer line, a total of 10 soil borings will be advanced along the sewer line using direct-push technology (DPT). Six of these locations will be biased toward those areas found to have among the highest concentrations of nitroaromatics based on the initial test pit soil analytical results. Two samples will be collected from each boring: one from the surface (0-1 foot below surface) and one from 8-10 feet below the surface. The 10 surface soil samples will be analyzed for nitroaromatics, SVOC, TAL metals, and PCBs. Additionally, one surface soil sample will be analyzed for total organic carbon. Four soil borings will be completed laterally away from the sewer line to delineate the lateral extent of contamination. The 10 subsurface soil samples will be analyzed for nitroaromatics only.

A total of 8 soil borings will be advanced at the WWTP2 area adjacent to former tanks. Soil samples will be collected from 0-1, 3-5 and 8-10 feet below ground surface. The soil samples will be analyzed for nitroaromatics, SVOC, TAL metals, and PCBs. In addition, on surface soil sample will be analyzed for total organic carbon.

The groundwater remedial investigation will be conducted as a phased approach using temporary piezometers (Phase 1) and permanent wells (Phase 2 described under Task 6.0 below). In the first phase of the groundwater investigation, a total of 10 piezometers are planned for installation along the TNTC Sewer Line and 6 piezometers are planned for installation at the WWTP2 area. Each of these will be continuously logged to bedrock (i.e., competent shale) during installation. If bedrock is encountered at less than 5 feet and the borehole is dry, then no piezometers will be installed at this location as it is unlikely to produce measurable water. In this case a suitable alternate location for piezometers installation will be sought along the WWTP2/TNTC Sewer Line. Water samples from nearly dry piezometers (e.g., <12 inches of water) are not always representative of formation water and may inappropriately influence contaminant evaluations. If such conditions are encountered, Shaw will propose to CELRN how they intend to proceed.

Similar to the WWTP2/TNTC sewer line, a total of 10 soil borings along the WWTP2 steel sewer line using direct-push technology (DPT). Six of these locations will be biased toward those areas found to have among the highest concentrations of nitroaromatics based on the initial test pit soil analytical results. Four soil borings will be completed laterally away from the sewer line at selected locations to delineate the lateral extent of contamination. Two samples will be collected from each boring: one from the surface (0-1 foot below surface) and one from 8-10 feet below the surface. The 10 surface soil samples will be analyzed for nitroaromatics, SVOC, TAL metals, and PCBs.

Additionally, one surface soil sample will be analyzed for total organic carbon. The 10 subsurface soil samples will be analyzed for nitroaromatics only.

The WWTP2 steel sewer line groundwater remedial investigation will also be conducted as a phased approach using temporary piezometers (Phase 1) and permanent well installations and sampling (Phase 2 described under Tasks 6.0 and 7.0 below). In the first phase of the groundwater investigation, a total of 10 piezometers are planned for installation along the WWTP2 Steel Sewer Line. Each of these will be continuously logged to bedrock (i.e., competent shale) during installation. If bedrock is encountered at less than 5 feet and the borehole is dry, then no piezometer will be installed at this location as it is unlikely to produce measurable water. In this case a suitable alternate location for piezometer installation will be sought along the WWTP2 Steel Sewer Line. Water samples from nearly dry piezometers (e.g., <12 inches of water) are not always representative of formation water and may inappropriately influence contaminant evaluations. If such conditions are encountered, Shaw will propose to CELRN how they intend to proceed.

Before any of the piezometers are sampled, the water levels will be measured and recorded for all of the piezometers involved in this investigation. The piezometer will be purged with clean, non-contaminating equipment. Periodically, during the purge process a portion of the purge water will be tested and recorded for pH, turbidity, specific conductance, dissolved oxygen, and temperature using flow-through measurement cells. Once the relevant parameters have stabilized (as defined by EM 200-1-3, page C-17) and three consecutive turbidity readings have been less than 100 NTUs the Shaw will measure and record the reduction-oxidation potential of the groundwater and the sample may be collected. If the relevant parameters do not stabilize and the water level cannot be maintained, the Shaw will propose to CELRN how they intend to proceed to ensure that sampling is of quality to fulfill one or more of the project objectives. Piezometer groundwater samples will be collected using low-flow technology with a peristaltic pump and PTFE tubing (e.g. Teflon®) unless this technology is not appropriate for a given analyte.

Groundwater samples collected from the WWTP2 area will be analyzed for nitroaromatics, SVOC, TAL metals (filtered and unfiltered) and water quality parameters. Groundwater samples collected from the TNTC sewer line area will be analyzed for nitroaromatics. Groundwater samples collected from the WWTP2 Steel Sewer Line will be analyzed for nitroaromatics and water quality parameters.

No raw explosive material is expected to be encountered during soil sampling activities. Should sampling personnel encounter raw explosives, Shaw will stop sampling and will contact CELRN to discuss procedures for disposal of the raw explosive material. Shaw will obtain all necessary utility clearances and permits from NASA.

All boring locations will be sketched and surveyed to the nearest 1 foot; land elevations will be surveyed to within + 0.01 foot referenced to the National Geodetic Vertical Datum of 1929.Any site clearing that may be necessary for equipment access will be coordinated with NASA.

Task 6.0 – Monitoring Well Installation

Six overburden/shale and six limestone bedrock monitoring wells will be installed at the WWWTP2/TNTC sewer line. Three overburden/shale and three limestone bedrock monitoring wells will be installed at the WWTP2 steel sewer line. The specific location of each well will be determined based on the analytical results of the piezometer samples. Coordination and the locating of all underground utilities in the vicinity of the borehole sites will be scheduled prior to drilling activities.

A qualified geologist or geotechnical engineer will be on site for all drilling, installation, development, and testing operations. Well installation and drilling methods will be in accordance with the procedures and requirements described in EM 1110-1-4000, *Monitor Well Design, Installation, and Documentation at Hazardous and/or Toxic Waste Sites*, and applicable State regulations and requirements. Where necessary, Shaw will use "double casing" as described in Section 3-10 of EM 1110-1-4000 to install a well through a contaminated upper zone. The plan for meeting applicable procedures and requirements will be included in the SAP Addendum if not covered in the approved Site-Wide SAP (*Work Plan for the HTW Investigation, Plum Brook Ordnance Works, Plum Brook Station/NASA,* October 1994). Variation from the 1998 November EM 1110-1-4000 guidelines will be proposed for approval in the SAP Addendum.

Shaw will establish coordinates and elevations according to EM 1110-1-4000 for each new well. A notch will be filed into the top of the well riser pipe and marked to serve as a vertical and horizontal measurement point. The coordinates will be to the closest 1 foot and referenced to the State Plane Coordinate System. Elevations will be surveyed to within $\pm$ 0.01 feet referenced to the National Geodetic Vertical Datum of 1929.

Upon completion of all drilling activities, the sites will be restored to the extent practical by grading the areas to remove any ruts, and reseeding the native grasses.

Task 7.0 – Monitoring Well Sampling

Two rounds of groundwater samples will be collected from each of the new monitoring wells installed at the WWTP2 and associated sewer line areas; one in the spring and one in the fall. Each of the samples from the three overburden/shale and three bedrock wells at the WWTP2 will be analyzed for TCL VOCs, TCL SVOCs, TAL Metals (filtered and unfiltered), nitroaromatics and water quality parameters. For the three overburden/shale wells and three bedrock wells installed along the TNTC sewer line, groundwater samples will be analyzed for nitroaromatics and water quality parameters only. Each of the samples from the three overburden/shale and three bedrock wells at the WWTP2 steel sewer line will be analyzed for nitroaromatics and water quality parameters.

