Request for Bid

Fixed-Price Defined Scope of Work

Remedial System Installation/Operation & Maintenance, Remedial System Performance Monitoring, and Quarterly Groundwater Monitoring, Sampling, and Reporting

Solicitor

SGL Investment Group

Former L&L Service Center
51 South Main Street
Stewartstown Borough, York County, Pennsylvania 17363

PADEP Facility ID #: 67-62730 PAUSTIF Claim #: 2001-0107(F)

Date of Issuance

October 26, 2015

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The Pennsylvania Underground Storage Tank Indemnification Fund (PAUSTIF), on behalf of the claimant who hereafter is referred to as the Client or Solicitor, is providing this Request for Bid (RFB) to prepare and submit a bid to complete the Scope of Work (SOW) for the referenced Site. The Solicitor is the current owner of the Site, including both on-property buildings. PAUSTIF has determined that the claim for the release incident reported in 2001 is eligible for coverage from the PAUSTIF subject to the applicable statutes and regulations. Reimbursement of Solicitor-approved reasonable and necessary costs, not to exceed the claim aggregate limit, for the corrective action work described in this RFB will be provided by PAUSTIF. The applicable deductible has been paid and claim coverage is currently not subject to proration.

Each bid response will be considered individually and consistent with the evaluation process described in the PAUSTIF Competitive Bidding Fact Sheet which can be downloaded from the PAUSTIF website http://www.insurance.pa.gov.

Calendar of Events

Activity	Date and Time
Notification of Intent to Attend Site Visit	November 9, 2015 by 5 p.m.
Mandatory Pre-Bid Site Visit	November 10, 2015 at 11 a.m.
Deadline to Submit Questions	December 4, 2015 by 5 p.m.
Bid Due Date and Time	December 11, 2015 by 3 p.m.

Contact Information

Technical Contact
Mr. Joseph. Ozog, P.G. **Excalibur Group, LLC** **91 Park Avenue** **Windber, PA 15963** **joeozog@excaliburgrpllc.com**

All questions regarding this RFB and the subject Site conditions must be directed via email to the Technical Contact identified above with the understanding that all questions and answers will be provided to all bidders. The email subject line must be **"Former L&L Service Center #2001-0107(F) – RFB QUESTION"**. Bidders must neither contact nor discuss this RFB with the Solicitor, PAUSTIF, the Pennsylvania Department of Environmental Protection (PADEP), or ICF

International (ICF) unless approved by the Technical Contact. Bidders may discuss this RFB with subcontractors and vendors to the extent required for preparing the bid response.

Requirements

Mandatory Pre-Bid Site Meeting

The Solicitor, the Technical Contact, or their designee will hold a mandatory Site visit on the date and time listed in the Calendar of Events to conduct a Site tour for one (1) participant per bidding company. The Technical Contact may answer questions at the Site meeting or may collect questions and respond via email. All questions and answers will be provided via email to all attendees. This meeting is mandatory for all bidders, no exceptions. This meeting will allow each bidding company to inspect the Site and evaluate Site conditions. **A notice of the bidder's intent to attend this meeting is requested to be provided to the Technical Contact via email by the date listed in the Calendar of Events with the subject "Former L&L Service Center #2001-0107(F) – SITE MEETING ATTENDANCE NOTIFICATION"**. The name and contact information of the company participant should be included in the body of the email. Although it is not required, prior notification of the bidder's intent to attend the Pre-Bid Site Meeting is appreciated. ***Attendance at the Pre-Bid Site Meeting is mandatory***.

Submission of Bids

To be considered for selection, **one (1) hard copy of the signed bid package and one (1) electronic copy (one (1) PDF file on a compact disk (CD) included with the hard copy) must be provided directly to the PAUSTIF's third party administrator, ICF, to the attention of the Contracts Administrator.** The Contracts Administrator will be responsible for opening the bids and providing copies to the Technical Contact and the Solicitor. Bid responses will only be accepted from those companies that attended the Mandatory Pre-Bid Site Meeting. **The ground address for overnight/next-day deliveries is ICF International, 4000 Vine Street, Middletown, PA 17057, Attention: Contracts Administrator. The outside of the shipping package containing the bid must be clearly marked and labeled with "Bid – Claim #2001-0107(F)"**. Please note that the use of U.S. Mail, FedEx, UPS, or other delivery method does not guarantee delivery to this address by the due date and time listed in the Calendar of Events for submission. Companies mailing bids should allow adequate delivery time to ensure timely receipt of their bid.

The bid must be received by 3 p.m., on the due date shown in the Calendar of Events. Bids will be opened immediately after the 3 p.m. deadline on the due date. Any bids received after this due date and time will be time-stamped and returned. If, due to inclement weather, natural disaster, or any other cause, the PAUSTIF's third party administrator, ICF's office is closed on the bid due date, the deadline for submission will automatically be extended to the next business day on which the office is open. The PAUSTIF's third party administrator, ICF, may notify all

companies that attended the Mandatory Pre-Bid Site Meeting of an extended due date. The hour for submission of bids shall remain the same. Submitted bid responses are subject to the Pennsylvania Right-to-Know Law.

Bid Requirements

The Solicitor wishes to execute a mutually agreeable contract with the selected consultant ("Remediation Agreement"). The Remediation Agreement is included as Attachment 1 to this RFB. The bidder must identify and document in their bid any modifications that they wish to propose to the Remediation Agreement language in Attachment 1 other than obvious modifications to fit this RFB (e.g., names, dates, and descriptions of milestones). The number and scope of any modifications to the standard agreement language will be one (1) of the criteria used to evaluate the bid. **Any bid that does not clearly and unambiguously state whether the bidder accepts the Remediation Agreement language in Attachment 1 "as is", or that does not provide a cross-referenced list of requested changes to this agreement, will be considered non-responsive.** This statement should be made in a Section in the bid entitled "Remediation Agreement". Any proposed changes to the agreement should be specified in the bid; however, these changes will need to be reviewed and agreed upon by both the Solicitor and the PAUSTIF.

The selected consultant will be provided an electronic copy (template) of the draft Remediation Agreement in Microsoft Word format to allow agreement-specific information to be added. The selected consultant shall complete the agreement-specific portions of the draft Remediation Agreement and return the document to the Technical Contact within 10 business days from date of receipt.

The Remediation Agreement fixed costs shall be based on unit prices for labor, equipment, materials, subcontractors/vendors, and other direct costs. The total cost quoted in the bid by the selected consultant will be the maximum amount to be paid by the Solicitor unless a change in scope is authorized and determined to be reasonable and necessary. There may be deviations from and modifications to this SOW during the project. The Remediation Agreement states that any significant changes to the SOW will require approval by the Solicitor, PAUSTIF, and PADEP. NOTE: Any request for PAUSTIF reimbursement of the reasonable costs to repair or replace a well will be considered on a case-by-case basis.

The bidder shall provide its bid cost using the Bid Cost Spreadsheet (included as Attachment 2) with descriptions for each task provided in the body of the bid document. Please note, if costs are provided within the text of the submitted bid and there is a discrepancy between costs listed in the Bid Cost Spreadsheet and in the text, the costs listed within the Bid Cost Spreadsheet will be used in the evaluation of the bid and in the Remediation Agreement with the selected consultant. Bidders are responsible to ensure spreadsheet calculations are accurate. The technical score for bids will be based solely on those tasks represented as milestones included in

the Bid Cost Spreadsheet and the total bid cost. Any optional bidder-defined tasks, milestones, or cost adders that are not requested as part of this RFB will not be considered by the Bid Evaluation Committee in the technical review and technical score for the bid.

In addition, the bidder shall provide:

1. The bidder's proposed unit cost rates for each expected labor category, subcontractors, other direct costs, and equipment;
2. The bidder's proposed markup on other direct costs and subcontractors (if any);
3. The bidder's estimated total cost by task consistent with the proposed SOW identifying all level-of-effort and costing assumptions; and
4. A unit rate schedule that will be used for any out of scope work on this project.

Each bid will be assumed to be valid for a period of up to 120 days after receipt unless otherwise noted. The costs quoted in the Bid Cost Spreadsheet will be assumed to be valid for the duration of the Remediation Agreement.

Please note that the total fixed-price bid must include all costs, including those cost items that the bidder may regard as "variable". These variable cost items will not be handled outside of the total fixed-price quoted for the SOW unless the RFB requests costing alternatives for specific items or services. Any bid that disregards this requirement will be considered non-responsive to the bid requirements and, as a result, will be rejected and will not be evaluated.

The RFB is requesting a total fixed-price bid (unless the RFB requests costing alternatives for specific items or services). PAUSTIF will not agree to assumptions (in bids or the selected bidders executed Remediation Agreement) referencing a level of effort and/or hours. Costs provided in your bid should be developed using your professional opinion, experience, and the data provided. PAUSTIF will not reimburse costs for additional hours to complete activities included as part of the base bid/contract price.

Each bid response document must include at least the following:

1. Demonstration of the bidder's understanding of the Site information provided in this RFB, standard industry practices, and objectives of the project.
2. A clear description, specific details, and original language of how the proposed work scope will be completed for each milestone. The bid should specifically discuss all tasks that will be completed under the Remediation Agreement and what is included (e.g., explain groundwater purging/sampling methods, which guidance documents will be followed, what will be completed as part of the Site specific work scope/SCR/RAP implementation). Recommendations for

changes/additions to the Scope of Work proposed in this RFB shall be discussed, quantified, and priced separately; however, failure to bid the SOW "as is" may result in a bid not being considered.

3. A copy of an insurance certificate that shows the bidder's level of insurance consistent with the requirements of the Remediation Agreement. Note: The selected consultant shall submit evidence to the Solicitor before beginning work that they have procured and will maintain Workers Compensation, commercial general and contractual liability, commercial automobile liability, and professional liability insurance commensurate with the level stated in the Remediation Agreement and for the work to be performed.
4. The names and brief resumes/qualifications of the proposed project team including the proposed Professional Geologist and Professional Engineer (if applicable) who will be responsible for overseeing the work and applying a professional seal to the project deliverables (including any major subcontractor(s)).
5. Responses to the following specific questions:
    a. Does your company employ a Pennsylvania-licensed Professional Geologist or Professional Engineer that is designated as the proposed project manager? How many years of experience does this person have?
    b. How many Pennsylvania Chapter 245 projects is your company currently the consultant for in the PADEP Region where the Site is located? Please list up to 10.
    c. How many Pennsylvania Chapter 245 Corrective Action projects involving an approved SCR, RAP, and RACR has your company and/or the Pennsylvania-licensed Professional Geologist or Professional Engineer closed (i.e., obtained Relief from Liability from the PADEP) using any standard?
    d. Has your firm ever been a party to a terminated PAUSTIF-funded Fixed-Price (FP) or Pay-for-Performance (PFP) contract without attaining all of the milestones? If so, please explain.
6. A description of subcontractor involvement by task. Identify and describe the involvement and provide actual cost quotations/bids/proposals from all significant specialized subcontracted service (e.g., drilling/well installations, laboratory, etc.). If a bidder chooses to prepare its bid without securing bids for specialty subcontract services, it does so at its own risk. Added costs resulting from bid errors, omissions, or faulty assumptions will not be considered for PAUSTIF reimbursement.
7. A detailed schedule of activities for completing the proposed SOW including reasonable assumptions regarding the timing and duration of Solicitor reviews (if

any) needed to complete the SOW. Each bid must provide a schedule that begins with execution of the Remediation Agreement with the Solicitor and ends with completion of the final milestone proposed in this RFB. Schedules must also indicate the approximate start and end date of each of the tasks/milestones specified in the Scope of Work, and indicate the timing of all proposed key milestone activities (e.g., within 30 days of the contract being executed).

8. A description of how the Solicitor, ICF, and the PAUSTIF will be kept informed as to project progress and developments and how the Solicitor (or designee) will be informed of and participate in evaluating technical issues that may arise during this project.
9. A description of your approach to working with the PADEP. Describe how the PADEP would be involved proactively in the resolution of technical issues and how the PADEP case team will be kept informed of activities at the Site.
10. Key exceptions, assumptions, or special conditions applicable to the proposed SOW and/or used in formulating the proposed cost estimate. Please note that referencing extremely narrow or unreasonable assumptions, special conditions, and exceptions may result in the bid response being deemed "unresponsive".

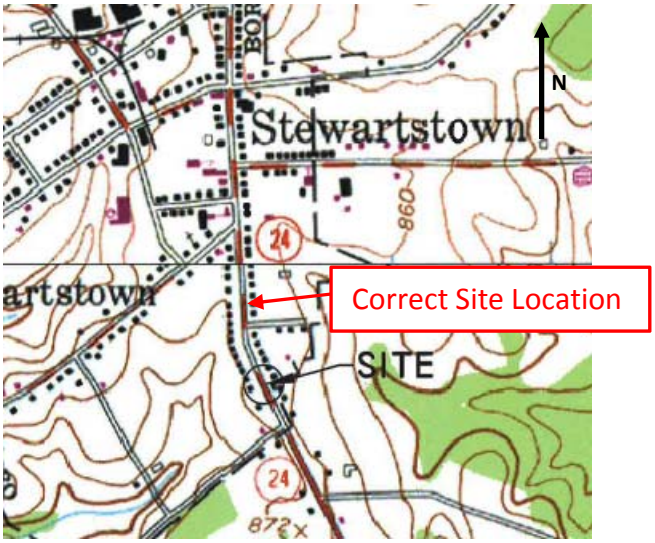
General Site Background and Description

Each bidder should carefully review the information and documentation provided in Attachment 3. The information and documentation has not been independently verified. Bidders may wish to seek out other appropriate sources of information and documentation specific to this Site. If there is any conflict between the General Site Background and Description provided herein and the source documents within Attachment 3, the bidder should defer to the source documents.

In this RFB (but not necessarily in the accompanying source documents), the term "Site" is used to match the PADEP's definition of site, which is the entire area known to be impacted by the regulated substance release. Therefore, in this RFB, the terms "on-site" and "off-site" refer to areas/features situated within and outside the boundaries of the Site, respectively. In contrast, the terms "facility," "station," "property," "subject property," or "source property" refer only to the land parcel(s) owned/controlled by the Solicitor that have been demonstrated to be the point of origin for the regulated substance release. As a result, the terms "on property" and "off property" are used in this RFB to distinguish the location of any contamination relative to the boundaries of the land parcel(s) owned/controlled by the Solicitor. Bidders are encouraged to follow the same conventions in writing their bid responses.

Bidders are also alerted to pay close attention to the north arrow direction on many of the available site maps, including those in the November 2014 Supplemental Site Characterization Report (SSCR) and the March 2015 Remedial Action Plan (RAP). Compass direction references in the

text of many historical Site reports may also be incorrect. In addition, many of the topographic maps depicting the Site's location show it to the south of its correct location (see below). Therefore, bidders are advised to verify that the Site location and/or the north arrow are depicted correctly on each drawing/map that is reviewed in preparing their bids.