Purging and sample collection will be in accordance with the requirements set forth in EM 1110-1-4000 and EM 200-1-3. In addition to the primary water samples, certain field control samples will be prepared as described in succeeding paragraphs. Shaw will coordinate with the primary and QA laboratories as to the volumes of sample necessary to satisfy all internal laboratory QC requirements. Any laboratory performing work for the USACE will comply with ISO/IEC Guide 25, *General Requirements for the Competence of Calibration and Testing Laboratories, 1990 Edition and Updates*. All samples will be collected and analyzed in conformance with applicable EPA and USACE requirements, using techniques and equipment described in the approved SAP Addendum or Site-Wide SAP.

Before a sample is collected from a well, the water level will be measured and recorded for that well and, if applicable, any associated nested well. Then a CELRN approved low-flow purge and sample procedure will be used. The well will be purged with clean, non-contaminating equipment.

Periodically during the purge process a portion of the purged water will be tested for pH, turbidity, specific conductance, dissolved oxygen, and temperature. Shaw will record these measurements on the well sampling form along with other appropriate sampling information. Once the relevant parameters have stabilized (as defined by EM 200-1-3, page C-10) and three consecutive turbidity readings have been less than 100 NTUs, the Shaw will measure and record the reduction-oxidation potential of the groundwater and the sample may be collected. If the relevant parameters do not stabilize and the water level cannot be maintained, then Shaw will propose to CELRN how they intend to proceed.

If the well does not recharge fast enough to permit even low-flow purging, Shaw will propose to CELRN how they intend to proceed. Flexible delivery tubing required for low-flow sampling will be constructed of a PTFE material such as Teflon. The groundwater sampling equipment will be dedicated or cleaned between each well use to prevent cross-contamination. Only low-flow sampling will be used unless the well does not contain enough water volume to allow for low flow sampling, in which a case a bailer will be used. If samples are obtained using a bailer, the bailer will be a bottom emptying device constructed of Teflon, PVC, or stainless steel. Tipping the bailer to obtain a sample from the top will not be done. The Shaw risk assessor will be advised if any groundwater samples are collected using a method other than low flow sampling.

Task 8.0 – Analytical Requirements

A total of 176 samples will be collected for laboratory analysis as described in the previous sections. In addition, the following quality assurance/quality control (QA/QC) samples will be collected and analyzed (relative quantities in parentheses):

- Equipment rinsates (≤ 5%)
- Source water (1)
- Blind duplicates (≤ 10%)
- Split samples (≤ 10%)
- Matrix spike/matrix spike duplicate samples (≤ 10%).

All details of sampling shall conform to the CELRN-EC-E approved SWSAP, and to applicable USEPA (SW-846) and USACE requirements (ER 1110-1-263, 1 April 1996). Details include sample volumes, composition and size of containers, methods of preservation, identification and labeling, packing, transportation and shipment.

Laboratory performance will be verified and documented that the work on this project is compliant with Department of Defense Quality Systems Manual (DOD QSM) Revision 4.1. The most recently promulgated methods from EPA's SW-846 *Test Methods for Evaluating Solid Wastes (SW-846)* will be used with the exception of SW-846 method 8330 for nitroaromatics. For comparability purposes, multi incremental sampling will not be required.

Shaw is responsible for collecting, packaging, coordinating and shipping QA samples to the quality assurance laboratory. All shipments will include a temperature blank. The primary samples will have project-specific QC that will be used only for this project. When sample shipments arrive at the laboratory a cooler receipt form will be completed and signed by the sample custodian. Copies of the completed chain of custody and cooler

receipt forms will be included in the Site Delineation Report.

Analytical data generated by the laboratory will be extensively reviewed prior to report generation to assure the validity of the reported data. The data from all site samples, with the exception of water quality parameters, total organic carbon, and IDW samples, will be validated by qualified Shaw personnel who have no responsibility for sample collection or analysis. Validation will follow the logic and review sections included in the US Environmental Protection Agency Contract Laboratory Program - National Functional Guidelines for Superfund Organic Data Review, June 2008 (EPA 540/R-08/01) and the US Environmental Protection Agency Contract Laboratory Program National Functional Guidelines for Superfund Inorganic Data Review, January 2010 (EPA 540/R-10/011).

Shaw will report all data reduction procedures including the methods or equations of concentration calculations, reporting units of concentration; moisture related data and the procedures used for calculating PARCC parameters. The data will be reported in a "CLP like" format and will be of sufficient quality for a Chemical Quality Assurance Report to be submitted. Shaw will provide CLP-like data packages consisting of all elements required in CLP definitive level data deliverables. Shaw will also provide an additional electronic data deliverable for the chemical data, consisting of a SEDD as defined in the USEPA Contract Laboratory Program requirements. Shaw will prepare a table which relates all QA samples to their corresponding field and QC samples sent to the primary laboratory.

An evaluation of the field screening method during implementation of the field investigation will be provided to the USACE. This evaluation will be done to modify the field screening approach if needed.

Task 9.0 – Disposal of Investigation Derive Waste

After receiving characterization data for the IDW, Shaw will review and prepare a letter proposing an appropriate disposal option. Shaw will arrange for disposal of the IDW through a subcontractor in accordance with all local, state and federal laws regulatory standards.

Task 10.0 – Geographic Information System Deliverable

Information collected during this investigation will be added to the database developed during previous investigations. This database includes information related to the installation of groundwater monitoring wells (both overburden and bedrock wells) by Morrison Knudsen Corporation, Dames & Moore, and IT Corporation. This database also

includes analytical (chemical) results obtained from the previous investigation of soil and groundwater collected by Dames & Moore and IT Corporation. The deliverable package, including Metadata, will be formatted as specified in the previously provided Data Standard for Corps of Engineers Environmental Restoration Sites and the Tri Services Spatial Data Standards (TSSDS). The TSSDS are available at the following link: *http://fwgcom.wes.army.mil/projects/standards/tssds/*. Shaw will be responsible for correcting any added files with transcription errors.

The information collected during this investigation will be entered into a Geographic Information System (GIS) Data Base. The GIS data will be too transferred to the Huntington District Corps of Engineers (CELRH), coordinating with CELRH (Rick Meadows) as to the appropriate data and supporting documentation formats.

Task 11.0 Preparation and Submittal of Site Characterization Report

After the analytical results for the soil, groundwater piezometer, and groundwater monitoring wells have been validated, Shaw will prepare a Site Characterization Report (Volume I of the RI) for each site. Data summaries for each medium will include a data summary of all sample IDs, sample locations, sample dates, detected chemical concentrations, method detection limits, qualifiers, maximum detected concentration column, background screening value (if applicable) and risk-based screening values. At this phase, screening values are not considered judicial or regulatory limits, but are included to provide perspective to the data. The screening levels will be the same levels as to be used in a data screening portion of a human health risk assessment (unless subsequently updated prior to the risk assessment). The investigation results will be presented in a report, which includes a narrative that details the nature of work performed during the investigation, problems encountered, and conclusions and recommendations. When Method Detection Limits for individual analytes and sample location are higher than the appropriate screening value, they will be identified in the report.