General Site Features and Site Background

The Former L & L Service Center facility is located at 51 South Main Street in Stewartstown Borough, York County, Pennsylvania.[1] Originally, the subject property was only 0.40 acres until sometime between April 2008 and April 2011 when the Solicitor combined the 51 South Main Street parcel with the adjoining parcel to the south (53 South Main Street) creating a total property size of approximately 0.9 acres.[2] Currently, the facility is no longer operated as a retail motor fuel sales station and convenience store (all retail fuel sales ended in 2013 and there are no known UST systems on the property). The former L&L Service Center station/convenience store building located on the 51 South Main Street parcel, which is owned by the Solicitor, is presently used as a general contracting service office by D&D Scarborough (see Attachment 3A). There is also a residential apartment located on the second floor of this building. The building on the 53 South Main Street parcel is occupied by Stewartstown Electrical Service, LLC (but the building is owned by the Solicitor) and also has a residential apartment located on the second floor. Attached to the east side of this building is a single-story, metal sided, two-bay garage structure. Both buildings have sub-grade basement levels. The Solicitor is the responsible party for the environmental cleanup.

[1] Other names by which this facility has been known historically include L&L Service Citgo and L&L Supply.
[2] Bidders are cautioned to keep this transition in the size of the subject property in mind as the older historical documents are reviewed. Site reports that pre-date 2008 reference the original 0.4-acre parcel as the subject property and mention the "adjoining commercial property to the south," which has been part of the subject property since sometime between 2008 and 2011.

Existing features on this approximately rectangular parcel consist of the aforementioned two-story buildings; five storage sheds of wood construction situated on the eastern edge of the property; a former remediation system shed; an attached overhead canopy that covers the former gasoline dispenser island area previously located in front (on the northwest side) of the former L&L Service Center building; and a storm water retention basin situated in the northeast corner of the 51 South Main Street parcel. The ground surface at this property is predominantly a mix of asphalt- or concrete-paved surfaces and some gravel-covered areas (e.g., the former gasoline UST cavity).

The subject property and surrounding area have been the subject of site characterization activity involving several consultants since 2001 in response to a release incident confirmed in February/March 1999. This release (of unknown quantity) was identified during the removal of five underground storage tanks (USTs): four gasoline tanks of 6,000, 1,500, 1,000, and 1,000 gallons in size, and one 1,000-gallon kerosene tank. All four gasoline tanks (designated tanks #001 through #004) were removed from a common cavity located off the southwest corner of the 51 South Main Street building.[3] The gasoline tanks supplied fuel (via suction piping) to a covered dispenser island area located off the northwest corner of the same building. The kerosene tank (tank #005) was located in a separate cavity off the north side of the building on the 51 South Main Street parcel, and fed a separate dispenser situated in its immediate vicinity. Neither bedrock nor groundwater were reported encountered in either tank excavation.

Historical reports (see Attachment 3B) indicate anywhere from 300 to 400 tons of "possibly" contaminated soil was removed from the gasoline tank excavation in 1999 and removed for off-site disposal.[4] According to the April 2011 SSCR (Attachment 3C), the total depth of the excavation was approximately 16 feet below ground surface (ft-bgs). No soil impacts above the Statewide Health Standard Medium-Specific Concentrations (SHS-MSCs) were identified for the soil samples collected from the kerosene tank excavation. However, post-excavation sampling completed in 1999 (16 samples) and subsequent soil boring investigations indicated soil impacted with constituent concentrations above the SHS-MSCs remained within, around, and beneath the footprint of this former gasoline tank cavity (see Attachments 3B and 3C). Uncontaminated soil was reportedly used to backfill both UST excavations in 1999.

In 1999, tanks #001 through #005 were replaced with a single, 15,000-gallon, multi-compartment UST situated off the north wall of the 51 South Main Street parcel building. This tank stored multiple gasoline grades and kerosene. In 2013, this UST was removed and post-excavation closure samples did not exhibit petroleum constituent concentrations in excess of SHS-MSCs

[3] Although the *UST Closure Report* indicated the "tanks were in good shape," when Claim #2001-0107(F) was filed in 2001, one of the removed gasoline tanks is reported to have "contained holes."
[4] In September 2003, five soil samples were collected from the soil stockpile and no unleaded gasoline constituents were detected above the SHS-MSCs for a used aquifer in a residential setting. The "possibly" contaminated soil is believed to have been shipped off-site for disposal, but no disposal documentation has been located.

save for one sample collected from the beneath a dispenser at the gasoline dispenser island area where soil impacts were known be present after the 1999 UST removal.

Although the *UST System Closure Report* for the 1999 tank removals was submitted in April 1999 and the PADEP required additional action as early as May 1999, it appears that activity to address the confirmed reportable release did not get underway until March 2002. On 3/11/02, ten direct-push soil borings (GP-1 through GP-10) were installed and sampled by the original site consultant. Shortly thereafter, four bedrock groundwater monitoring wells (MW-1 through MW-4) were installed on the subject property (three 4-inch diameter wells and one 6-inch diameter well) using air rotary drilling methods (see Attachment 3D). These initial four wells were drilled to depths ranging from 57 to 77 ft-bgs. Subsurface materials encountered beneath the asphalt pavement and stone sub base were reported to consist of orange weathered micaceous sands down to approximately 30 ft-bgs, underlain by brown and gray weathered saprolites to the maximum depth of the borings. One or more unleaded gasoline constituents were detected in each monitoring well at concentrations above the SHS-MSCs for a used aquifer in a residential setting (see Attachment 3D) prompting the site consultant to propose installing additional monitoring wells to determine the extent of groundwater contamination.

The initial phase of site characterization was documented in the report provided as Attachment 3E. This same report, which was disapproved by the PADEP in April 2005, also proposed an interim remedial action (IRA) in the form of groundwater extraction and re-injection coupled with enhanced bioremediation. However, as discussed below, this IRA was approved and implemented for approximately 1½ years until concerns regarding its apparent ineffectiveness and possible effects on the dissolved-phase plumes were raised. A second SSCR was prepared by the original site consultant in 2011 (see Attachment 3D), which was approved by the PADEP with modifications. The current consultant, Mountain Research, LLC (MRLLC), assumed responsibility for this Site in July 2011.

At the present time, a total of ten (10) on-property groundwater monitoring wells (MW-1 through MW-6, and MW-8 through MW-11) and sixteen off-property monitoring wells (MW-7, MW-12 through MW-26) have been installed. Characterization of on- and off-property soil conditions has entailed completing 42 soil borings to date.[5] There are currently three surviving on-property soil vapor monitoring points (SVP-4 through SVP-6) and three off-property soil vapor monitoring points (SVP-2, SVP-3, and SVP-7). Attachment 3G provides a summary of the details for each monitoring well and soil vapor monitoring point.

The subject property and surrounding properties are serviced by municipal water and sanitary sewer is provided by Stewartstown Borough. Natural gas service is provided by Columbia Gas

[5] Bidders should note that the multiple phases of soil boring activity resulted unfortunately in duplicating some of the numeric soil boring designations over time. Consequently, bidders are advised to pay close attention to the drilling dates associated with the duplicate soil boring designations. Figure 2 in Attachment 3F helps to distinguish between the historical soil borings bearing the same numeric designations.

from main lines located beneath South Main Street (State Route 24). Water, sanitary sewer, and natural gas service laterals enter along the north wall of the 51 South Main Street building (see Figure 4 in Attachment 3G). The sewer lateral for the 53 South Main Street building enters along its southern wall, but the water and gas line connections to this building have yet to be identified. The underground water and natural gas lines serving the subject property are believed to be located at depths of 3 to 5 ft-bgs, while the sanitary sewer mains are believed to reside at 12.5 ft-bgs. Underground electric lines run parallel to the northern boundary of the subject property connecting to the former remediation shed, while overhead electrical, telephone, and cable lines serve the two property buildings and neighboring properties. Storm sewer lines run parallel with South Main Street. In July 2013, a ground-penetrating radar survey was performed to identify underground utilities and any other subsurface anomalies (see Attachment 3G).

In general, land use in the vicinity of the subject property consists of residential properties to the north, south, east, and across South Main Street to the west. Area topography slopes to the south. Over 1,000 feet to the southwest is the closest of four potable water supply wells serving Stewartstown Borough. This well (#6) is located along Trout Lane (see Figure 8 in Attachment 3G) and is reportedly 395 feet deep with surface casing installed to 40 ft below ground surface. The subject property and the residential properties in its immediate vicinity are served by the public water supply system; however, several domestic potable supply wells were once present along Trout Lane (see Attachment 3G) to the southwest and within ⅛ mile to the east of the source property. It is presently unclear how many of these domestic supply wells may remain in use for potable or other uses.

Selection of Remediation Standards

The Solicitor has selected Act 2 closure at this Site under the Site Specific Standard (SSS) utilizing a variety of “appropriate means” available under the applicable Chapter 245 and 250 regulations. What may constitute these “appropriate means” is not yet fully determined, but is likely to include the following:

- Pathway elimination through an environmental covenant (EC) established for the source property (which the Solicitor has already indicated a willingness to accept);
- Implementation of a Post-Remedial Care Plan (PRCP) particularly with respect to the use of groundwater off the property;
- Demonstrating that post-remedial constituent concentrations do not pose an unacceptable risk (particularly with respect to the construction/utility worker exposure pathways);
- Demonstrating that human health risks associated with complete and potentially complete exposure pathways are acceptable.

It is also conceivable that demonstrating attainment of the SHS-MSCs may prove possible for select constituents of concern in certain media (e.g., soil and/or groundwater).

Active soil and groundwater remediation appears necessary to achieve some of the aforementioned elements for securing Site closure under the SSS. For example, active remediation appears to be necessary to produce post-remedial constituent concentrations in soil, soil gas, and groundwater that do not pose an unacceptable health risk with respect to those exposure pathways that cannot be eliminated by means of engineering or institutional controls. Active remediation also appears necessary to aid the demonstration of declining/stable constituent concentration trends and overall plume stability.

Sensitive Receptor Survey

A sensitive receptor survey was completed within a 1,500 ft radius of the site (2,500 ft radius for groundwater) that included a review of surrounding land use, an assessment of underground conduits and utilities, and a groundwater use inventory. A preliminary ecological screening was also completed and it appears that no additional ecological investigation is required (see Attachment 3G).

Surrounding Land Use

Land use in the vicinity of the former L&L Service Center property is generally residential as described in an earlier section of this RFB.

Closest Surface Water & Wetlands

The closest surface water bodies to this Site are reported to be Leib's Creek, which is located approximately 2,000 feet to the east of the subject property, and a small tributary of Ebaugh Creek, which is located over 1,000 feet southwest of the subject property near the Trout Lane Well Field. The Site is located just east of the Ebaugh Creek watershed and the groundwater divide separating the Deer Creek and Muddy Creek Basins (see Attachment 3G).

The receptor survey and assessment appears to have established that the probability of impact to an exceptional value wetland is likely negligible.

Groundwater Use

The source property and surrounding area are served by the Borough of Stewartstown public water supply system. A groundwater use survey was completed within a 2,500 ft radius of this Site based on review of the Pennsylvania Groundwater Information System (PaGWIS) database, conduct of a commercial database search, and review of a U.S. Geological Survey (USGS) publication entitled "Case study for Delineating a Contributing Area to a Water-Supply Well in a

Fractured Crystalline Bedrock Aquifer" (see Attachment 3G). In addition, representatives of the Stewartstown Borough Water Authority (SBWA) were contacted by the current consultant regarding public water supply well locations and to identify those properties connected to the public supply. As discussed above, the closest of these four supply wells is designated well #6 and is located more than 1,000 feet to the southwest of the source property.

The PaGWIS database search identified 39 water supply wells within ½ mile of the Site (the commercial database search identified 51 supply wells within the same radius). The supply wells identified closest to the Site were two 400-ft deep wells located within ⅛ mile of the subject property to its east. The subject property and surrounding properties are served with municipal water provided by the SBWA whose supply is derived from four supply wells located in and around Stewartstown Borough (see Attachment 3G). Although a door-to-door survey was not conducted, the current consultant did compare the street addresses for properties within a 500-ft radius of the Site to documents provided by the SBWA to the original site consultant as discussed in the 2011 SSCR (see Attachment 3G). All of the street addresses within this search radius were confirmed to be on the SBWA's list of properties connected to the public water supply. A door-to-door survey was subsequently conducted to verify that three properties identified by the SBWA as possibly operating domestic supply wells were now connected to the municipal water supply (see below).

Stewartstown Borough and the adjacent Hopewell Township are reported to have ordinances currently in place requiring properties situated within 150 feet of the public water system to connect to and use the municipal water supply. However, these ordinances also allow for properties located within this distance to continue using private water wells for potable and/or non-potable purposes.

Overview of Site Geology, Hydrogeology and Hydrology

Bidders are encouraged to review Attachments 3B through 3G as these documents trace the evolution of the site characterization activities completed over the past 14 years. Several of these documents also outline the early phase of remedial actions at this Site (see Attachment 3C). A reasonably complete summary of these activities may also be found in Attachments 3G, 3H, and 3I as the two most recent site documents submitted for PADEP review. The November 2014 Supplemental SCR (Attachment 3G) was approved by the PADEP with modifications on 1/15/15 (see Attachment 3J). The most recent Remedial Action Plan (Attachment 3I) was submitted in March 2015 and was approved with modifications by PADEP in a letter dated April 16, 2015 (see Attachment 3J). As noted below, some of these modifications/comments have since been addressed by the current consultant while others remain to be addressed by the selected consultant in implementing the approved RAP; however the selected consultant will be responsible for ensuring documentation has been provided to the PADEP regarding all its modifications to the March 2015 RAP. The following subsections provide information abstracted from these two documents.

Bedrock

Underlying bedrock at the Site has been described as the Late Precambrian, Wissahickon Formation. This formation can be broken down further into the Upper Pelitic Schist, which consists of an albite-chlorite-muscovite, quartz schist with sporadic thin beds of laminated micaceous quartzite. Although competent bedrock has not been encountered at this Site within the maximum drilling depth of 77 ft-bgs, a weathered schist was encountered at a depth of 50 to 70 feet below grade.

The USGS study of the nearby Trout Lane Well Field (see Attachment 3G) indicates the structural trend for the metamorphic crystalline bedrock is north 30° east. Foliation within the bedrock is believed to be roughly parallel to this trend. A bedrock outcrop identified 2,500 ft to the west of the Site exhibited a foliation strike of north 30° east and a dip of 35° northwest along with near vertical jointing. Attachment 3G also refers to two dominant linear orientations at north 30° east and north 50° west.

Soil Quality

Based on available boring logs, overburden materials at the site include organic topsoil and sandy silts and clays intermixed with minor fine-grained sands, underlain by a highly weathered schist up to 77 ft-bgs. The sandy silts and clay soil extend to approximately 15 ft-bgs followed by a red to tan weathered schist to approximately 22 ft-bgs. The deeper weathered schist becomes grayer in color and gradually more competent. Cross sections developed by the current consultant can be reviewed as Figures 12 through 14 in Attachment 3G.