Figures will be prepared that show sampling locations (including depths) for each sample collected. Additionally, figures will be prepared for sampling results indicating those values that exceed screening criteria and for reference purposes only, and a table showing PBOW background concentrations of inorganic analytes.

The Site Characterization Report will be submitted as Volume I of the RI report. Shaw will submit draft and final versions of the Site Characterization Report. A draft version will be submitted to all reviewing parties, including OEPA, CEHNC-CX, and USAPHC

(Prov). Shaw will respond to all comments with official response to comments submitted to CELRN and will revise the report as per agency comments.

Task 12.0 – Baseline Human Health Risk Assessment

A Baseline Human Health Risk Assessment (BHHRA) Work Plan and Report will be prepared for the WWWTP2/TNTC sewer line, which are consistent with current USEPA, USACE, and OEPA guidance, and are also consistent with the standard practice used in the other BHHRA work plans and report prepared for other PBOW sites. Work plans and reports from these other sites (e.g., Powerhouse 2 Ash Pits) will be used as go-by's to ensure consistency in risk assessment.

The BHHRA work plan will summarize information about the PBOW site background, history, and characteristics. The work plan will provide a detailed approach in completing a BHHRA that satisfies regulatory and USACE requirements and covers the risk scenarios for current and potential future receptors. The work plan will include detailed methodology and algorithms for human health risk assessment including, but not limited to, data evaluation, selection of chemicals of potential concern, exposure assessment, toxicity assessment, risk characterization, uncertainty analysis, preliminary risk-based remediation goals derivation, and findings reporting. The work plan will be comprehensive enough for the WWWTP2/TNTC sewer line media.

The BHHRA will evaluate the risks associated with exposure to contaminants in WWWTP2/TNTC sewer line soil, and groundwater. It will include a site conceptual exposure model, selection of chemicals of potential concern (COPC), exposure assessment, toxicity assessment, risk characterization, uncertainty analysis, risk-based remediation goals, and recommendations/conclusions. The BHHRA report will be submitted as Volume II of the RI report.

Task 13.0 – Screening Level Ecological Risk Assessment

A Screening Level Ecological Risk Assessment (SLERA) Work Plans and Reports will be prepared for the WWTP2/TNTC sewer line which are consistent with current USEPA, USACE, and OEPA guidance, and are also consistent with the standard practice used in the other SLERA work plans and report prepared for other PBOW sites. Work plans and reports from these other sites (e.g., Powerhouse 2 Ash Pits) will be used as go-by's to ensure consistency in risk assessment.

The SLERA work plans will summarize information about the PBOW site background, history, and characteristics. The work plans will provide a detailed approach in completing a SLERA that satisfies regulatory and USACE requirements and covers the

exposure pathways for ecological receptors. The work plans will include detailed methodology and algorithms for subtasks of the SLERA. The work plans will be comprehensive enough for the LBA media.

The SLERA will evaluate the risks associated with exposure to contaminants in WWTP2/ TNTC sewer line soil and surface expression of groundwater if present. It will include an ecological problem formulation, exposure assessment, effects evaluation and development of toxicity reference values, risk characterization, uncertainty analysis, and summary/conclusions/recommendations. The SLERA report will be submitted as Volume III of the RI.

A subtask of the problem formulation will include two site reconnaissance walkovers to be performed by expert ecologists/wildlife biologists with strong skills in the identification of flora and fauna of northern Ohio. These walkovers will be used to compile a vegetation community map of the WWTP2/TNTC sewer line areas and also species checklists. One walkover will be performed in late spring (May/June) and the other in early fall (September/October). The checklists and community map will be appended to the SLERA report.

Shaw will submit draft and final versions of the SLERA work plan and report. A draft version of each will be submitted to all reviewing parties, including OEPA, CEHNC-CX, and USAPHC (Prov). Shaw will respond to all comments and will submit official response to comments to CELRN. Shaw will revise the draft work plan and report per agency comments.

Task 14.0 – Feasibility Study

Shaw will prepare FS reports for the protection of soil and groundwater associated with WWTP2 and TNTC Waste Water Sewer Line Areas. The FS reports will only address those contaminants that have impacted the media being evaluated to the extent that it does not meet human health risk-based criteria or ARARs. The FS reports will be prepared using USEPA and USACE guidance documents. The technical approach and level of effort to complete these tasks are outlined in the following sections. The soil and groundwater FS reports will be issued as two separate volumes. The following discussion of the necessary components of an FS applies to both the soil and groundwater.

The Draft FS will be submitted in two versions: An internal draft and a subsequent external draft. The internal draft will be distributed for USACE review only and will be reviewed by CELRN, CELRH, USAPHC (Prov), and CEHNC-CX. Shaw will respond to

USACE comments on the internal draft and submit responses to these comments. Once all comments on the internal Draft FS are addressed to the satisfaction of CELRN, Shaw will incorporate the responses to comments into a revised Draft FS which will be sent to the entire distribution list for review.

Prior to finalizing the FS, Shaw will respond to all comments on the Draft FS. Once all comments are resolved to the satisfaction of the CELRN, the Shaw will incorporate all responses into the Final FS which will be submitted to the entire distribution list and submitted to the public.

Task 15.0 – Feasibility Study

The Feasibility Study (FS) reports will be prepared for the protection of soil and groundwater associated with WWTP2/TNTC sewer line. The FS reports will address only those contaminants that have impacted the media being evaluated to the extent that it does not meet human health risk-based criteria or ARARs. The FS reports will be prepared using USEPA and USACE guidance documents. The soil and groundwater FS reports will be issued as two separate volumes. The following discussion of the necessary components of the FS applies equally to both the soil and groundwater reports.

The Draft FS will be submitted in two versions: An internal draft and a subsequent external draft. The internal draft will be distributed for USACE review only and will be reviewed by CELRN, CELRH, USAPHC (Prov), and CEHNC-CX. Shaw will respond to USACE comments on the internal draft and submit responses to these comments. Once all comments on the internal Draft FS are addressed to the satisfaction of CELRN, Shaw will incorporate the responses to comments into a revised Draft FS which will be sent to the entire distribution list for review.

Prior to finalizing the FS, Shaw will respond to all comments on the Draft FS. Once all comments are resolved to the satisfaction of the CELRN, the Shaw will incorporate all responses into the Final FS which will be submitted to the entire distribution list and submitted to the public.

Identification of Applicable or Relevant and Appropriate Requirements

The appropriate federal, state, and local ARARs will be determined on a site-specific basis under this task. ARARs will be identified at several points in the remedy selection process and will be categorized under the following:

- ***Action-Specific ARARs.*** These are technology or activity based requirements or limitations on actions taken with respect to hazardous wastes and are triggered by the particular remedial activities that are selected to accomplish a remedy.

- ***Chemical-Specific ARARs.*** These are based on acceptable exposure levels for human health and risk values for specific chemicals of concern, not a mixture of chemicals that may restrict or control the use of a particular treatment option. If a specific chemical has multiple ARARs, the most stringent ARAR will be used.
- ***Location-Specific ARARs.*** Restrictions placed on the concentrations of hazardous substances or the conduct of activities solely because they are in a specific location.

Development of Remedial Action Objectives

Remedial Action Objectives (RAOs) will be developed for soil and groundwater. They will consist of medium-specific goals for protection human health and the environment and for the attainment of identified ARARs. The RAOs will be developed to include the evaluation of soil as the potential continuing source of groundwater contamination. This evaluation will determine if remediation of soil in excess of that already targeted for remediation in the soil FS report (i.e. for the protection of direct contact) is required to protect groundwater.

Identification of Volumes or Areas of Impacted Media

A determination will be made during the development of alternatives regarding the areas or volumes of each media (e.g., soil, sediment and groundwater) to which general response actions might be applied. The initial determination will be made for each medium of interest and will be based upon results of the analytical sampling data that have been collected during previous phases of investigative work at the site. Defining areas or volumes of media will include a consideration of exposure routes and receptors, site conditions, and the nature and extent of contamination.

Initial Process Option Identification

The initial process option identification takes into consideration eight (8) technology process options within the general response action for the site contents will be screened for soil and groundwater. These options include the "*no further action*" alternative as required by federal regulations.

Identification of Remedial Technologies Types and Process Options

The identification of technology types and process options will be conducted by investigating the available sources including, but not limited to the following: references developed for application to Superfund Sites; standard engineering texts not specifically directed toward hazardous waste sites; and vendor literature. Potential technology types and process options that could successfully treat the waste as well as innovative

technologies will also be considered.

Screening of Remedial Technologies and Process Options

The number of potentially applicable technology types and process options will be reduced by evaluating the options with respect to technical implementability. Those technologies that are considered ineffective for remediation will be eliminated from further consideration. Documentation will be provided as to why these technologies were eliminated.

Preparation of Computer Aided Drafting and Design (CADD) Flow Diagrams, Plans, and Schematics

Technical drawings, flow diagrams, plans, schematics, etc., will be prepared under this task in support of the two FS reports (soil and groundwater), and will be prepared in a format compatible with USACE equipment. It is assumed that the following drawings will be required to support the soil and groundwater FS reports:

- One general drawing for each alternative in the screening phase
- Two detailed drawings for each alternative evaluated
- Two plan drawings showing locations, aerial extent, and expected volume of waste for each site area to be evaluated.

A compatible electronic file will be provided to the USACE including a three-dimensional, 2-foot topographic contour map of the site. This map will also coincide with the existing State Plane Coordinate Grid System.

Evaluation of Process Options

Technology types considered implementable for soil and groundwater will be evaluated in greater detail before selecting one process to represent each technology type. The purpose of selecting one representative process for each technology type is to simplify development and evaluation of alternatives. Process options will be evaluated based on effectiveness and implementability.

Effectiveness. An effectiveness evaluation will be conducted to determine whether a process option is capable of handing a certain volume of media while meeting RAOs; potential impacts to human health and the environment due to construction of implementation of remediation; and whether the technology is proven. Innovative technologies may be evaluated during this process.

Implementability. Potential technologies will be evaluated to determine their implementability. This will be based on both technical and administrative factors. Some

of these issues include the ability to obtain necessary permits, the availability of treatment, storage, and disposal services (including capacity), and the availability of necessary equipment and skilled workers to implement the technology.

Assemble Alternatives

The FS will include a description of each alternative and a rational for its selection based on the results of the initial process option identification. General response actions will be combined using different technologies and volumes of media to assemble alternatives. More than one response may be applied to each medium assuming that eight general response sections will be evaluated for soil and groundwater.

Screening of Alternative Technology Types

Technology process options will be defined with respect to their effectiveness, implementability, and costs such that differences among the selected process option alternatives from the various technology types can be identified. The following information will be investigated and reported, as appropriate, for the various technology processes available for an alternative.

- ***Size and Configuration of Treatment System.*** The size and configuration of on-site treatment systems including the rates or flows of treatment.
- ***Time Frame for Treatment.*** The time frame in which treatment can be implemented and the removal goals obtained.
- ***Spatial Requirements.*** Spatial requirements for constructing treatment systems or for staging construction.
- ***Permits.*** Information regarding the required permits for off-site actions and imposed limitations pretreatment and emission control requirements; coordination with local agencies and the public; as well as other legal considerations.

Screening Evaluations

Defined technology type alternatives will be evaluated against the short- and long-term aspects of three broad criteria: effectiveness, implementability, and costs. The purpose of the screening evaluation is to reduce the number of alternatives that will undergo a more thorough and extensive analysis. The alternatives will be evaluated more generally in this phase than during the detailed analysis. Evaluations at this stage will be sufficiently detailed to distinguish among process option alternatives. The entire alternative will be evaluated during alternative screening as to its effectiveness, implementability, and costs as described below.

Effectiveness Evaluation. Each technology type alternative will be evaluated as to its effectiveness in providing protection and reduction in toxicity, mobility, or volume that it can achieve. Both short- and long-term components of effectiveness will be evaluated.

Implementability Evaluation. Each technology type alternative will be evaluated as a measure of both the technical and administrative feasibility of constructing, operating, and maintaining a remedial action alternative. The following items, at a minimum, will be addressed during the implementability evaluation:

- Operation and Maintenance
  - Downtime
  - Operator License Requirements
- Requirements for Monitoring, Analyses, and Record Keeping
- Availability
  - Equipment, Materials, and Personnel
  - Off-site Treatment, Storage, and Disposal Capacity
- Post Remediation Site Control
- Potential for Failure of Alternative
- Need for Replacement
- Description of Potential Threats from Such Failure or Replacement
- Reliability of Engineered Components
- Reliability of Non-Engineered Components.

Cost Evaluation The costs associated with each alternative will be comparatively estimated with relative accuracy so that costs decisions among alternatives will be sustained as the accuracy of cost estimates improves beyond the screening process. Cost estimates will be detailed to a level commensurate with the design and will include appropriate design contingencies. Costs that will be evaluated for each remedial alternative include the following: Capital costs, operation and maintenance costs, present worth analysis, base year costs, and life cycle costs.

Innovative Technologies

Technologies are classified as innovative if they are fully developed but lack sufficient costs or performance data for routine use. The FS reports will consider innovative technologies for soil and groundwater, as appropriate.

Detailed Analysis of Alternatives

The detailed analysis of alternatives will consider costs as well as other aspects of the technologies being evaluated. This includes compliance with ARARs, reduction in toxicity, mobility, or volume by treatment, as well as effectiveness and implementability assuming that eight process options will be evaluated in detail. Detailed lists of cost components considered in the preparation for each alternative evaluation are provided in the SOW.

Compliance with ARARs

All alternatives will be evaluated to determine whether state and federal ARARs, as defined in CERCLA Section 121, will be achieved. The detailed analysis will summarize which requirements are applicable or relevant and appropriate to the alternative and will describe how the alternative meets these requirements. When an ARAR is not achieved, then the basis for justifying one of the six waivers permitted under CERCLA will be discussed. The following items will be addressed for each alternative during the detailed analysis of ARARs.

- ***Compliance with Chemical-Specific ARARs.*** This factor discusses whether these ARARs can be met, and, if not, whether a waiver is appropriate and/or justified.
- ***Compliance with Location-Specific ARARs.*** This factor discusses whether these ARARs can be met, and, if not, whether a waiver is appropriate and/or justified.
- ***Verification of Action-Specific ARARs.*** The action-specific ARARs developed during the combination of process options will be more definitive as the alternatives become better defined. At the conclusion of the screening phase, sufficient information will be available on the technologies and the most probable configuration of technologies so that action-specific ARARs can be confirmed. Action-specific ARARs will include all federal requirements and any state requirements that are either more stringent than federal ARARs or specify requirements where no federal ARARs exist.