During initial characterization activities conducted by the original site consultant in 2002, 17 soil samples were collected from ten soil borings. Each soil sample was reportedly collected from the depth interval exhibiting the "highest potential for petroleum impact." Exceedances of the soil-to-groundwater SHS-MSCs for a used aquifer in a residential setting were reportedly detected in samples collected from 12 to 28 ft-bgs in these borings: SB-1, SB-4, SB-5, SB-6, SB-7, and SB-8. Additional soil sampling completed in 2010 reportedly identified exceedances of the soil-to-groundwater SHS-MSCs for benzene, toluene, ethyl benzene, naphthalene, 124-TMB, and/or 135-TMB in samples collected from 10 to 24.5 ft-bgs from these 17 borings: SB-1, SB-2, SB-8, SB-9, SB-10, SB-11, SB-12, SB-13, SB-14, SB-15, SB-16, SB-17, SB-18, SB-21, SB-22, SB-23, and SB-24.

In 2013, the current consultant completed four off-property soil borings (SB-4 through SB-7) on the 48 South Main Street parcel located across the street from the source property to its west (see Figure 9 in Attachment 3G). One soil sample was collected from each boring at a depth of 12 ft-bgs for laboratory analysis. None of the analyzed constituents were reportedly detected at concentrations above laboratory detection limits in all four soil samples; however, the current

consultant noted a "field error" when no deeper soil sample was collected from the SB-4 boring when elevated PID readings were recorded at depths of 32 to 38 ft-bgs in that boring.

On 3/11/15, the current consultant completed three additional soil borings (SB-25 through SB-27) at locations on property (SB-25) and off property (SB-26 and SB-27). The soil sample collected from 22 to 23 ft-bgs in SB-25 (see Attachment 3F) exhibited exceedances of the soil-to-groundwater SHS-MSCS for multiple constituents suggesting further delineation of soil impacts on the southern end of the source property was required. No exceedances of the soil-to-groundwater SHS-MSCs were reportedly detected in the soil sample collected from SB-27 (all results were below method detection limits). The SB-26 boring represented an attempt to collect a soil sample from the 32 to 38 ft-bgs interval where elevated PID readings had been recorded for boring SB-4. Unfortunately, the direct-push rig used to advance boring SB-26 failed to achieve the depth necessary to collect a sample from this interval (see Attachment 3F). No constituents were detected at concentrations above method detection limits in the other soil samples collected from the SB-26 borehole.

The current consultant returned to the Site on 4/30/15 and completed SB-28 at a location between SB-25 and MW-4 on the southern end of the source area, and installed a groundwater monitoring well at the SB-4/SB-26 location (MW-25) during which soil samples were collected from the boring. On 4/28/15 (MW-23), 4/29/15 (MW-25), and 6/8/15 (MW-26), off-property bedrock monitoring wells MW-23, MW-25, and MW-26 were installed in an effort to complete groundwater delineation, but no soil samples were collected from these boreholes for laboratory analysis. Attachment 3F provides the soil boring analytical results.

Based on the cumulative record of soil quality data, the two figures in Attachment 3K present the current consultant's up-to-date interpretation of the extent of on-property impacts to soil above the soil-to-groundwater SHS-MSCs at depth intervals above and below 15 ft-bgs. As the figures show, soil-to-groundwater SHS-MSC exceedances are reportedly present over sizable areas on the western side of the source property both in the unsaturated zone soils and intermittently saturated (smear) zone soils.

Groundwater Quality

An overburden/weathered bedrock water-bearing zone has been reportedly identified to depths of 50 to 77 ft-bgs (groundwater that may be present below this depth has not been evaluated). In this water-bearing zone, concentrations of benzene, toluene, ethyl benzene, MTBE, 124-TMB, and 135-TMB reportedly currently exceed the SHS-MSCs for a used aquifer in a residential setting both on and off the source property. These are considered to be the COCs in groundwater.

Figures 4 through 11 in Attachment 3F depict the current consultant's interpretation as to the extent of dissolved-phase constituent impacts to groundwater above the SHS-MSCs for a used aquifer in a residential setting. Based on the data for the July 2015 sampling event, exceedances

of the SHS-MSCs for at least one unleaded gasoline constituent were reported detected in these wells:

On-Property Monitoring Wells	Off-Property Monitoring Wells
MW-1	MW-7
MW-2	MW-12
MW-8	MW-13
MW-9	MW-14
MW-10	MW-15
MW-11	MW-16
	MW-20
	MW-22
	MW-25
	MW-26*

*The current consultant re-sampled this well on 8/11/15 and none of the constituents of concern were detected at concentrations above the analytical method detection limits (see Appendix 3F).

As shown in this table, petroleum-impacted groundwater at concentrations above the SHS-MSCs for a used aquifer in a residential setting extends off the source property to the north, northeast, northwest, west, and/or southwest depending on the constituent of concern.

On 4/28/15, 4/29/15, and 6/8/15, the current consultant installed bedrock groundwater monitoring wells MW-23, MW-25, and MW-26, respectively, in response to the PADEP's RAP modification that dissolved-phase plume delineation needed to be completed to the northwest, west, and southwest of the subject property. These three monitoring wells were installed by a combination of hollow-stem auger and air rotary drilling techniques to a depth of 50 ft-bgs, and constructed with 15 to 20 feet of 2-inch inner diameter 0.010 machine slot PVC well screen. MW-23 and MW-24 were first sampled on 6/2/15; MW-26 was first sampled on 6/23/15 and was the only well sampled on that date. See Attachment 3F for the analytical results. Based on the data from the June 2015 sampling events, the current consultant believes it has reasonably delineated the extent of the dissolved-phase constituent plumes associated with the subject release.

Slug and Aquifer Testing

In 2011, slug testing was performed by the original site consultant on MW-1 through MW-11 and MW-13 through MW-15. Analysis of the slug testing data reportedly indicated a geometric mean hydraulic conductivity value of 0.166 feet/day. In 2013, additional slug testing was completed by the current consultant on MW-1, MW-3 through MW-22, and MW-24 to determine hydraulic conductivity and transmissivity of the overburden/weathered bedrock aquifer. This latest round of slug testing reportedly indicated a geometric mean hydraulic conductivity value of 0.00015 feet/day and an average transmissivity value of 0.0035 square feet/day.

In August 2004, a constant-rate pump test was performed by the original site consultant over a 24-hour period using MW-1 as the extraction well. Based on the test results, the average calculated hydraulic conductivity and transmissivity values were 0.967 feet/day and 30.81 square feet/day, respectively. The current consultant also conducted a constant-rate pump test at this site in mid-December 2013. Step-testing was performed initially on MW-1 resulting in using 1.75 gallons per minute pumping rate for the constant-rate pumping test. Figure 11 in Attachment 3G is the total drawdown contour map developed by the current consultant to depict the cone of depression created by pumping MW-1. Appendix I in Attachment 3G includes the Cooper/Jacob straight-line plots, corresponding displacement data, and displacement versus time graphs for the 24-hour pump test completed at the Site in 2013. Based on the results of this pump test, the geometric mean hydraulic conductivity value was reportedly calculated to be 2.31 ft/day and the geometric mean transmissivity value was reportedly calculated to be 49.90 square feet/day.

Precipitation in the area appears to have a direct influence on the overburden groundwater. In its discussion of the December 2013 pump test results, the current consultant noted that "an apparent background influence after a precipitation event…causing increases in the water column in MW-1 (0.7 ft) and MW-4 (1.4 ft), but not in MW-6." The current consultant also observed, "It is uncertain why there was no response in MW-6," but the "response in MW-1 and MW-4 indicates that the overburden aquifer is directly influenced by precipitation recharge." Also, in the data included as Attachment 3L, recent water-level monitoring of selected site monitoring wells has indicated overburden groundwater levels respond relatively quickly to precipitation events (see below).

Soil Gas

In 2010, soil vapor sampling conducted on the source property (six points designated VP-1 through VP-6) reportedly identified several constituent concentrations above the residential soil gas screening levels (see Attachment 3G). Reportedly, five of the six soil vapor monitoring points were installed as nested pairs having two sampling depths (see Attachment 3C and Figure 19 in Attachment 3G). Soil gas samples from VP-3 (at two sampling depths) reportedly exhibited exceedances of the PADEP residential screening value for benzene, ethyl benzene, xylenes, 124-TMB, and 135-TMB.[6] Soil gas samples from VP-4 (at two sampling depths) reportedly exhibited exceedances of the PADEP screening values for benzene, toluene, ethyl benzene, xylenes, 124-TMB, and 135-TMB. In response, vapor mitigation systems were installed in the basements of both on-property buildings.

Additional soil gas sampling was conducted in 2013 both on and off the property. Between 7/22/13 and 7/24/13, the current consultant installed six new nested soil vapor monitoring points (SVP-2 through SVP-7) with a total of three vertically staggered stainless steel screens. Three of

[6] For some soil gas samples, the practical quantitation limits for benzene, MTBE, cumene, naphthalene, 124-TMB, and 135-TMB reportedly exceeded the PADEP residential screening values.

the soil vapor monitoring points (SVP-2, SVP-3, SVP-5, and SVP-7) were completed with screens at 5, 15, and 28 ft-bgs. SVP-4 was completed with screens at 5, 15, and 21 ft-bgs, and SVP-6 was completed with screens at 5, 15, and 25 ft-bgs. Soil vapor samples collected from these six points on 8/29/13 reportedly did not exhibit constituent concentrations above the residential soil gas screening levels except in the one point (SVP-4) completed within the former gasoline UST cavity (see Attachment 3G). However, a comparison of the 2013 soil vapor analytical results against the USEPA Regional Screening Levels (RSLs) for soil vapor in a residential setting indicated that benzene, ethyl benzene, 124-TMB, MTBE, and naphthalene were detected in all six points at concentrations above the USEPA RSLs. Consequently, the Johnson & Ettinger Soil Vapor Screen Model was used to quantify the vapor intrusion into buildings risk (see Section 12.7 in Attachment 3G). Both the calculated total carcinogen risk and the Hazard Quotient value were reportedly determined to be below the acceptable threshold values for site closure under the SSS.

During the second quarter of 2015, the current consultant audited the existence and condition of the previously installed soil vapor points SVP-2, SV-3, and SVP-7, vapor points VP-1 and VP-6, injection well IW-1, and the injection trenches. The current consultant was able to locate SVP-2, SVP-3, and SVP-7, VP-1, and IW-1, but locations of VP-6 and the locations of the former injection trenches and wells IW-2 and IW-3 referenced in older site plans could not be established.

Separate Phase Hydrocarbons and Recovery

Measurable separate-phase hydrocarbon (SPH) had not been encountered at this Site until January 2015 when the current consultant reported detecting SPH in MW-11 after drilling two air sparge (AS) wells for pilot testing in the vicinity of MW-11. Shortly after drilling the two test AS wells (IW-1 and IW-2 in Figure 4 of Attachment 3I), the current consultant observed “a slight film of a dark substance” on the water surface in MW-11. In response, approximately 100 gallons of water was purged from MW-11. No further SPH was subsequently observed in MW-11 leading the current consultant to conclude “the substance was potentially separate-phase liquid leaching from the soil during well installation activities.”

Recent Water-Level Monitoring for Possible Pumping Well Influence

As discussed in several Site reports, supply well #6 in the Trout Lane well field owned and operated by Stewartstown Borough is located within 800 feet to the southwest of the subject Site, and approximately 700 feet beyond MW-26, which the current consultant sees as defining the furthest southwestern extent of impacted overburden groundwater. The proximity of supply well #6 to the Site and indications of an apparent northeast-to-southwest orientation to some of the dissolved-phase constituent plumes prompted the monitoring of water levels in several Site wells over a period of fifteen days in August 2015 while tracking precipitation events, changes in barometric pressure, and the gallons per day pumped by supply well #6 over the same period.[7]

[7] A prior aquifer analysis was completed by the current consultant using a transducer placed in MW-21 to record water levels and barometric pressure over 16 days. The transducer data were then compared to precipitation data and the

Attachment 3L provides the current consultant's presentation and evaluation of the resulting monitoring data. As shown in Attachment 3L, water levels in the monitored wells rose at least slightly in response to the recorded precipitation events and displayed the expected inverse relationship with changes in barometric pressure. Although the overall decline in groundwater levels across multiple wells indicated the rate of groundwater discharge exceeded the rate of recharge, there were no indications in these five monitored wells of water levels changing in response to supply well #6 withdrawals. Consequently, the current consultant has judged that the apparent southwest-to-northeast orientation of the dissolved-phase constituent plumes is likely influenced by remnant structural features in the weathered bedrock, and "may be the cause of the dominant groundwater gradient in the northeast direction and a southwest direction that does not follow gradient." However, overall, with no indications of an influence exerted by the pumping of Stewartstown Borough supply well #6, the current consultant believes the probability of a hydraulic connection between the impacted overburden groundwater at the Site and supply well #6 is fairly low. Water samples collected from supply well #6 (by the Stewartstown Borough over time and by the current consultant on 6/1/15) have not exhibited petroleum constituent concentrations above analytical method detection limits (see Attachment 3M). As such, the aquifer analysis and sampling data address an important exposure pathway consideration for the viability of the Solicitor's combined SHS-SSS remediation goals for soil and groundwater at this Site.

Public Water Usage Confirmation

During the second quarter of 2015, the current consultant conducted an investigation to confirm public water usage in the vicinity of this Site. Interviews with the Stewartstown Water Authority identified three properties as possibly using a private water supply: 10974 Trout Lane, 10945 South Main Street, and 72 South Main Street. The current consultant subsequently completed a door-to-door survey and confirmed that all three properties are on public water.

Conceptual Site Model

Figure 17 in Attachment 3G is the generalized cross section developed by the current consultant as part of its conceptual site model (CSM) for this Site. Minimal observations of saturated soil were noted except in the soil borings installed on the west side of South Main Street (saturation was noted at 38 ft-bgs in SB-4 and SB-7). Groundwater gauging conducted to date has indicated an average depth to overburden groundwater of approximately 32 ft-bgs. Depth to groundwater over the period of record has ranged from approximately 21 to approximately 45 ft below top of

total gallons pumped each day from municipal well #6 over the same period (see Attachment 3N). Although no indications of water level influence due to changes in pumping municipal well #6 was observed, several irregularities in the data, including well survey activity on 5/12/15 that disturbed the transducer in MW-21, suggested a second analysis monitoring multiple monitoring wells was advisable.

casing.[8] Groundwater within the monitoring wells has been interpreted to lie within the weathered schist saprolite. No groundwater appears to be within the sandy silts and clayey overburden material. However, since all current monitoring wells are installed within the soil or weathered bedrock schist, these wells are considered overburden monitoring wells.

The current consultant believes the source of the petroleum hydrocarbon impact at the Site is the historical operation of the former gasoline UST systems situated on the 51 South Main Street parcel. Site characterization has confirmed impacts to unsaturated soils, periodically saturated (or smear zone) soils, and below the zone of permanently saturated soils. The figures in Attachment 3K depict the current consultant's interpretation of the extent of impact in the unsaturated and smear zone soils. Note that the current consultant interprets the data as showing shallower soil impacts near the former gasoline UST cavity and dispenser island area (i.e., the source area), and then deepening impacts to soil with increasing distance from the source area. Reportedly, overburden soils consisting of sandy silts and clay and weathered schist bedrock are present to depths of over 50 ft-bgs. The current consultant believes the weathered schist contain relic bedrock features that may affect the fate and transport of contamination and/or groundwater flow. Saturated conditions are encountered predominantly in the gray weathered schist, but, in some areas, appears to extend into the red/tan weathered schist under higher water table conditions.

To date, the highest dissolved-phase constituent concentrations have been detected in MW-11, which is proximal to and downgradient of the source area. The current consultant believes contamination entered the aquifer through vertical migration from impacted recharge water or by periodic vertical groundwater fluctuations into the impacted soil zone. Several phases of groundwater monitoring well installations have gradually sharpened delineation of the dissolved-phase impact to groundwater above the soil-to-groundwater SHS-MSCs. Recently, access to several neighboring properties was gained by the current consultant to complete delineation, especially to the west and southwest.

Groundwater Flow and Contaminant Fate-and-Transport Modeling

Because the shallow overburden water-bearing zone appears to be within the weathered schist material, groundwater flow at this Site is believed to be influenced by the relic structural features (e.g., foliation and fractures). No investigation of any water-bearing zone in the underlying competent bedrock has reportedly been conducted at this Site to date. However, based on the study of the Trout Lane Well Field (see Attachment 3G), the USGS has interpreted the bedrock aquifer to be hydraulically connected to the overburden water-bearing zone (i.e., pumping the test

[8] The current consultant regards the depth to water of 19.27 ft below top of casing measured in MW-4 on 3/5/03 to be anomalous as an average depth of 30.34 ft below top of casing has been indicated for this well in over a decade of gauging activity.

well constructed in the competent bedrock produced measurable drawdown in the observation wells constructed in the overburden).

Based on the available groundwater elevation contour maps, the current consultant interprets the primary groundwater gradient to be approximately 0.019 ft/ft northeast. However, secondary gradients in a northwest and east direction have also been suggested by the current consultant. The current consultant believes a groundwater gradient ridge is apparent near MW-9 and MW-10 where groundwater elevations are consistently lower on the west side of South Main Street. The secondary groundwater gradients have been attributed to the location of the Site within a north-to-south trending topographic water basin divide. The USGS study of the Trout Lane Well Field also refers to a roughly northeast-to-southwest trending groundwater table divide located just west of the source property that parallel South Main Street. This groundwater table divide splits into the Deer Creek Watershed Basin and the Muddy Creek Watershed Basin to the west and east of the divide, respectively.

Significant fluctuations in groundwater elevation on the order of approximately 15 to 20 feet have been noted during the period of record. Pumping tests conducted by the USGS within the Trout Lane Well Field (see Attachment 3G) indicate the aquifer shows a significant response to precipitation causing groundwater levels to rise significantly. These tests also reportedly indicated an elliptical northeast-to-southwest trending cone of depression, which is consistent with the strike of bedrock foliation, what appears to be the primary groundwater gradient, and the dominant lineation trend of north 30° west suggesting a bedrock fracture orientation.

Migration in a northeast direction appears evident in light of the dissolved-phase impacts exhibited at MW-7, MW-12, MW-13, and MW-14. Although these impacts are less than what is observed in the northwest direction, there appears to be a greater spread of impact in the northeast direction. As discussed in Attachment 3G, fate-and-transport modeling performed by the current consultant using the New Quick Domenico model was conducted in the northeast direction only given the availability of data from downgradient monitoring wells with which to calibrate the model. The results of the 30-year projections established the following distances along the centerline of the plume as measured from MW-11:

- Benzene: 190 feet
- MTBE: 120 feet
- Naphthalene: 147 feet
- Toluene: 81 feet
- 124-TMB: 255 feet
- 135-TMB: 300 feet

Exposure Pathway Analysis

The current consultant submitted a separate Risk Assessment Report along with its SSCR in late 2014 (see Attachment 3H). The baseline human health risk assessment was conducted to evaluate potential adverse effects of human exposure to the impacted soil and groundwater at this Site. The risk assessment identified the potentially exposed populations and exposure pathways under current and reasonably anticipated future on- and off-property land use scenarios.

Sections 3.3 and 3.5 in Attachment 3H discuss the methods used to quantify the human health risks for the identified receptors and exposure scenarios. The exposure assumptions used in the calculation of risk are discussed in Section 3.4.

Attachment 3H summarizes the total risk calculated by the current consultant for each receptor and route of exposure. The summation of these total carcinogenic and non-carcinogenic risk values were then compared by the current consultant to the PADEP-accepted Target Risk Threshold of 1×10^{-4} and the Hazard Quotient of 1.0. Unacceptable non-carcinogenic risks were identified for the on-property and off-property construction worker in a ***future*** hypothetical trench through the inhalation of vapors. Unacceptable carcinogenic and non-carcinogenic risks were also identified for an on- and off-property resident and for the on-property commercial worker through ingestion and inhalation of groundwater and associated vapors ***if*** private supply wells are installed and used.

Upon reviewing the November 2014 Human Health Risk Assessment Report (Attachment 3H), the PADEP offered several comments that the current consultant is currently addressing. Chief among these comments (see Attachment 3O) was the PADEP questioning the use and applicability of the Risk Assessment Guidance (RAG) issued by Virginia Department of Environmental Quality's Voluntary Remediation Program (VDEQ-VRP) in evaluating the carcinogenic and non-carcinogenic risks for the on- and off-property construction worker exposure scenarios. The PADEP reviewer also noted several calculation errors and discrepancies between the calculated values cited in the tables and texts. The current consultant has partially addressed the PADEP's comments on the November 2014 Human Health Risk Assessment Report (see Attachment 3O), but it will be the responsibility of the selected consultant to refine and execute the resolution of these comments and revisit the risk assessment re-calculations under Milestone G.

Interim Remedial Actions

Interim remedial actions undertaken at the subject property to date have included the following:[9]

[9] There are also references in the historical reports and correspondence to a proposed program of "in-situ chemical oxidation point source reduction treatments" utilizing Fenton's Reagent. This proposed treatment program was never implemented.

- The reported removal of 300 to 400 tons of allegedly petroleum-impacted soil from the February 1999 closure of five USTs. Six of the 16 post-excavation soil samples exhibited exceedances of the soil-to-groundwater SHS-MSCs for a used aquifer in a residential setting.
- The installation and ongoing operation of two positive pressure "radon type" vapor mitigation systems in the basements of the both on-property buildings. These systems were installed in 2011. The current consultant conducts periodic visual and qualitative inspections of both these systems (see Section 12.5 in Attachment 3G). Continued operation and maintenance of these vapor mitigation systems will be continued by the successful bidder.
- The late 2007 or early 2008 installation and operation for approximately 1½ years of a groundwater extraction, treatment, and re-injection system. Initially, this system reportedly extracted groundwater from MW-1 alone and then from MW-1 and MW-2 and re-injected the treated and bio-augmented water via two on-property injection wells IW-1 and IW-2 (see Figure 5 in Attachment 3G).[10] Later, when re-injection via the injection wells was determined to cause mounding, a horizontal injection trench was installed on the eastern portion of the subject property to receive the bio-augmented water for re-injection. Historical plans (see Attachment 3E) also show an additional injection trench was planned along the western side of the subject property (with a lateral extending to the former gasoline UST cavity), but whether this trench was ever installed could not be confirmed. With the PADEP's concurrence, this system stopped operating on 10/9/09 after extracting approximately 1,292,000 gallons of groundwater.

Conceptual Remedial Plan

The Solicitor and current consultant have proposed site closure under the SSS through "appropriate means." At a minimum, it is expected that "appropriate means" will include applying an EC to the source property, implementing a PRCP, and re-assessing the residual risk associated with those exposure pathways that cannot be eliminated. Whether site-specific risk-based numeric values will eventually be calculated for a demonstration of soil and/or groundwater attainment is less clear at this time. Nevertheless, in anticipation of a risk-based approach to site closure, the current consultant prepared submittals (e.g., PADEP-approved November 2014 SSCR and March 2015 RAP) that call for additional remedial action "to reduce groundwater impact to levels conducive to the protection of human health based on a quantitative risk assessment." The selected remedial approach includes a combination of air sparging (AS) with both deep and shallow soil vapor extraction (SVE).

[10] Historical site maps also depict a third injection well (IW-3) installed on the south end of the subject property

An AS/SVE system is proposed in the PADEP-approved RAP to remediate soil and groundwater impacts on the source property combined with monitored natural attenuation of off-property groundwater impacts. However, the RAP notes a possible need for off-property "satellite remediation systems" if the pace of contaminant reductions off the property prove insufficient.

The AS/SVE remediation system is intended to volatilize groundwater contamination by means of air sparging and to remove contaminant mass in the vapor phase from both the unsaturated and smear zone soils. The SVE component of the system will need to remove vapors caused by the air sparging and desorbed vapors from impacted soil. Therefore, given the depth to water at this site, the remedial system design includes installing deep and shallow SVE wells to address the vertical extent of the impacts to soil and effectively capture the volatiles released by air sparging.

Remedial Feasibility Testing

AS/SVE feasibility testing was conducted at the site by the current consultant between 1/12/15 and 1/15/15. Several feasibility test wells were installed and screened at specific depth intervals to target the individual zones of interest in the overburden/weathered bedrock aquifer. The two AS wells, IW-1 and IW-2,[11] were installed in the vicinity of MW-11 and screened in the permanently saturated zone from 45 to 50 ft-bgs. Two shallow SVE wells, SVE-1S and SVE-2S, were screened from 14 to 19 ft-bgs in the unsaturated soil zone, and two deep SVE wells, SVE-1D and SVE-2D, were screened from 24 to 30 ft-bgs within the periodically saturated soils of the overburden/weathered bedrock aquifer. Appendix A in Attachment 3I contains the boring logs/well construction information for the feasibility test wells, and Figure 6 in Attachment 3I depicts their locations.

Feasibility testing by the current consultant began with the deep SVE test in order to demonstrate vacuum influence at the peripheral wells before beginning the AS portion of the test. Using a regenerative blower, a vacuum of 5 inches of mercury (in. Hg) was applied to SVE-1D for one hour. As shown in Figure 6 in Attachment 3I, vacuum influences were observed in multiple observation wells offering confirmation that the AS test could be initiated safely. At the conclusion of this initial test, an air sample was collected from the extracted vapor stream for analysis by Method TO-15 (see Table 1 in Attachment 3I for the analytical data).

Prior to beginning the AS test on 1/14/15, baseline groundwater samples were collected from IW-1, IW-2, and MW-11 for analysis of volatile organic compounds (VOCs), total dissolved solids (TDS), total iron, hardness, biological oxygen demand, and chemical oxygen demand, petroleum-degrading bacteria (PDB) and heterotrophic plate counts (HPC). An air compressor was used to sparge atmospheric air into the aquifer using IW-1 while IW-2 was used for monitoring purposes.

[11] Although the nomenclature is the same, bidders are cautioned that the two AS wells designated IW-1 and IW-2 by the current consultant are ***not*** the former remedial system injection wells installed by the prior site consultant and also designated IW-1 and IW-2 on the historical site maps.

Three separate air sparging tests, at one hour intervals, were completed using flow rates of 5, 10, and 17 cubic feet per minute (cfm) while monitoring nearby wells for pressure and changes in static water levels. Dissolved oxygen (DO) readings were also collected at the conclusion of the each test. The aquifer was allowed to recover for 2 hours before beginning the next test phase. The results of each AS testing phase are summarized in Appendix D of Attachment 3I. After completing the third sparge test, post-test aqueous samples were collected from IW-1, IW-2, and MW-11 (see Table 2 in Attachment 3I for the analytical results).

On 1/15/15, the SVE testing within the smear zone soils resumed with a mid-vacuum level test on SVE-1D. This test applied a vacuum of 13 in. Hg and lasted for one hour. Following the mid-vacuum test, a high vacuum (26 in. Hg) test was performed on SVE-1D for one hour and then on SVE-1D and SVE-2D together for another hour. During the deep SVE testing, vacuum levels at the peripheral wells and on the vacuum line were monitored along with flow and PID readings. In addition, vapor flow rate measurements were taken from the vacuum line inside the trailer along with PID and temperature readings.

After each deep SVE test stage, soil vapor samples were collected using Summa canisters for Method TO-15 analysis. Each vapor sample was collected from the extraction line leading from the well head to the regenerative blower. Table 1 in Attachment 3I provides the soil vapor sampling results.

Following the deep SVE testing, three shallow SVE feasibility tests were performed on SVE-1S for one half hour each at three different vacuum levels: 5 in. Hg (low vacuum), 12 in. Hg (mid-vacuum), and 23 in. Hg (high vacuum). This three-stage test was followed by a high-vacuum test (21 in. Hg) for one-half hour utilizing SVE-1S and SVE-2S. After each shallow SVE test stage, soil vapor samples were collected using Summa canisters for Method TO-15 analysis. Each vapor sample was collected from the extraction line leading from the well head to the regenerative blower.

AS Testing Results

Based on a comparison of the pre-and post-AS test aqueous samples collected from IW-1, IW-2, and MW-11, the current consultant concluded, “The concentration changes of total iron, MTBE, and benzene at IW-1 and IW-2 are most likely the result of groundwater migration due to air sparging,” and that the COD and naphthalene concentration decreases at MW-11 “were likely affected by the pre-test purging of approximately 100 gallons of groundwater” from that well to remove SPH (see Attachment 3I). Also, based on monitoring of groundwater levels during the three-phase AS testing, the current consultant concluded, “The aquifer could accept these flow rates with minimal groundwater mounding.” Based on PID readings collected at the observation wells, the current consultant noted increases between each step up in the sparging flow rates indicating that “air sparging was effectively volatilizing constituent concentrations from the groundwater.” Finally, with respect to pressure readings, the current consultant reported that

testing at IW-1 "provided no significant data likely due to the large volume of the vadose zone caused by the deep water table." In addition, only IW-2 registered a pressure increase (0.24 inches of water during the 5 cfm test, 0.5 inches of water during the 10 cfm test, and 0.3 inches of water during the 17 cfm test).

Given these results for the air sparge feasibility test, the current consultant submitted a RAP based on an air sparging flow rate of 17 cfm and a calculated radius of influence (ROI) of 15 feet.[12] The current consultant selected the highest tested flow rate "based upon the saturated aquifer's willingness to accept the highest tested flow rate with minimal groundwater mounding," and because this highest flow rate had demonstrated the largest increase in DO readings in the aquifer.

Deep SVE Testing Results

The deep SVE test on SVE-1D demonstrated variable vacuum influence at MW-8, MW-10, MW-11, SVE-1S, and SVE-2D. No vacuum influence was noted at MW-12 during any of the tests. The low-vacuum test demonstrated effective removal of constituent concentrations based on PID readings of the extracted vapor and analysis of the soil vapor samples; therefore, the RAP specifies application of a 5 in. Hg vacuum at the deep SVE wells to "provide effective removal of impacted soil vapor within the smear zone of the weathered bedrock aquifer while limiting equipment and operating costs."