Long-Term Effectiveness

The evaluation of alternatives under this criterion addresses how the technologies achieve reduction of risk and what risks may be present after the response objectives have been met. This focuses primarily on the extent and effectiveness of the controls that may be required to manage the risk posed by treatment residuals and/or untreated wastes. The following components will be addressed for each alternative.

Magnitude of Residual Risk. This factor assesses the residual risk remaining from untreated waste or treatment residuals at the conclusion of the remedial activities. The potential risk may be measured by numerical standards such as increased cancer risk levels or the volume or concentrations of contaminants in waste, media, or treatment residuals remaining on site. The characteristics of the residuals will be considered to the degree that they remain hazardous, considering their volume, toxicity, mobility, and propensity for bioaccumulation.

Adequacy and Reliability of Controls. This factor assesses the adequacy and suitability of controls, if any, that are used to manage treatment residuals or untreated wastes remaining on-site. This may include an assessment of containment systems and institutional controls to determine whether these sufficiently ensure that exposure to human and environmental receptors remain within the protective range. This factor also addresses the long-term reliability of management controls for providing continued protection from residuals, including an assessment of the potential need to replace components of the alternative as well as the potential exposure pathway(s) and the associated risk should the RA require replacement.

Reduction of Toxicity, Mobility, or Volume by Treatment

This criterion addresses the statutory preference for selecting remedial alternatives that employ treatment technologies. These technologies are intended to permanently and significantly reduce toxicity, mobility, or volume of hazardous substances as their principal element. These technologies include the following:

- The treatment processes the remedy will employ and the materials they will treat
- The quantity of hazardous materials that will be destroyed or treated, including how the principal threat(s) will be addressed
- The degree of expected reduction in toxicity, mobility, or volume measured as a percentage of reduction
- The degree to which the treatment will be irreversible
- The type and quantity of treatment residuals that will remain following treatment
- Whether the alternative satisfies the statutory preference for treatment as a principal element.

A discussion will be provided as to how the technologies considered in the detailed analysis will or will not result in a reduction of toxicity, mobility, or volume by treatment.

Short-Term Effectiveness

This evaluation will address the effects of the alternative during the construction and implementation phase until remedial response objectives are achieved. Alternatives will be evaluated with respect to their potential adverse effects on human health and the environment during implementation of the remedial alternative. The following will be considered:

- Protection of the community associated with implementation of the remedial action
- Protection of workers during implementation of the remedial action
- Protection of the environment from potential impacts associated with the remedial action.

Implementability

This criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during implementation. This includes the following:

- Technical Feasibility
  1) Construction and operation including technical difficulties, reliability issues, and uncertainties associated with the construction or operation
  2) Ease of undertaking additional RA, including a discussion of what, if any, future RA may be undertaken and the difficulty associated with implementation of such additional actions
  3) Monitoring considerations, to address the ability to monitor the effectiveness of the remedy and including an assessment of the risks of exposure should monitoring be insufficient to detect system failure.
- Administrative Feasibility
- Availability of Services and Materials
  1) Availability of adequate off-site treatment, storage, capacity, and disposal services
  2) Availability of necessary equipment and specialists, as well as provisions to ensure availability of any necessary additional resources
  3) Availability of services and materials, including the potential for obtaining competitive bids
  4) Availability of prospective technologies.

Comparative Analysis

This analysis evaluates the relative performance of each alternative to specific evaluation criteria in order to identify the advantages and disadvantages of each alternative as compared to one another.

Unselected Alternatives

Unselected alternatives may be reconsidered at a later step in the detailed analysis if similar retained alternatives continue to be favorably evaluated or if information is developed that identifies an advantage not previously presented.

Report Preparation and Submittal

Separate draft FS reports will be submitted for review for soil and groundwater. The formal response to the comments will be submitted in writing. The draft report will be revised as necessary to address these comments and reissued as the final report.

Final Feasibility Study

The formal response to comments received for the Draft WWTP2/TNTC sewer line will be submitted to the USACE for review. The responses will be revised as necessary based on USACE review. Following resolution of the comments, the draft FS will be revised as necessary and submitted as the Final WWTP2/TNTC sewer line. This submittal will be issued as two separate volumes; one for soil and one for groundwater.

Task 16.0 – Proposed Plan

A Proposed Plan (PP) will be prepared for the WWTP2/TNTC sewer line including both soil and groundwater based on the final WWTP2/TNTC sewer line FS. This PP will be prepared in accordance with all applicable federal, state and local guidance and policy.

The Draft Proposed Plan will be submitted in two versions: An internal draft and a subsequent external draft. The internal draft will be distributed for USACE review only and will be reviewed by CELRN, CELRH, and CEHNC-CX. Shaw will respond to USACE comments on the internal draft and submit responses to these comments. Once all comments on the internal Draft Proposed Plan are addressed to the satisfaction of CELRN, Shaw will incorporate the responses to comments into a revised Draft Proposed Plan which will be sent to the entire distribution list for review.

Prior to finalizing the Proposed Plan, Shaw will respond to all comments on the Draft Proposed Plan. Once all comments are resolved to the satisfaction of the CELRN, all

responses will be incorporated into the Final PP which will be submitted to the entire distribution list and submitted to the public.

Task 17.0 – Meetings

Shaw will attend two meetings tentatively scheduled to be held in Sandusky, Ohio.

Task 18.0 – Project Management

Project management includes labor necessary to manage the project and includes home office support services such as procurement, contracting, invoicing, and coordination.

Task 19.0 – Miscellaneous Task Team Support

Shaw will participate in and provide support for task groups formed by the PBOW project team. Services involved in task group support may include participation in meetings and teleconferences, joint scoping, scheduling future site activities, task group memoranda, miscellaneous CADD support, and document reviews.

PROJECT SCHEDULE AND MILESTONES

The project schedule and milestones are presented in Figure 1.

KEY SHAW PROJECT PERSONNEL

- **Project Manager** - Mr. Steven T. Downey will serve as Shaw's Project Manager.
- **Technical Lead** - Mr. Michael Gunderson will serve as the Technical Lead.
- **QA Manager** - Mr. Kenneth Martinez will serve as the Project QA Manager.
- **H&S Officer** – Mr. Doug Russell will serve as Shaw's H&S Officer
- **Project Chemist** -Mr. Eddie Weaver will serve as the Project Chemist.

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) REVIEW

This section of the QCP summarizes the Shaw internal technical and external peer review. The Shaw QA program provides controls for the formal verification (checking) of documents such as calculations and the presentation of information in the form of drawings, logs, and tables. Review and necessary approvals are also cited for quality-related documents; however, during the course of a project or proposal, verification of technical decisions and concepts (such as interpretation of data and evaluation of results) is required in order that the project or proposal can proceed on a sound conceptual basis. The review approach may be needed to address the following questions:

- During the project planning stage, have appropriate steps been implemented to satisfy the goals and objectives of the project?
- Are data of sufficient quality and properly interpreted so that conclusions can be justified and demonstrated?
- Are design parameters reasonable for the computations performed? What is the effect of variations of the assumptions upon the results?
- Do the results presented by Shaw in the form of a report, or other document, adequately represent the work performed and the conclusions reached? Do the results fulfill the objectives of the project?