Shallow SVE Testing Results

The shallow SVE feasibility testing also involved measuring flow rate, temperature, and PID readings in the extraction line, monitoring vacuum levels at selected wells, and collecting soil vapor samples from the test well at the conclusion of the test (see Table 1 and Appendix D in Attachment 31). Testing at SVE-1D demonstrated some measurable vacuum influence at all vacuum levels in surrounding observations wells except for MW-12. The low-vacuum test reportedly demonstrated effective removal of constituent concentrations based on PID readings of the extracted vapor and analysis of the soil vapor samples.[13] Therefore, the RAP calls for applying a 5 in. Hg vacuum at the deep SVE wells to "provide effective removal of impacted soil vapor within the smear zone of the weathered bedrock aquifer while limiting equipment and

[12] Bidders will note that on page 14 of the March 2015 RAP (Attachment 3I), the calculated air sparge ROI is indicated to be 22 feet. However, in a 3/26/15 e-mail to the PADEP, the current consultant provided a replacement page noting that the page 14 reference to 22 feet is incorrect—"it should read 15 feet."

[13] The points designated MW-A, MW-B, and MW-C shown on some of the current site drawings in Attachment 3I (e.g., Figure 7) are believed to be the current consultant's substitute designations for some of the original consultant's soil vapor points. For example, MW-A appears to equate to the original SVP-6, and MW-B appears to equate to the original SVP-4. The selected consultant will be expected to either preserve the original designation assigned to a boring, monitoring well, or soil vapor monitoring point when it was installed, or employ a new sequential designation scheme and provide a crosswalk that correlates the original and new designations.

operating costs." The current consultant also concluded, "No conclusive evidence of short circuiting of either SVE system was encountered due to the [previously excavated area]."

Conclusions of Remedial Feasibility Testing

In the March 2015 RAP, air sparging was selected by the current consultant as the preferred remedial technology "due to the low groundwater extraction yield from the on-site wells," the lack of discharge options for extracted groundwater, and because "more aggressive forms of *in-situ* treatment have the potential to cause excessive mounding that could transport more COC off-site." The SVE systems will complement the AS system for remediating sorbed-phase soil impacts, as well as mitigating any soil vapor impacts. Consequently, the RAP specifies installing the SVE system in two zones: one shallow SVE system with SVE wells screened from 15 to 20 ft-bgs to address impact to unsaturated soils, and a deep SVE system with SVE wells screened from 25 to 30 ft-bgs to capture vapors from air sparging of the saturated zone below 45 ft-bgs and for vapor removal from the intermittently saturated (smear) zone soils.

The March 2015 RAP (Attachment 3I) specifies an AS system with a flow rate of 17 cfm combined with both shallow and deep SVE systems operating at 5 in. Hg. The selected consultant will be responsible for installing this AS / SVE remediation system as it is described in the March 2015 RAP (see Attachment 3I) and operating/maintaining the system for two years. **Each bidder must explicitly commit to initiating construction of and obtaining necessary permits for the remediation system within 60 days of executing the Remediation Agreement. Startup of the completed remediation system shall be within 120 days of executing the Remediation Agreement.**

Other Information

To the extent there is any discrepancy between the summary of site conditions provided above and the source documents, bidders shall rely on the source document information. Bidders should carefully consider what information, analyses, and interpretations contained in the background documents can be used in developing their scope of work for their bid in response to this RFB.

Scope of Work

This RFB seeks competitive bids from qualified contractors to perform the activities in the Scope of Work (SOW) specified herein. The work scope was provided to the PADEP Southcentral Regional Office (SCRO) case manager for review and comment, and the comments received were incorporated.

Closure Goal

Depending on the receptor and exposure pathway, the Solicitor has elected to achieve Act 2 closure at this site under the Site Specific Standard (SSS) utilizing a variety of "appropriate means" available under the applicable Chapter 245 and 250 regulations. What may constitute these "appropriate means" is not yet fully determined, but is likely to include the following:

- Pathway elimination through an appropriate and compliant environmental covenant (EC) established for the source property (which the Solicitor has already indicated a willingness to accept);
- Implementation of a Post-Remedial Care Plan (PRCP) particularly with respect to the use of groundwater off the property;
- Demonstrating plume stability and the removal of any separate-phase hydrocarbon (SPH) to the maximum extent practicable;
- Demonstrating that post-remedial constituent concentrations do not pose an unacceptable risk (particularly with respect to the construction/utility worker exposure pathways);
- Demonstrating attainment of calculated constituent-specific, risk assessment-based, numeric SSS values; and
- Demonstrating there are no affected water supplies pursuant to the requirements of Chapter 245.307 (i.e., current and potential future water supplies will need to be addressed in order to obtain closure).

It is also conceivable that demonstrating attainment of the Statewide Health Standard Medium-Specific Concentrations (SHS-MSCs) may prove possible for select constituents of concern in certain media (e.g., soil and/or groundwater).

As the SOW is not intended or expected to achieve site closure during the contractual period of performance, the selected consultant is not expected to engage in any demonstrations of attainment, establishing an EC, or developing a PRCP. However, as noted below, the SOW does specify performing stability analyses in the context of submitting quarterly Remedial Action

Progress Reports, and also contains a milestone for re-evaluating the risk assessment calculations after seven quarters of remedial system O&M.

Objectives

In general, the SOW described in this RFB requires additional site characterization activities; pre-remedial groundwater gauging, sampling, and reporting on a quarterly basis; installation of the proposed AS/SVE remediation system as described in the March 2015 RAP; start-up and shakedown of the installed remediation system; eight (8) quarters of operation and maintenance (O&M) of the AS/SVE remediation system; performance monitoring, sampling, and reporting related to operation of the remediation system; an engineering evaluation of the remediation system's effectiveness after four quarters and seven quarters of O&M activity; O&M of two on-property vapor mitigation systems; and eight (8) quarters of quarterly groundwater monitoring, sampling and reporting. These work scope elements are ***not*** intended to include all tasks leading to site closure for the covered release impacts in soil or groundwater, although it is possible that site conditions could materialize during the contract period that suggest it is time for site closure tasks consistent with the Solicitor's selected remediation standard.

The SOW contained in this RFB has been developed and structured as a limited duration, defined work scope-type solicitation. Therefore, in reviewing the quality of bids submitted under this type of solicitation, there is a greater emphasis placed on cost over technical approach (as compared to bids offered in response to "Bid to Result" RFBs). Nevertheless, technical detail, accuracy, and completeness remain important and are evaluated against the SOW requirements.

Constituents of Concern (COCs)

Soil, groundwater, and soil gas samples collected at the Former L&L Service Center site have been analyzed for the PADEP Act 2 post-March 2008 short-list of unleaded gasoline compounds. Based on these analyses, the COCs in site environmental media are the following:

- *Soil* – Benzene, toluene, ethyl benzene, xylenes, naphthalene, MTBE, 124-TMB, and 135-TMB;
- *Groundwater* – Benzene, toluene, ethyl benzene, xylenes, naphthalene, MTBE, 124-TMB, and 135-TMB; and
- *Soil gas* – Soil vapor sampling in 2010 detected concentrations above the PADEP Residential Soil Gas MSC for benzene, toluene, ethyl benzene, xylenes, 124-TMB, and 135-TMB. These results prompted the installation of vapor mitigation systems in the basements in each of the two on-property buildings, which currently remain in operation. Soil vapor sampling in 2013 yielded only benzene concentrations above the PADEP Residential Soil Gas MSC; all other constituent concentrations were either below the PADEP Residential Soil Gas MSC or below the laboratory

practical quantitation limits (PQLs), although several PQLs were above the PADEP Residential Soil Gas MSC. Comparison of the 2013 analytical results against the USEPA Regional Screening Levels (RSLs) for soil vapor noted exceedances for benzene, ethyl benzene, MTBE, naphthalene, and 124-TMB. However, use of the Johnson & Ettinger model to quantify the risk for vapor intrusion into buildings concluded no risk of vapor intrusion for structures with and without basements on or off the source property.

General SOW Requirements

The bidder's approach to completing the SOW shall be in accordance with generally accepted industry standards / practices and all applicable federal, state, and local rules, regulations, guidance, and directives. The latter include, but are not limited to meeting the applicable requirements of the following:

- The Storage Tank and Spill Prevention Act (Act 32 of 1989, as amended);
- Pennsylvania Code, Title 25, Chapter 245 - Administration of the Storage Tank Spill and Prevention Program;
- The Land Recycling and Environmental Remediation Standards Act of 1995 (Act 2), as amended);
- Pennsylvania Code, Chapter 250 - Administration of Land Recycling Program; and
- Pennsylvania's Underground Utility Line Protection Law, Act 287 of 1974, as amended by Act 121 of 2008.

During completion of the milestone objectives specified below and throughout implementation of the project, the selected consultant shall:

- Conduct necessary, reasonable, and appropriate project planning and management activities until the project (i.e., Remediation Agreement) is completed. Such activities may include Solicitor communications / updates, meetings, record keeping, subcontracting, personnel and subcontractor management, quality assurance / quality control, scheduling, and other activities (e.g., utility location). Project planning and management activities will also include preparing and implementing plans for health and safety, waste management, field sampling / analysis, and/or other plans that are necessary and appropriate to complete the SOW, and shall also include activities related to establishing any necessary access agreements. As appropriate, project management costs shall be included in each bidder's pricing to complete the milestones specified below.

- Be fully responsible for identification and avoidance of any and all underground utilities or other obstructions encountered while performing the SOW. Project planning and management shall include identifying and taking appropriate safety precautions to not disturb Site utilities including, but not limited to, contacting Pennsylvania One Call as required prior to any ground-invasive work.
- Be responsible for coordinating, managing, and completing the proper management, characterization, handling, treatment, and/or disposal of all impacted soils, water, and derivative wastes generated during the implementation of this SOW. The investigation-derived wastes, including purge water, shall be disposed in accordance with standard industry practices and applicable laws, regulations, guidance, and PADEP directives. Waste characterization and disposal documentation (e.g., manifests) shall be maintained and provided to the Solicitor and the PAUSTIF upon request. All investigation derived wastes shall be handled and disposed per PADEP's Regional Office guidance. It is the selected consultant's responsibility to conform to current PADEP Regional Office guidance requirements in the region where the Site is located.
- Be responsible for providing the Solicitor and facility operator with adequate advance notice prior to each visit to the property. The purpose of this notification is to coordinate with the Solicitor and facility operator to ensure that appropriate areas of the property are accessible. Return visits to the Site will not constitute a change in the selected consultant's SOW or result in additional compensation under the Remediation Agreement.

As such, all bids shall include the costs of the aforementioned activities and associated functions within the quotes for all applicable tasks / milestones.

Site-Specific Guidelines

As part of this RFB, the selected consultant will need to consider the following site-specific guidelines:

On-Property Access. Given that the Former L&L Service Center property is the location of an active business, covers an area of only 0.9 acres, and is fronted by a busy roadway, maneuverability can be challenging and present safety and traffic management concerns. As such, safety precautions should be carefully considered prior to and during any field activities along with an elevated level of attentiveness. Due to space constraints on the property, any waste drums or other non-essential items will need to be removed as quickly as possible. If it is necessary to close or restrict access to the former dispenser island area to complete any of the milestones within this RFB, the Solicitor requires at least two (2) weeks advance notice and coordination with site personnel.

Off-Property Access. At the present time, the current consultant reports that all executed off-property access agreements are between the Solicitor and the respective property owners. Therefore, for the purpose of this bid solicitation, bidders shall assume no further negotiations will be required with respect to all pre-existing access agreements. Copies of all pre-existing access agreements will be provided to the selected consultant after execution of the Remediation Agreement. Should an additional access agreement (or agreements) become necessary, such additional work would be considered out-of-scope and subject to the changed conditions clause of the Remediation Agreement.

Field Activities. All on- and off-property work should be conducted during the normal business days and hours of 8:00 AM to 5:00 PM from Monday through Friday, unless work outside of these normal business days and hours is authorized by the respective property owner. The selected consultant will be responsible for determining and adhering to other restrictions that may apply to the Site or surrounding properties.

Responsibility. The selected consultant will be the consultant of record for the site. It will be required to take ownership of the project and will be responsible for representing the interests of the Solicitor and PAUSTIF with respect to the project. This includes utilizing their professional judgment to ensure reasonable, necessary and appropriate actions are recommended and undertaken to protect sensitive receptors and carry out adequate remedial actions in order to move the site toward closure.

Field Instrumentation. Each bidder should state in their bid response the appropriate field instrumentation (e.g., pumps, meters, photoionization detectors, etc.) to be used during the completion of the SOW. Specifically, the product associated with the regulated release at this site is unleaded gasoline. As such, any field-screening instrumentation used at the site should be able to detect the presence of hydrocarbons associated with that type of product.

Safety Measures. Each bidder should determine the safety measures necessary to appropriately complete the milestones. For example, if a consultant believes that it is appropriate and necessary to complete utility clearance using an air knife (or equivalent), the cost should be included in their fixed-price cost. If a bidder includes costs to conduct specific safety measures or activities, the bidder should specify it in the bid response and discuss why it is appropriate and necessary and indicate which methods will be utilized and to what extent. As discussed in the RFB, while cost is a key factor in evaluating the bid responses submitted in response to this solicitation, other factors are taken into consideration during the bid evaluation process, including the use of appropriate safety measures.

Waste Disposal. The investigation-derived waste (IDW) waste (including, but not limited to, soil/rock cuttings, used carbon, well development/purging liquids, and liquids generated during well installation) shall be disposed of per the instructions included in the “General SOW Requirements” section of the RFB. Bidders will be responsible for arranging any off-site waste

disposal (if required) and including costs in their bid response to cover the disposal of all potential waste related to the milestones included in the SOW. Containerized soil and groundwater may be temporarily stored on-site, but should be removed from the site as quickly as possible due to space constraints as mentioned above. Bidders will be responsible for including costs in their bid response to cover the disposal of all potential waste related to the milestones included in the SOW. Bidders should estimate the volume of waste using their professional opinion, experience and the data provided. **PAUSTIF will not entertain any assumptions from the selected bidder in the Remediation Agreement with regards to a volume of waste. Invoices submitted by the selected bidder to cover additional waste disposal costs as part of activities included under the fixed-price Remediation Agreement for this site will not be recommended for reimbursement.**

Site-Specific Milestones

Milestone A Series – Supplemental Site Characterization Activities and Reporting. In PADEP's 1/5/15 letter approving the November 2014 Supplemental Site Characterization Report (Attachment 3G), the PADEP specified the following expectations for additional site characterization:

- Soil contamination has not been fully delineated laterally. Additional soil delineation should be performed. (This comment was subsequently addressed by the current consultant).
- The groundwater dissolved contaminant plume has not been completely delineated. Additional groundwater characterization should be performed. (This comment was subsequently addressed by the current consultant).
- Fate-and-transport analysis has not been performed towards the northwest. A preliminary fate-and-transport analysis should be performed to the northwest at a minimum (the current consultant has not addressed this comment to date, but there are now data from additional off-property monitoring wells installed to the northwest).
- Additional evaluation of fate-and-transport modeling to the northeast should be performed since MTBE has been detected in monitoring well MW-19 (the current consultant has not addressed this comment to date).
- The stability of the dissolved groundwater contamination plume has not been evaluated (the current consultant has not addressed this comment to date).
- Additional evaluation of the public water supply well should be performed. (This comment was subsequently addressed by the current consultant).

As outlined in the "General Site Background and Description" section, the current consultant has: conducted additional soil boring advancement and sampling; installed new off-property groundwater monitoring wells; revisited its fate-and-transport modeling of the contaminant plumes to the northeast; collected a sample from the public water supply well on Trout Lane for unleaded gasoline analysis; and confirmed that fate-and-transport analysis of the contaminant plume to the northwest may be postponed until off-property monitoring wells can be installed in that direction. In addition, the current consultant successfully concluded efforts to secure off-property access for installing more off-property groundwater monitoring wells and believes it has reasonably delineated the extent of groundwater impacts. However, should adding one or more groundwater monitoring wells become necessary in response to PADEP directives, this work will be outside the scope of the Remediation Agreement.

Under this milestone, bidders are to address the fate-and-transport modeling to the northeast and to the northwest, and the plume stability analysis expectations outlined by the Department in its 1/5/15 letter. Each bidder shall describe in detail its scope of work for the component elements of Milestone A and the timing and schedule of each component element relative to the overall project schedule. Bidders are strongly encouraged to review the November 2014 SSCR and March 2015 RAP, and the other documents provided in Attachment 3 rather than rely solely on the summary information presented in this RFB. Milestones A1 and A2 shall be conducted as soon as possible following execution of the Remediation Agreement. Bidders are to document the completed work performed under Milestones A1 and A2 in one of the first two quarterly RAPRs to be prepared under Milestone B.

Milestone A1: Fate-and-Transport Modeling to the Northeast and Northwest -- Bidders shall develop a quantitative and calibrated contaminant fate-and-transport model. The model shall address all dissolved-phase constituents whose concentrations exceed the relevant PADEP SHS-MSCs for groundwater, including (but not limited to) the Department's specific concern for MTBE migration to the northeast of the source property. It is expected that contaminant modeling will be conducted using the PADEP's New Quick Domenico application or equivalent.[14] Model input shall incorporate the site-specific values, including hydraulic conductivity and hydraulic gradient that were previously determined through prior site investigations. Results from the contaminant fate-and-transport modeling shall be presented in a quarterly RAPR to be prepared under Milestone B and shall: (i) describe all model input / output; (ii) include an explanation of model construction along with identification and justification of all input parameter values and sources; and (iii) provide a discussion of the modeling results and conclusions in detail with

[14] Use of the New Quick Domenico model may or may not prove acceptable to the PADEP, but whatever the model used, the selected consultant will need to justify/support its use.

respect to assessing current and predicted future plume stability and demonstrating the reliability and veracity of the model.[15]

Milestone A2: Pre-Remedial Plume Stability Analysis -- Bidders should note that the plume stability analysis requirement is applicable in two contexts. First, such an analysis has been requested by the PADEP in its letter dated 1/5/15 (see Attachment 3J) apparently in a pre-remedial context. Therefore, the pre-remedial plume stability analysis requested under Milestone A2 is intended to satisfy this expectation and is to be documented in a subsequent quarterly RAPR issued under Milestone B. Bidders are to assume that this pre-remedial evaluation of plume stability is intended to assess whether the existing plume body is expanding or may have already stabilized and/or started to contract in light of the passage of time and/or as a result of the historical remedial actions undertaken at the Site. Consequently, this pre-remedial assessment of plume stability under Milestone A2 is seen as providing a sense of tracking remedial progress. However, as described in Milestone E, bidders are also expected to revisit the plume stability analysis in each quarterly RAPR during the period of performance, but as the remediation system will be operating, these ongoing assessments of plume stability will be limited to the qualitative analysis aspects only.

In evaluating and discussing plume stability prior to the start of remediation, bidders are expected to not rely *solely* on the Mann-Kendall statistical analysis, such as is embodied in the Wisconsin Dept. of Natural Resources (WDNR) spreadsheet, in making its assessment.[16] Rather, bids are to be based on completing a more comprehensive qualitative and quantitative assessment that encompasses the preponderance of data for overall plume stability. For example, localized perturbations of constituent concentrations in individual wells (e.g., due to groundwater fluctuations) in the plume core (i.e., source area) is not likely a reflection of the stability of the plume as a whole. Therefore, the plume stability demonstration should first include qualitative analyses of the plumes (e.g., a chronological/time-series sequence of iso-concentration contours) to assess relative plume stability. However, quantitative statistical analysis shall also be utilized to supplement the qualitative evaluation to include assessing how the quantitative results relate to the qualitative observations. The quantitative analysis should focus on the off-property and on-property perimeter monitoring wells for which there are at least eight (8) quarters of analytical data.

Milestone B Series – Pre-Remediation Quarterly Groundwater Monitoring, Sampling & Reporting. Under this milestone, bidders shall provide a firm fixed-price to continue with quarterly groundwater monitoring, sampling, and reporting events while performing the Milestone A

[15] The need for surface water modeling applications such as SWLOAD5B and PENTOX SD is not expected given the dissolved contaminant concentrations and distance to the nearest surface water body. Although unexpected, should the PADEP require surface water modeling, such modeling would be subject to the "New Conditions" provision of the Remediation Agreement.

[16] Bidders should note that the WDNR removed its Mann-Kendall spreadsheet from its guidance and website because it no longer endorses its use (see http://dnr.wi.gov/topic/Brownfields/Pubs.html).

activities and during installation of the remedial system. For the purposes of this RFB, it is assumed the Milestone B activities will be required for three (3) quarters (Milestones B1 through B3). However, each bid must specify the number of quarterly events that will be needed, along with rationale, prior to implementation of the remedial approach (Milestone D). Additional quarterly monitoring and reporting events beyond three quarters will be addressed under optional unit cost Milestone H.

Each groundwater monitoring and sampling event shall include all 26 existing on- and off-property monitoring wells (MW-1 through MW-26). The conduct and results of each event shall be documented in quarterly Remedial Action Progress Reports (RAPRs). During each quarterly groundwater monitoring and sampling event, the depth to groundwater shall be gauged in all existing monitoring wells and prior to purging any of the wells for sampling. Groundwater level measurements obtained from the monitoring wells shall be converted to groundwater elevations for assessing groundwater flow direction and hydraulic gradient.

Each of the monitoring wells designated for sample collection shall be purged and sampled in accordance with the PADEP Groundwater Monitoring Guidance Manual and standard industry practice specifications for low-flow purging and sampling. Any monitoring well exhibiting a measurable thickness of separate-phase hydrocarbons (SPH) shall not be purged and sampled; however, recoverable SPH shall be removed from any well in which it is deemed present.[17] Bidders shall manage purged groundwater and other derived IDW generated by the well purging and sampling activities in accordance with the PADEP-SCRO guidance.

Groundwater samples shall be analyzed for the **post**-March 2008 PADEP short-list of unleaded gasoline parameters (BTEX, MTBE, cumene, naphthalene, 124-TMB, and 135-TMB) by a PADEP-accredited laboratory using appropriate analytical methods and detection levels. Appropriate QA/QC samples shall also be collected during each event and analyzed for the same parameters.[18] In addition, each event shall include the collection of field measurements at all 26 wells for the following parameters: pH, temperature, specific conductance, dissolved oxygen (measured in-situ), and oxidation/reduction potential.

The RAPRs describing the sampling methods and results will be provided to the PADEP on a quarterly basis and within 30 days of the receipt of analytical results for each quarter. At a minimum, each RAPR shall contain the following:

- A summary of site operations and remedial progress made during the reporting

[17] While the presence of SPH is not anticipated, the need to dispose of containerized SPH shall be subject to the New Conditions provision of the Remediation Agreement, including demonstrating the need for and providing a proposal for the out-of-scope work.
[18] Each bidder's approach to implementing Milestone B shall clearly identify the number of sampling events, number of wells / samples per event, well purging and sampling method(s), QA/QC measures, analytes, purge water management methods, and other key assumptions affecting the bid price.

period;

- Narrative description of the sampling procedures and results;
- Tabulated data collected from the monitored wells documenting the depth to groundwater and thickness of any SPH encountered;
- Groundwater elevation contour maps depicting groundwater flow direction;
- Tabulated historical quantitative groundwater analytical results, including results from the current quarter;
- Current quarter laboratory analytical report(s);
- One site-wide iso-concentration contour map for each compound detected in any one well above the SHS during the quarter;[19]
- For each well exceeding SHS, a graphical depiction of historical key contaminant concentrations and groundwater elevations to provide an assessment of correlations between fluctuating water levels / precipitation events and contaminant concentrations;
- For each well exceeding SHS, a graphical depiction of recent key contaminant concentration trends. Each quarter, contaminant concentration trend lines shall be calculated using at a minimum, the previous two-years of analytical data (or data collected after the active remediation has been initiated, if applicable) to be plotted on an x-y scatter plot with a logarithmic scale. The exponential trend lines shall be projected forward in time to assess the pace of or projected timeframe for remediation to achieve attainment of the selected remediation standard(s);
- As applicable, a discussion of the data to offer an updated qualitative assessment whether these data are consistent with a stable, shrinking, or expanding plume;
- Treatment and disposal documentation for waste generated during the reporting period; and
- Demonstration of compliance with the required Federal, State, and local permits and approvals.

PAUSTIF will only reimburse for the necessary quarterly groundwater sampling / reporting events actually completed under this milestone (e.g., this milestone shall be considered completed with the initiation of Milestone D). Each RAPR shall be sealed by a Professional Geologist and / or Professional Engineer registered in the Commonwealth of Pennsylvania (bidders shall refer to

[19] All figures included in each RAPR (e.g., site plan, groundwater elevation maps, dissolved plume maps, etc.) shall be available in electronic format to the Solicitor upon request.

state licensing laws to determine which seals are required based on the work performed and documented in the report).

Milestone C – RAP Final Design. Under this milestone, the bidder shall provide a firm fixed price cost to complete the final design elements for the remediation system components to be installed in fulfillment of the PADEP-approved RAP. Each bid shall detail the approach and include the system design elements and components, which are to be entirely consistent with the equipment list, specifications, trenching plans (cross-section and layout), and applicable permits as described in the RAP. Any deviations from the approved RAP in terms of equipment specifications, well constructions details, the number of AS wells, and/or the number of shallow and deep SVE wells will affect the bidder's technical score. Bidders do have some leeway to alter the AS or SVE well locations based on review of the site conditions and pilot test findings, and each bid must include the reasoning/rationale for these well adjustments. Each bid response shall provide a complete equipment list (including equipment name, manufacturer, and model number) for the remediation system.

The complete final design under this milestone shall be included in the RAP Final Design document which will be a separate deliverable sealed by a Professional Geologist and Professional Engineer registered in the Commonwealth of Pennsylvania and shall include preparation of the piping and instrumentation diagram and other design drawings not provided in the March 2015 RAP. The project schedule must specify no less than two (2) weeks for the Solicitor and PAUSTIF to review and comment on the draft RAP Final Design (in the form of a RAP Addendum) before being finalized and submitted to the PADEP for its review and comment. This RAP Final Design / RAP Addendum is to be submitted to ***and approved or acknowledged*** by the Solicitor, then approved by the PADEP *prior* to the purchase of equipment under Milestone D.

Milestone D Series – Implementation of the Remedial Approach. Under this milestone series, bidders shall prepare a fixed-price cost to implement the remedial approach as described in the March 2015 RAP. The cost breakdown of the RAP-specified activities shall follow the format prescribed below.

Milestone D1 – Installation of Additional AS & SVE Wells and Piping Trenches. Under this milestone, bidders shall provide a firm fixed-price cost for installing the not-yet-installed AS and shallow/deep SVE wells and piping trenches described in the March 2015 RAP (and in the bidder's RAP Final Design/RAP Addendum to be prepared under Milestone C). The design and layouts outlined in the March 2015 RAP should govern ***unless*** a bidder discerns and justifies a necessary and appropriate adjustment in the location of the AS wells and/or shallow/deep SVE wells. Each bidder shall independently consider the proposed AS and shallow/deep SVE well locations depicted in the March 2015 RAP relative to known utilities; and the bidder's interpretation of groundwater flow and flow variations, remedial feasibility testing data, and

configuration of the dissolved-phase plume. Each bid response shall provide the proposed locations for the AS and shallow/deep SVE wells and associated trenches on a site drawing.

The remediation wells shall be constructed in general accordance with the PADEP Groundwater Monitoring Guidance Manual and consistent with the March 2015 RAP. Each bid response shall indicate the drilling methods used to advance boreholes, total depth for each well, and well construction details (i.e., well casing diameter, screened interval, sand pack, etc.).

Figures 8 through 10 in Attachment 3I depict the proposed locations, typical construction, and well head design for the seven (7) additional AS wells that are to be installed on the property.[20] These seven additional AS wells plus existing sparge well IW-2 will comprise the AS component of the remediation system. The seven additional sparge wells shall be installed to a total depth of 50 ft-bgs.[21] Each two-inch (inner) diameter AS well will be constructed of solid PVC riser pipe and 5 feet of screen. Well heads will consist of an air-tight cap and pitless adapter connected to the well's drop tube. Final construction of the AS wells must ensure that the screened interval remains fully submerged below the water table surface accounting for seasonal groundwater fluctuations. Each AS well shall be equipped with a stainless steel diffuser installed in the well below the historically low groundwater elevation observed in the source area, which is approximately 45 ft-bgs. The diffusers shall be placed within the screened interval of each sparge well approximately one foot off the bottom of the well. Rubber gaskets shall be used to prevent sparged air from rising up within each sparge well.

Figures 11 and 12 in Attachment 3I depict the proposed locations for the network of four total shallow SVE wells. With two existing shallow SVE wells already installed (SVE-1S and SVE-2S),[22] two additional shallow SVE wells are to be installed to complete the shallow SVE well network. The additional shallow SVE wells shall be advanced to a total depth of 20 ft-bgs,[23] and completed with 5 continuous feet of 0.020-inch PVC screen placed at 15 to 20 ft-bgs. Well heads will be sealed with an air-tight cap (see Figures 13 and 14 in Attachment 3I for the typical well construction and wellhead construction diagrams).

Figures 15 and 16 in Attachment 3I depict the proposed locations for the network of ten total deep SVE wells. With two existing deep SVE wells already installed (SVE-1D and SVE-2D),[24] eight additional deep SVE wells are to be installed to complete the deep SVE well network. Each deep SVE well is intended to capture both vapors produced by the AS component of the remediation system as well as remove soil vapors from the smear zone soil. The additional deep SVE wells

[20] See also Table 4 and Appendix A in Attachment 3I for details on how the existing sparge wells are constructed.
[21] The completion depth and construction of each sparge well may need to vary slightly in response to observations made during drilling.
[22] See Table 4 and Appendix A in Attachment 3I for details on the existing shallow SVE wells.
[23] The actual depth of the screened interval and construction of each shallow SVE well may need to vary slightly based on observations made during drilling.
[24] See Table 4 and Appendix A in Attachment 3I for details on the existing deep SVE wells.

shall be advanced to a total depth of 30 ft-bgs,[25] and completed with 5 continuous feet of 0.020-inch PVC screen placed at 25 to 30 ft-bgs. Well heads will be sealed with an air-tight cap (see Figures 17 in Attachment 3I for the wellhead construction diagram).