The internal technical review (ITR) process is used to verify these steps. Documents to be written during a project and indicated in the proposal will be subjected to peer review. The Shaw PM will complete a matrix of these documents on a delivery order basis and use it to obtain the required reviews.

A technical reviewer is selected based upon the following criteria:

- The reviewer must be independent of the project. The reviewer must be sufficiently informed regarding the project, but should not be making decisions that determine or affect the course of the project. The peer review process is an "outside" review of the project.
- The reviewer must be a person knowledgeable in the specific area of work, preferably a senior technical associate. Technical reviewers will be part of the Shaw organization.

At the conclusion of a technical peer review, the reviewer(s) will prepare written review comments, sign off on the Discipline Sign-Off Review form (Figure 2) and forward to the PM; a copy of these review documents will also be placed in the project files. Technical review comments will be resolved and incorporated into the document as appropriate. ITR comments are available for USACE inspection upon request.

External peer review will be performed on all draft project deliverables prior to issuance as final documents. It is anticipated that the external peer review will be performed, as a minimum, by the USACE and the OEPA. A formal response to peer review comments will be issued to all reviewing parties, documenting revisions made where appropriate to the draft deliverables; this does NOT apply to the Report of Finding prepared under this delivery order. All responses to the peer review comments will be coordinated with the USACE for their concurrence prior to incorporation. Final deliverables will be submitted after incorporating any pertinent comments that arise from peer review of the draft documents. Table 1 summarizes the preparation and review process for the required project deliverables.

FIELD ACTIVITY QA REQUIREMENTS

Field investigation activities will follow the procedures specified in the SSAP to ensure that project quality requirements are satisfied. Field activity QA will be implemented by performing project-specific training; properly preparing for field work before mobilization; issuing variances, nonconformance reports, and corrective action reports; and documenting field quality control in the investigation reports.

Field team members, including Shaw personnel and subcontractor personnel, will receive project-specific training before mobilization to the job site by reading the applicable work plans and procedures. Upon mobilization to the site, but prior to commencing field activities, all site personnel will attend the project kickoff meeting, which will consist of a review of all project requirements and objectives to ensure that the project team is fully aware of the goals of the PBOW investigations. Before initiating each days field work, all team members will participate in a tailgate safety meeting (TSM) conducted by the Shaw Field Coordinator to address safety and quality issues pertinent to the activities to be performed. The TSM will be documented and all personnel will sign the attendance record. Worker training will follow the requirements specified in Shaw SOPs.

Prior to mobilization to the site, the Shaw PM, assisted by the Shaw Field Coordinator and the Shaw Analytical Coordinator, will examine project field work preparation requirements to ensure that all necessary arrangements, including personnel assignments, work plans, site entry/drilling permits, training, schedule, equipment rentals, supplies, subcontractors, have been accomplished for execution of the field effort in an efficient and effective manner. The Shaw PM and QAM must approve the project preparation prior to mobilization.

Changes or variances to the SAP, SSHP, QAPP, and/or site-specific work plans may be initiated either in the office or in the field as may be necessary. All variances will be noted on the Field Activity Daily Log (FADL) and will be formally recorded on the Variance Log. Variances will be approved by the Shaw QAM and the Shaw PM prior to implementation of the change. Variances that will affect the project scope, cost, or schedule will be submitted to the USACE for approval prior to implementation.

Nonconforming equipment, items, activities, conditions, and unusual incidents that could affect compliance with project requirements will be identified, controlled, and reported in a timely manner. A nonconformance is defined as a malfunction, failure, deficiency, or deviation that renders the quality of any item unacceptable or indeterminate. The originator (any Shaw employee) of a nonconformance report will describe the finding on the Nonconformance Report provided for this purpose and will notify the Shaw PM and QAM. Each nonconformance will be

reviewed and a disposition will be issued for the item, activity, or condition. The disposition of a nonconformance will be documented and approved by the Shaw organization responsible for issuing the nonconformance. The QAM will concur with the disposition of the nonconformance prior to closure of the Nonconformance Report.

In addition, the Shaw PM will notify the USACE Technical Coordinator within 48 hours of significant nonconformances that could impact the project cost, schedule, or scope of work and will indicate the corrective action taken or planned.

SUBCONTRACTOR QA/QC REVIEW

Shaw has assigned personnel to monitor and review work performed by subcontractors in conjunction with this investigation. Mr. Steven T. Downey will serve as the principal point-of-contact (POC).

The selection of qualified subcontractors, as required, will be accomplished in accordance with Shaw procurement and quality assurance (QA) procedures. Subcontractors such as drillers, geophysical specialists, surveyors, and environmental monitoring specialists, must satisfy predefined qualifications developed by the PM and Shaw that is defined in the procurement bid packages. Each subcontractor bid submittal is reviewed by technical personnel, purchasing, and QA personnel to verify that the bidders are technically qualified and can satisfy the project objectives. Before starting work, Shaw will perform a quality check to ensure that the subcontractor(s) has fulfilled the procurement requirements necessary to begin activities. Subcontractors involved in environmental measurements will be monitored by the Shaw Field Coordinator to verify the use of calibrated equipment and qualified operators.

CUSTOMER INVOLVEMENT

Customer involvement will be ongoing throughout the duration of this investigation, and Shaw personnel will be available as needed for question, consultation, etc. Project personnel may be reached at the following telephone numbers:

Mr. Steven T. Downey Project Manager	(865) 694-7496	Fax (225) 987-3034
Mr. Michael Gunderson Technical Lead	(865) 694-7446	Fax (865) 690-3626
Mr. Kenneth Martinez Quality Assurance Manager	(865) 670-2656	Fax (865) 690-3626
Doug Russell	(865)-692-3584	Fax (865) 690-3626

H&S Officer

Mr. Eddie Weaver (865) 560-5274 Fax (865) 693-4944

Project Chemist

Each work plan or other deliverable to be prepared in more than draft form will be submitted to the USACE Nashville District as specified in the SOW for review and comment. All review comments will be addressed and incorporated into the final submittals, if appropriate.

DOCUMENTATION OF PROJECT DECISIONS AND RECORDS MANAGEMENT

The Shaw Project Records Clerk is responsible for maintaining control and retention for project-related records. Record control includes receipt from external and internal sources, transmittal, and transfer to storage, and indication of record status. Retention includes receipt at storage areas, indexing and filing, storage and maintenance, and retrieval. Shaw will maintain the project repositories at 312 Directors Drive in Knoxville, Tennessee, for all project records, including correspondence. Records will be controlled and retained, as appropriate, in the office central files or laboratory files. The Project Records Clerk will assign control numbers to all outgoing documents and is responsible for properly filing the controlled records (except for those related to accounting, purchasing, and drafting, which are retained in the respective department files). Shaw will also provide the USACE Nashville District with a copy of all telephone memos, written correspondence, and meeting minutes regarding information related to the project within ten (10) days of the event. Copies of all records will be retained by Shaw for a minimum of seven (7) years after the end of the contract period. In addition, project records deemed to be of importance by the USACE will be turned over to the USACE at the time of project close-out.

PROJECT CLOSE-OUT

At the completion of this investigation, a project close-out meeting will be conducted. This will be at a time and place to be determined by Nashville District personnel, and may take the form of a teleconference. The purpose of this meeting will be to exchange feedback, discuss lessons learned, and conduct a final product verification.

Shaw
Shaw Environmental & Infrastructure, Inc.

Table 1

Waste Water Treatment Plant #2 and Associated Sewer Lines Former Plum Brook Ordnance Works, Sandusky, Ohio

Submittal Description/ Title	Document Preparation and Review Process					
	Principal Author(s)	Discipline	Peer Review	Discipline	Project Review	Discipline
SSAP	Jonathan Reagan Eddie Weaver	Soil Scientist Chemist	David Kessler Eric Weaver	Geologist Geologist	Michael Gunderson Steve Downey Ken Martinez	Geologist Engineer QA Specialist
SSHP	Doug Russell	H&S Coordinator	Eric Weaver Ken Martinez	Geologist QA Specialist	Steven Downey Michael Gunderson	Engineer Geologist
Site Characterization Report	Eric Weaver Eddie Weaver	Geologist Chemist	David Kessler Tom Siard	Geologist Risk Assessor	Steven Downey Michael Gunderson Ken Martinez	Engineer Geologist QA Specialist
BHHRA	Tom Siard	Risk Assessor	Bill Anderson David Kessler	Engineer Geologist	Steven Downey Michael Gunderson Ken Martinez	Engineer Geologist QA Manager
SLERA	Jonathan Lindberg	Risk Assessor	Bill Anderson David Kessler	Engineer Geologist	Steven Downey Michael Gunderson Ken Martinez	Engineer Geologist QA Manager
Feasibility Study	Bill Anderson	Engineer	Tom Siard David Kessler	Risk Assessor Geologist	Steven Downey Michael Gunderson Ken Martinez	Engineer Geologist QA Manager

NOTE: Where multiple authors are identified, one or more of those identified may be involved in the document preparation depending on availability. Should replacements be necessary, personnel of comparable experience and qualifications will be utilized.

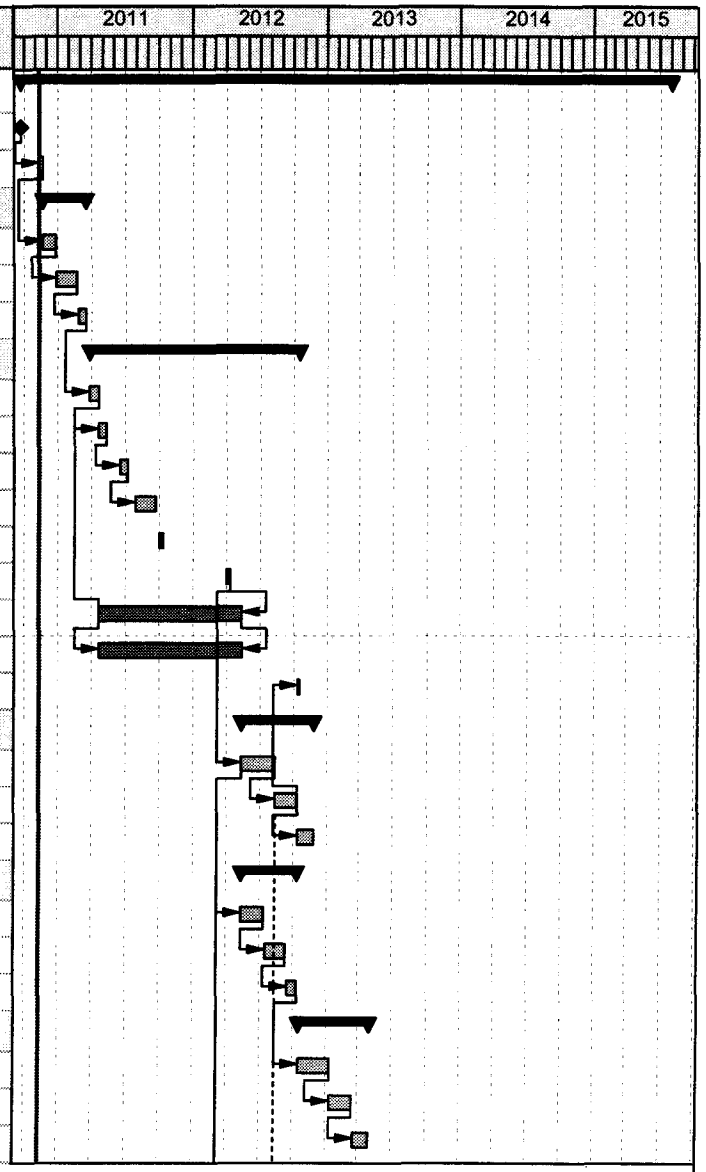
Shaw
Shaw Environmental & Infrastructure, Inc.

Waste Water Treatment Plant #2 and Associated Sewer Lines Former Plum Brook Ordnance Works, Sandusky, Ohio

Submittal Description/ Title	Document Preparation and Review Process					
	Principal Author(s)	Discipline	Peer Review	Discipline	Project Review	Discipline
Proposed Plans	Tom Siard	Risk Assessor	Michael Gunderson Bill Anderson David Kessler	Geologist Risk Assessor Geologist	Steven Downey Michael Gunderson Ken Martinez	Engineer Geologist QA Manager
Decision Documents	Tom Siard	Risk Assessor	Michael Gunderson Bill Anderson David Kessler	Geologist Risk Assessor Geologist	Steven Downey Michael Gunderson Ken Martinez	Engineer Geologist QA Manager

NOTE: Where multiple authors are identified, one or more of those identified may be involved in the document preparation depending on availability. Should replacements be necessary, personnel of comparable experience and qualifications will be utilized.

Activity ID	Activity Name	Remaining Duration	Start	Finish
WWTP 2 Area and TNT C WWSL RI, BHHRA, SLER...		1195	20-Sep-10 A	31-Jul-15
A1000	Task Order Award / NTP	0	20-Sep-10 A	
A1010	Quality Control Plan (QCP)	6	08-Nov-10 A	17-Nov-10
Work Plan		83	18-Nov-10	18-Mar-11
A1020	Draft Work Plan	24	18-Nov-10	23-Dec-10
A1030	Review Draft Work Plan	40	27-Dec-10	21-Feb-11
A1040	Final Work Plan	19	22-Feb-11	18-Mar-11
Field Work		399	28-Mar-11	19-Oct-12
A1050	Site Clearing & Survey	17	28-Mar-11	19-Apr-11
A1060	TNT C Sewer Line Trenching	16	20-Apr-11	12-May-11
A1070	Direct Push Investigaiton	16	14-Jun-11	06-Jul-11
A1080	Well Installation	39	28-Jul-11	21-Sep-11
A1090	Well Sampling #1 (Fall)	8	03-Oct-11*	12-Oct-11
A1100	Well Sampling #2 (Spring)	7	02-Apr-12*	11-Apr-12
A1110	Analytical	270	20-Apr-11	11-May-12
A1120	IDW	270	20-Apr-11	11-May-12
A1130	GIS	5	15-Oct-12	19-Oct-12
Site Characterization Report		140	14-May-12	30-Nov-12
A1140	Draft Site Characterization Report	64	14-May-12	13-Aug-12
A1150	Review Draft Site Characterization Report	43	14-Aug-12	12-Oct-12
A1160	Final Site Characterization Report	33	15-Oct-12	30-Nov-12
BHHRA Work Plan		108	14-May-12	15-Oct-12
A1170	Draft BHHRA Work Plan	43	14-May-12	13-Jul-12
A1180	Review Draft BHHRA Work Plan	44	16-Jul-12	14-Sep-12
A1190	Final BHHRA Work Plan	21	17-Sep-12	15-Oct-12
BHHRA		137	16-Oct-12	01-May-13
A1200	Draft BHHRA	61	16-Oct-12	14-Jan-13
A1210	Review Draft BHHRA	44	15-Jan-13	15-Mar-13
A1220	Final BHHRA	32	18-Mar-13	01-May-13



Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone
Start ...
Summ...