With respect to the borings to be completed for the added wells, the selected consultant shall examine and document the drilling cuttings / soil cores for lithology, groundwater occurrence, and potential staining / odor indicative of hydrocarbon contamination. The drilling cuttings / soil cores shall also be screened in the field using a calibrated photoionization detector (PID) and standard headspace methods. A discussion on the drilling and well installation activities shall be included in a quarterly RAPR. However, bidders shall assume that no soil samples are to be collected from these well boreholes for laboratory analysis.

Figures 18 and 19 in Attachment 3I depict the proposed layout for the remediation system trenching and piping and a trench cross-section, respectively. The AS and SVE wells shall be connected to the treatment system shed through individual lines to permit monitoring and adjustments on a well-by-well basis. The individual injection and vacuum lines shall be valved to allow separate adjustments for each AS or SVE well. The eight AS wells shall be connected to the system shed by a 1-inch diameter lines. The deep and shallow SVE wells shall be connected to the system shed by 2-inch diameter PVC pipes. Figures 10 and 14 in Attachment 3I provide details for the AS and SVE wellhead construction, respectively.

Each bidder's fixed-price cost shall account for: (i) identifying subsurface utilities and other buried features of concern, including, but not necessarily limited to contacting PA One Call and clearing the borehole location to a minimum depth of 5 feet using vacuum excavation; (ii) well development activities (as applicable); (iii) management of IDW; and (iv) professional surveying of the new well locations and top-of-casing elevations. Well drilling / installation and development along with supporting documentation (e.g., waste manifests, boring logs and construction details, etc.) shall be documented in a quarterly RAPR (Milestone E).

Milestone D2 – In-situ Remedial System Equipment Purchase and Assembly. Any equipment[26] necessary to implement the remedial approach described in the March 2015 RAP and in the RAP Final Design/RAP Addendum (Milestone C) shall be purchased new and preferably pre-assembled and tested as much as possible at the equipment vendor factory as a turn-key prefabricated system prior to site deployment. Under this approach, the purchased equipment is to be fully integrated and tested electrically and mechanically inside an enclosure (properly insulated with appropriate lighting, and heating & ventilation systems) before being shipped to the site. After delivery and setting in place, final connections shall be made to the electrical service

[25] The completion depth and construction of each deep SVE well may need to vary slightly in response to observations made during drilling.
[26] All equipment purchased under this contract will eventually become the property of the Solicitor. The selected consultant shall be responsible for operating and maintaining the equipment for the contractual period beginning from the date of successful remediation system startup.

and subsurface piping / conduits installed as part of Milestone D3 (see below). Clear and legible copies of all equipment manuals and warranties shall be provided to Solicitor.

Please note that the proposed remedial system shall be equipped with the form of telemetry as indicated in the approved RAP. The telemetry capabilities of the remediation system must allow for remote monitoring of real-time operation and remote control of key system components. Minimum system monitoring and data logging requirements shall include: SVE vacuum levels and air sparging pressure. Optional components of the telemetry system include: SVE extraction flow rates and air sparging flow rates. Per the RAP, telemetry data are to be monitored at least once per day while the remediation system is operating. The selected consultant shall coordinate with the telephone, cable or internet service provider to bring and provide appropriate service to the location of the remediation equipment to allow remote communications and document up-time. Payment of the service connection shall be the responsibility of the selected consultant and shall be accounted for in the quoted fixed-price bid.

Milestone D3 – Site Preparation Work. The selected consultant shall obtain all necessary construction and operational permits, including any permit fees, and/ or permit exemptions and post same as required. The Solicitor shall be provided copies of all permits / permit exemptions before field construction activities commence. On-property mark-out of buried utilities shall be completed in advance of any drilling or trenching activities. PA One Call notification shall be made and documented prior to drilling or trenching activities.

The electrical compound shall be constructed and equipped as a Class I, Division II hazardous and explosion-proof area and shall comply with applicable local/state codes and the National Electric Code. The selected consultant shall also be responsible for contacting Stewartstown Borough to determine whether building permit applications and/or fee payments are necessary to comply with local zoning requirements and regulations in regards to placing the remediation enclosure on the subject property and/or completing the on-property construction activities.

The selected consultant shall contact USEPA Region III regarding the need for an underground injection control (UIC) permit for the AS/SVE remediation system. Bidders shall assume that the USEPA is likely to indicate that filing a UIC permit application is not necessary, but that the USEPA will at least request a written summary of the Site history and remedial system configuration.

The selected consultant will need to determine whether a vapor discharge permit/approval will be required by the York County Health Department for the treated discharges from the catalytic oxidizer (CatOx) unit and/or the vapor-phase granular activated carbon (VGAC) unit.

Finally, the selected consultant shall coordinate with the electrical service provider to bring and provide appropriate electrical service to the location of the remediation equipment. Payment of the electrical service connection shall be the responsibility of the selected consultant and accounted for in the fixed-price bid. Three-phase power is reported to be available along South

Main Street at the property, and the local electrical provider is Metropolitan Edison. The RAP calls for the power supply to the remediation system compound/shed to be directed underground to the location shown in the March 2015 RAP.

Milestone D4 – Remediation Equipment Pad, Trenching, Subsurface Piping, Mechanical, and Electrical. The selected consultant will be responsible for preparing the area where the remediation equipment will be located as specified in the RAP (and the RAP Final Design/RAP Addendum), including, if necessary, construction of a concrete pad. Each bid shall clearly reference/depict the proposed location for the remediation system compound/shed. Appropriately sized piping and electrical conduit/wiring shall be trenched and buried below the frost line extending between the remediation equipment location and the remediation system wells. Buried piping shall be installed with tracer wire to facilitate locating the subsurface lines after the trenches have been backfilled. Buried piping shall be tested for integrity and documented before trench backfilling. Buried piping and conduit stub-ups shall be terminated and secured in the remediation equipment area to facilitate final connections to remediation equipment and winterization of the stub-ups. Surface restoration from all trenching and well head completions shall be similar to current conditions.

Milestone D5 – Final Connections and Startup / Trouble-Shooting of the Remediation System. The selected consultant shall be responsible for making the final connections between piping/conduit stub ups and power drop/meter and the manifold(s)/conduits on the interior of the pre-assembled and tested treatment system. Any sections of above-grade piping located outside of the equipment enclosure will need to be freeze-protected (e.g., by insulation and heat tracing).

The selected consultant shall start up and demonstrate proper operation of the remediation system equipment. Each bid shall explain startup procedures and timeframe. At a minimum, such demonstration shall include documentation that: (a) all below- and above-grade equipment is operational; (b) the design parameters are achievable at the treatment system and at the well heads; (c) all safety and control switches function properly; and (d) the system can operate automatically (without manual intervention). The successful bidder shall provide the Solicitor with startup documentation demonstrating proper operation of the system. To the extent problems are identified during the site work preparation and/or remediation system installation and start-up phases, the successful bidder shall repair these problems and repeat the proper system operation demonstration.

Also as part of this task, the selected consultant shall prepare an O&M Plan. As part of the O&M Plan, the selected consultant shall be responsible for developing a checklist to be completed by field technicians during each O&M visit that will provide key information deemed necessary to evaluate remediation performance, permit compliance, and system maintenance on a continuing basis. Each bid response shall include an appropriate example of an O&M checklist that identifies typical minimum data requirements to be recorded during each O&M site visit.

The selected consultant will provide the Solicitor and PAUSTIF with a copy of the O&M Plan prior to remediation system startup, and with electronic and hard copies of as-built drawings for the remediation system upon completion of the successful system startup.

The Solicitor and the PAUSTIF shall have the opportunity to inspect and confirm that the system has been installed as described in the Remediation Agreement and in the remedial system final design and is in daily operation as described in the remedial system final design.

Milestone D6 – Temporary Operation of a Catalytic Oxidizer Unit and Initial Setup of VGAC Units. The selected consultant will be responsible for acquiring any air discharge permit (if applicable), setting up, and operating a CatOx unit for one month to treat the extracted vapor stream. The vapor extracted from the shallow and deep SVE wells will be initially treated by a CatOx unit capable of treating the anticipated vapor flow rate and hydrocarbon concentrations. Each bid must explicitly explain the methods to monitor vapor recovery rates and what criteria will be used to trigger the transition from use of the CatOx system to VGAC. If it proves necessary to extend operation of the CatOx unit beyond one month, each additional month will be addressed via Optional Cost Adder Milestone K. At the conclusion of operating the CatOx unit, which is to be based on the selected consultants criteria stated in its bid, the selected consultant will be responsible for removing and returning the CatOx unit and installing a single pair of VGAC vessels connected in series, each vessel containing 400 pounds of virgin carbon (800 pound total treatment), for VGAC treatment of the extracted vapor stream.

Milestone E Series – Remediation System O&M and Quarterly Groundwater Monitoring, Sampling & Reporting During Remediation. Under this milestone, bidders shall provide the Solicitor with firm quarterly fixed-price unit costs inclusive of routine O&M of the AS/SVE remedial system;[27] quarterly groundwater monitoring and sampling of the 26 existing on- and off-property monitoring wells (MW-1 through MW-26); and quarterly reporting over eight (8) consecutive quarters (Milestones E1 through E8). The quarterly fixed-price cost shall also include responding to any and all unexpected telemetry-triggered O&M visits (i.e., no minimum or maximum number of telemetry-triggered O&M visits are to be assumed). A telemetry service account will need to be set up between the service provider and the selected consultant.

For the purpose of this RFB, it is assumed that Milestone E activities will be required for a period of two years (8 quarters). Beyond the eight quarters of system O&M specified in this milestone, any additional quarters of Milestone E activities shall be covered by/addressed under Optional Cost Adder Milestone I in the Bid Cost Spreadsheet. As for the possibility that sufficient remedial progress may be realized to permit idling the remediation system early (i.e., before the eight Milestone E quarters of remediation have been completed), this scenario is addressed under Milestones F and G and Optional Cost Adder H.

[27] Utilities, including electric usage, telephone, cable, and internet, as applicable, will be reimbursed at cost (without markup) as time-and-material cost adders to the Remediation Agreement (see CA1 in Exhibit B).

The selected consultant, at its own expense, shall be responsible for all costs for repairing or replacing consultant-owned equipment purchased and used for completing the work scope that may, by any means, have become stolen, damaged, deteriorated, or destroyed over the course of completing the Remediation Agreement work scope. Each bid shall be inclusive of all such costs to repair and/or replace remedial system components. The selected consultant's responsibility to operate and maintain remediation-related equipment at this site also extends to the vapor mitigation systems in the two on-property buildings (see below).[28] However, should components of the vapor mitigation systems fail and require replacement, or should the PADEP require additional monitoring or more frequent O&M of the vapor mitigation systems, this circumstance shall be subject to the New Conditions provision of the Remediation Agreement, including demonstrating the need for and providing a proposal for the out-of-scope work.

Each bid must specify the number and frequency of site visits to occur each quarter. As provided in the PADEP-approved RAP (see Section 8.1.3 in Attachment 3I), O&M tasks are primarily focused on data collection and evaluation to: (1) determine, demonstrate, and document remediation system performance; (2) properly maintain the system equipment; and (3) demonstrate compliance with permits and other applicable regulatory requirements. Each bid shall include a description of the O&M activities including, but not limited to:

- *Performance monitoring* shall include data collection and evaluations geared toward evaluating how well the remedial strategy is working and making necessary adjustments to the system operational configuration to optimize system performance. Performance monitoring activities are to include, but not necessarily be limited to, measurements that allow contaminant mass recovery quantification. The selected consultant shall report quarterly (i.e., via a RAPR) concerning its evaluations of system performance and system optimizations performed.
- *System maintenance & monitoring* shall include monitoring and routine maintenance as specified by the equipment manufacturer(s) to ensure warranties are not voided and the equipment is kept in good working order. Operational time shall be logged by system instrumentation and reported to the Solicitor in quarterly RAPRs. The selected consultant is expected to maintain at least an 85% uptime on the system during each quarter. Failure to meet this minimum expectation over two consecutive quarters will constitute, at the Solicitor's sole discretion, a breach of contract and the Solicitor may choose to terminate the contract.
- *Compliance monitoring* shall include system and site sampling needed to demonstrate compliance with any operating permit for the SVE system and any other applicable regulatory requirements. Documentation of compliance shall be

[28] Each bidder will have the opportunity to inspect each of the vapor mitigation systems in operation (above-ground components only) during the pre-bid meeting.

provided to the Solicitor in quarterly RAPRs and to the permit authority, as necessary.

This milestone series also includes ensuring continued operation of the vapor mitigation systems installed in the basements of the two on-property buildings. The available historical documents contain very little about the two vapor mitigation systems. Each system is believed to consist of a single extraction point installed through the basement floor and connected to a blower. The depth of the extraction points or details about the blowers are currently not available. The current consultant indicates that each system is checked on a quarterly basis coincident with a scheduled quarterly groundwater monitoring event. On these occasions, PID readings for the influent vapor stream are collected and are reported in the RAPR for that quarterly gauging and sampling event. Each bid shall assume continuing with these same practices. The current consultant reports performing no operation or maintenance activities with respect to these vapor mitigation systems other than verifying (and reporting) whether each system was operational upon arriving at and then departing the Site. There is no monitoring of these systems in between each quarterly groundwater monitoring event. There is no record of any permits being associated with these systems nor any record that system components have been replaced previously. Bidders shall assume ongoing checks, operation, monitoring, and reporting concerning the vapor mitigation systems will continue for the duration of Milestone E, and for the duration of Optional Cost Adder Milestone I if executed.

As a precautionary measure, to be completed during a routine O&M event, soil vapor samples shall be collected from soil vapor sampling points SVP-2, SVP-3, SVP-4, and SVP-7 to ensure operation of the AS/SVE system does not cause substantively increased soil vapor concentrations that pose concerns for vapor intrusion into buildings. Soil vapor samples shall be collected in laboratory-certified 6-liter Summa canisters from these four points at one month, six months, and nine months after the remediation system begins operating. These soil vapor samples shall be analyzed via USEPA method TO-15, C5 – C10 constituents.

The quarterly groundwater monitoring and sampling events conducted during operation of the AS/SVE remediation system shall include the 26 existing on- and off-property monitoring wells (MW-1 through MW-22 and MW-24). During each event, the depth to groundwater and any potential SPH shall be gauged in all monitoring wells prior to purging any of the wells for sampling. Groundwater level measurements obtained from the monitoring wells shall be converted to groundwater elevations for assessing groundwater flow direction and hydraulic gradient. Low-flow purging and sampling methods shall be used. The conduct and results of each event shall be documented in quarterly RAPRs. Any well exhibiting more than a sheen of SPH shall not be purged and sampled.[29] The selected consultant shall manage purged groundwater and other

[29] While the presence of SPH is not anticipated, the discovery of SPH in a given monitoring well shall be subject to provision 11.a.i.1 of the Remediation Agreement, including demonstrating the need for and providing a proposal for the out-of-scope work.

derived IDW generated by the well purging and sampling activities in accordance with the PADEP-SCRO guidance requirements.