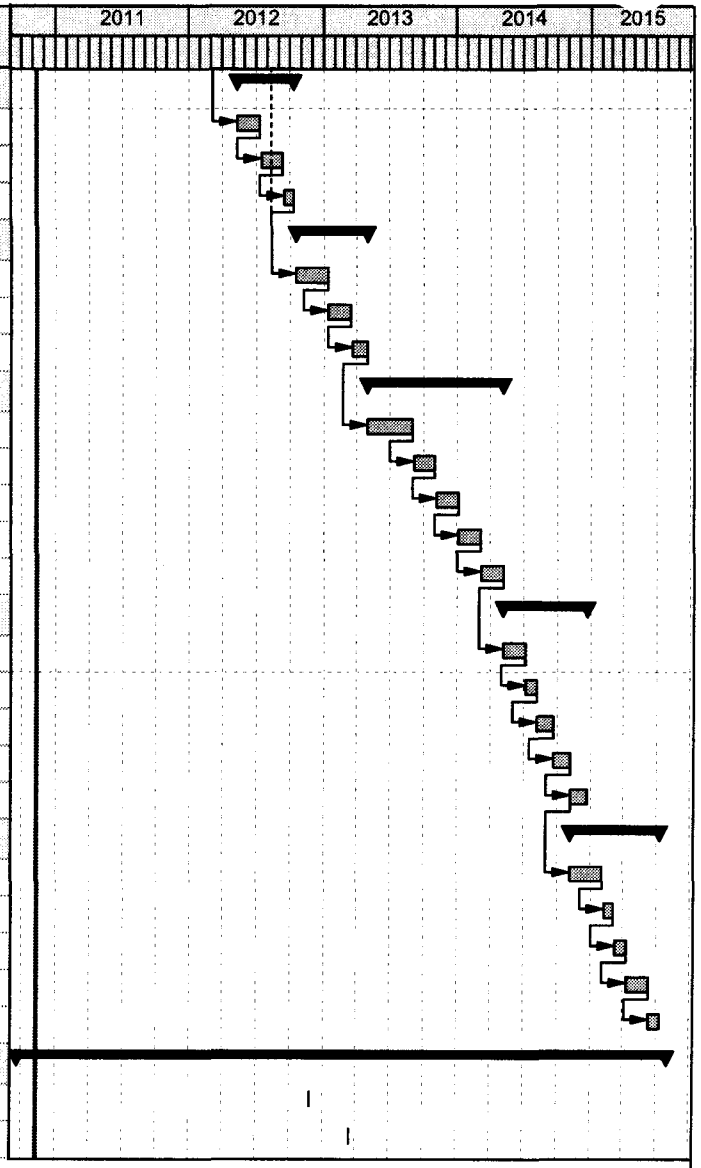
Figure 1

Louisville A/E Contract #W912QR-08-D-0013

DX-19 - WWTP 2 Area and TNT C WWSL RI, BHHRA, SLERA, FS, PP and DD

Shaw Environmental & Infrastructure Project Schedule

Activity ID	Activity Name	Remaining Duration	Start	Finish
SLERA Work Plan		108	14-May-12	15-Oct-12
A1230	Draft SLERA Work Plan	43	14-May-12	13-Jul-12
A1240	Review Draft SLERA Work Plan	44	16-Jul-12	14-Sep-12
A1250	Final SLERA Work Plan	21	17-Sep-12	15-Oct-12
SLERA		137	16-Oct-12	01-May-13
A1260	Draft SLERA	61	16-Oct-12	14-Jan-13
A1270	Review Draft SLERA	44	15-Jan-13	15-Mar-13
A1280	Final SLERA	32	18-Mar-13	01-May-13
Feasibility Study (FS)		255	02-May-13	05-May-14
A1290	Internal Draft FS	85	02-May-13	30-Aug-13
A1300	Review Internal Draft FS	44	03-Sep-13	01-Nov-13
A1310	Draft FS	41	04-Nov-13	03-Jan-14
A1320	Review Draft FS	44	06-Jan-14	06-Mar-14
A1330	Final FS	41	07-Mar-14	05-May-14
Proposed Plan (PP)		160	06-May-14	22-Dec-14
A1340	Internal Draft PP	43	06-May-14	07-Jul-14
A1350	Review Internal Draft PP	22	08-Jul-14	06-Aug-14
A1360	Draft PP	32	07-Aug-14	22-Sep-14
A1370	Review Draft PP	33	23-Sep-14	06-Nov-14
A1380	Final PP	30	07-Nov-14	22-Dec-14
Decision Document (DD)		168	07-Nov-14	09-Jul-15
A1390	Internal Draft DD	60	07-Nov-14	04-Feb-15
A1400	Review Internal Draft DD	22	05-Feb-15	06-Mar-15
A1410	Draft DD	21	09-Mar-15	07-Apr-15
A1420	Review Draft DD	43	08-Apr-15	08-Jun-15
A1430	Final DD	22	09-Jun-15	09-Jul-15
Management & Support		1195	20-Sep-10 A	31-Jul-15
A1440	Meeting #1	3	28-Nov-12*	30-Nov-12
A1450	Meeting #2	3	13-Mar-13*	15-Mar-13



Remaining Level of Effort ◆ Start ...
Actual Level of Effort Summ...
Actual Work
Remaining Work
Critical Remaining Work
◆ ◆ Milestone

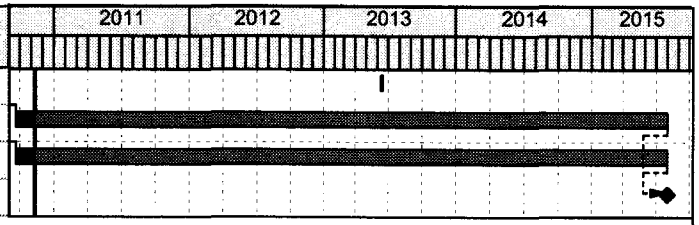
Figure 1

Louisville A/E Contract #W912QR-08-D-0013

DX-19 - WWTP 2 Area and TNT C WWSL RI, BHHRA, SLERA, FS, PP and DD

Shaw Environmental & Infrastructure Project Schedule

Activity ID	Activity Name	Remaining Duration	Start	Finish
A1460	Meeting #3	3	12-Jun-13*	14-Jun-13
A1470	Misc. Task Team Support	1195	20-Sep-10 A	31-Jul-15
A1480	Project Management	1195	20-Sep-10 A	31-Jul-15
A1490	Project Completion	0		31-Jul-15*



Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone
Start ...
Summ...

Figure 1

Louisville A/E Contract #W912QR-08-D-0013

DX-19 - WWTP 2 Area and TNT C WWSL RI, BHHRA, SLERA, FS, PP and DD

Shaw Environmental & Infrastructure Project Schedule