Groundwater samples shall be analyzed for the **post**-March 2008 PADEP short-list of unleaded gasoline parameters (BTEX, MTBE, naphthalene, cumene, 124-TMB and 135-TMB) by a PADEP-accredited laboratory using appropriate analytical methods and detection levels. Appropriate QA/QC samples shall also be collected during each event and analyzed for the same parameters.[30] In addition, each event shall include the collection of field measurements from all on- and off-property wells for these water quality parameters: pH, temperature, specific conductance, total dissolved solids, dissolved oxygen (measured *in-situ*), and oxidation / reduction potential.

The RAPRs describing the sampling methods and results shall be provided to the PADEP on a quarterly basis. At a minimum, each RAPR submitted during the period of remediation system operation shall contain the following:

- A summary of site operations and remedial progress made during the reporting period;
- Narrative description of the sampling procedures and results;
- Tabulated data collected from the monitored wells documenting the depth to groundwater and thickness of any SPH encountered;
- Groundwater elevation contour maps depicting groundwater flow direction;
- Tabulated historical quantitative groundwater analytical results, including results from the current quarter;
- Current quarter laboratory analytical report(s);
- One site-wide iso-concentration contour map for each compound detected in any one well above the SHS during the quarter;[31]
- For each well exceeding SHS, a graphical depiction of historical key contaminant concentrations and groundwater elevations to provide an assessment of correlations between fluctuating water levels / precipitation events and contaminant concentrations;
- For each well exceeding SHS, a graphical depiction of recent key contaminant concentration trends. Each quarter, contaminant concentration trend lines shall be

[30] Each bidder's approach to implementing Milestone E shall clearly identify the number of sampling events, number of wells / samples per event, well purging and sampling method(s), QA/QC measures, analytes, purge water management methods, and other key assumptions affecting the bid price.
[31] All figures included in each RAPR (e.g., site plan, groundwater elevation maps, dissolved plume maps, etc.) shall be available in electronic format to the Solicitor upon request.

calculated using at a minimum, the previous two-years of analytical data (or data collected after the active remediation has been initiated, if applicable) to be plotted on an x-y scatter plot with a logarithmic scale. The exponential trend lines shall be projected forward in time to assess the pace of or projected timeframe for remediation to achieve attainment of the selected remediation standard(s);

- As applicable, a discussion of the data to offer an updated qualitative assessment whether these data are consistent with a stable, shrinking, or expanding plume and, therefore, whether or not the plume appears to be responding to the remedial action in a manner suggestive of a timely and cost-effective Site closure;
- A hydrocarbon recovery and AS/SVE well performance data table including: (a) date the system was monitored; (b) runtime since the last monitoring event and cumulative runtime; (c) average sparge and vapor flow rates and adjustments since the last monitoring event; (d) influent vapor phase recovery (in ppmv) since the previous monitoring event; (e) total vapor phase hydrocarbon recovery since the last monitoring event (in lbs.) and cumulative and to date total vapor phase hydrocarbon recovery (in lbs.); and (f) a list of which AS wells and shallow/deep SVE were operational or deactivated and when those adjustments were made;
- Tabulated data presenting remedial system sampling results associated with GAC consumption. For vapor recovery, the sample date, PID readings for the influent, mid-fluent, and effluent and once per quarter sampling and analytical results for concentrations of BTEX, MTBE, naphthalene, and cumene shall be tabulated per sampling event;
- An evaluation and summary of overall remedial system performance and contaminant mass recovery optimization adjustments made over the reporting period. The report shall also include the rationale for and results of remedial system adjustments made, and future anticipated adjustments and/or corrective measures to optimize overall contaminant recovery;
- Documentation and analysis demonstrating that the 85% performance uptime requirement for the remediation system was achieved for the quarter. If the 85% performance uptime requirement was not met for the quarter, the RAPR shall identify the operational problems experienced and outline the changes and/or modifications taken to restore system performance and improve operational consistency.
- Treatment and disposal documentation for waste generated during the reporting period; and
- Demonstration of compliance with the required Federal, State, and local permits and approvals.

Each quarterly RAPR shall be signed and sealed by a Professional Geologist and / or Professional Engineer registered in the Commonwealth of Pennsylvania (bidders shall refer to state licensing laws to determine which seals are required based on the work performed for and documented in the RAPR).

PAUSTIF will only reimburse for the necessary quarterly O&M and groundwater sampling / reporting events actually completed under this milestone. If it proves necessary to extend the period of O&M beyond the RFB-specified eight quarters, each additional quarter will be addressed via Optional Cost Adder Milestone I. The selected consultant shall seek and obtain written approval from Solicitor and PAUSTIF to continue operation of the remedial system (Optional Cost Adder Milestone I).

Milestones F1 and F2: Performance/Engineering Evaluation – Under Milestones F1 and F2, after four quarters and then again after seven quarters of system O&M, the selected consultant shall complete a performance / engineering evaluation of the remediation system and discuss the results in the next quarterly RAPR specified in the Milestone E series.[32] The purpose of these evaluations is to assess how effective the system has been at recovering vapor-phase contaminant mass, and reducing contaminant concentrations in soil and groundwater to meet the SSS closure goal. Each evaluation shall consider all historical soil and groundwater analytical data and remediation system operational efficiency/monitoring results, including, but not limited to dissolved-phase constituent contaminant trends, vapor-phase concentrations in system influent, cumulative vapor-phase hydrocarbon mass removal, and system run-time.

A report documenting the findings and conclusions of each remedial system performance/engineering evaluation and providing specific recommendations to enhance the performance of the remedial system and/or accelerate contaminant recovery shall be prepared and issued as part of the subsequent quarterly RAPR submittal. Based on the system performance/engineering evaluation findings, the report shall also offer recommendations as to whether:

- The system should: (a) continue operating as originally designed and installed; (b) be modified to enhance performance; or (c) be idled to begin a period of rebound monitoring;
- An alternate remedy needs to be developed;
- One or more satellite remedial systems installed off the property may be necessary; and/or
- The selected Site closure goal should be reconsidered.

[32] Completion of the individual engineering evaluations will not be necessary if PADEP should consent to idling the remediation system before the first or the second performance/engineering evaluation is scheduled to occur. Should this occur, the selected consultant shall not submit a payment request for Milestone F1 and/or for Milestone F2.

Should the performance / engineering evaluations conclude and affirmatively demonstrate that more AS and/or shallow/deep SVE wells are needed to effect timely remediation, the report should provide details concerning the proposed system modifications.

Should the performance / engineering evaluations suggest that one or more remedial systems are needed to address groundwater impacts off the source property, the reports issued under these milestones shall provide the supporting rationale behind the recommendation that one or more off-property satellite remedial systems are needed at this Site. The RAP outlines these criteria as suggesting off-property satellite remedial systems may be necessary:

- Concentration trends are increasing at MW-16, MW-20, or MW-22 for any constituent of concern after the first two quarters of active remediation on the source property.
- Groundwater sample results for MW-16, MW-20, or MW-22 exhibit increasing trends for any constituent of concern over any period comprising four consecutive quarters.
- MW-16, MW-20, or MW-22 exhibit stable constituent concentrations that are not decreasing over any period comprising four consecutive quarters if the stable constituent concentrations continue to pose an unacceptable health risk.
- If MW-21 or MW-24, which currently lie outside the currently known downgradient extent of the impact to groundwater, should exhibit constituent concentrations above the SHS-MSCs for a used aquifer in a residential setting.[33]

Milestone G: Risk Assessment Recalculations. After seven quarters of remediation system O&M have been completed, bidders shall evaluate the exposure point concentrations (EPCs) used in the November 2014 HHRAR (see Attachment 3H) and determine whether more recent soil, soil gas, and/or groundwater data would significantly affect the EPC values. Such new data may be from recent quarterly groundwater sampling, from characterization activities that were completed subsequent to the data presented in the November 2014 HHRAR, or from other sources. A Risk Assessment Addendum shall be prepared providing an updated evaluation of risk pathways with emphasis on the risk to a construction worker in a trench (including the revised EPCs and revised calculated individual and cumulative risks for the identified pathways and receptors). Since this document will not be presented to PADEP, a full-blown report is not necessary; rather the purpose of this milestone is to help evaluate if it is necessary to continue operating the remediation system to reduce human health risks to acceptable levels.

[33] This criterion assumes MW-21 and MW-24 are not impacted at the time the on-property remediation system begins operating. If either of these two wells are impacted at the time the on-property remediation system begins operating, Mw-21 and/or MW-24 shall be added to the list of wells referenced in the other criteria.

The bidder must identify and explain in its bid any perceived deficiencies in or desired modifications to the November 2014 HHRAR that are to be addressed in the Risk Assessment Addendum. In that respect, bidders are directed to the correspondence exchanged between the current consultant and the PADEP discussing how the Department preferred to address its comments on the November 2014 HHRAR (see Attachment 3O). At a minimum, the bidder's response must at least follow through these previously identified modifications, but the bidder may specify additional modifications it may deem necessary. **Each bid must clearly and unambiguously provide a cross-referenced list of changes the bidder intends to address in its Risk Assessment Addendum along with its supporting rationale**. This statement should be made in the section within each bid entitled "Milestone G: Risk Assessment Recalculations".

After completing the draft Risk Assessment Addendum, the selected consultant will present the draft document to the Solicitor and PAUSTIF for review and comment as a separate deliverable. The project schedule should allow two (2) weeks for Solicitor and PAUSTIF to review the draft Risk Assessment Addendum before it is finalized.

Should idling the remediation system prove possible and acceptable to the PADEP ***before*** the seventh quarter of Milestone E activities, the selected consultant shall move up its completion of Milestone G accordingly.

Optional Cost Adder Milestone H – Additional Quarterly Groundwater Monitoring, Sampling, & Reporting. As noted above, the Milestone B series covers three (3) consecutive quarters of pre-remedial groundwater monitoring, sampling, and reporting. If pre-remedial groundwater monitoring, sampling, and reporting prove necessary beyond the three quarters specified for the Milestone B series, bidders shall provide a firm quarterly fixed-price quote for Optional Cost Adder Milestone H that is consistent with the work scope specified for Milestones B.

Optional Cost Adder Milestone H shall also cover quarterly groundwater monitoring, sampling, and reporting should it prove possible and acceptable to the PADEP to idle the remediation system (i.e., remediation system O&M ends) during the period of this Agreement. Although post-remedial activities to closure are ***not*** addressed by this RFB, there is usually an interim period during which quarterly groundwater monitoring, sampling, and reporting needs to continue while the parties sort out reasonable, necessary, and appropriate work scope for the post-remedial activities. Optional Cost Adder Milestone H will apply during this interim period, but will end once the new work scope addressing the post-remedial activities, including attainment sampling, has been agreed upon.

Optional Cost Adder Milestone I – Additional Remediation System and Vapor Mitigation System Operation/Monitoring and Quarterly Groundwater Monitoring, Sampling, and Reporting During Remediation. Under this optional cost adder milestone, bidders shall provide

a firm quarterly fixed-price unit cost to continue the routine O&M of the remedial system and vapor mitigation systems; quarterly groundwater monitoring and sampling of the on- and off-property monitoring wells; and reporting beyond the eight quarters specified in Milestone E. The SOW for this unit cost adder milestone shall follow all Milestone E series protocols and requirements. Optional Cost Adder Milestone I will apply during this interim period, but will end once a new work scope has been agreed upon for activities not covered by this Agreement.

Optional Cost Adder Milestone J – Vapor-Phase Granular Activated Carbon Change-Out. VGAC treatment of the extracted vapor stream will consist of a single pair of VGAC vessels each with 400 pounds of virgin carbon (800 pound total treatment) connected in series. Under this milestone, bidders shall provide a firm fixed-price unit cost for each VGAC change-out event of the "primary" VGAC vessel, placing the vessel with the fresh virgin GAC in the secondary position. Bidders shall detail the scope of work and provide the criteria or "trigger(s)" that would be used in determining when the VGAC needs to be replaced. The fixed-price cost shall be inclusive of all labor, subcontractor costs, VGAC replacement, and waste handling / disposal items.

Optional Cost Adder Milestone K – Additional Monthly Operation of CatOx Unit. Under this milestone, bidders shall provide a firm fixed-price unit cost for each additional month of CatOx unit O&M. The fixed-price cost shall be inclusive of all labor, subcontractor costs, any permitting fees, and waste handling / disposal items.

Optional Cost Adder Milestone L – Monitoring and Sampling on a Per Well Basis. Under this milestone, bidders shall provide a firm all-inclusive fixed-price unit cost per well for gauging, purging, sample collection, sample management and analysis. This milestone would apply to the gauging, purging, and sampling of any groundwater monitoring well that may be added to the existing network of 26 on- and off-property monitoring wells during the performance period of this Remediation Agreement. This unit cost per well shall also apply as a deduction to the payment requests submitted under the Milestones B and E series when it proves not possible to gauge and sample a given well because that well is inaccessible or is otherwise obstructed.

Additional Information

In order to facilitate PAUSTIF's review and reimbursement of invoices submitted under this claim, the Solicitor requires that project costs be invoiced by the milestones identified in the executed Remediation Agreement. Actual milestone payments will occur only after successful and documented completion of the work defined for each milestone. The selected consultant will perform only those tasks/milestones that are necessary to reach the objective(s) identified in this RFB. The selected consultant will not perform, invoice, or be reimbursed for any unnecessary work completed under a milestone.

Any "new conditions", as defined in Attachment 1, arising during the execution of the SOW for any of the milestones may result in termination of or amendments to the Remediation Agreement.

Modifications to the executed Remediation Agreement will require the written approval of the Solicitor and the PAUSTIF. PADEP approval may also be required.

List of Attachments

1. Remediation Agreement
2. Bid Cost Spreadsheet (has been formatted for an 11 x 17 sheet)
3. Site Information/Historic Documents
    a. Aerial and street-level photographs of the subject property and Site
    b. 1999 UST Closure Report
    c. April 2011 Supplemental Site Characterization Report
    d. June 3, 2002 Project Summary and 10/21/02 Quarterly Groundwater Sampling Report & Project Status Update
    e. March 21, 2005 Preliminary Site Characterization Report and Interim Remedial Action Plan and April 5, 2005 disapproval letter from the PADEP
    f. Second Quarter 2015 Remedial Action Progress Report
    g. November 2014 Site Characterization Report plus the logs for soil borings and monitoring wells completed after its submittal
    h. November 2014 Human Health Risk Assessment Report
    i. March 2015 Remedial Action Plan
    j. January 5, 2015 letter from the PADEP approving the November 2014 Site Characterization Report with modifications and April 16, 2015 letter from the PADEP approving the March 2015 Remedial Action Plan with modifications
    k. Latest maps depicting current consultant's interpretation of the extent of impacts to subsurface soil in excess of the PADEP Statewide Health Standards
    l. Results from the August 2015 water-level monitoring for possible influence on the dissolved-phase constituent plumes by the pumping of supply #6 operated by Stewartstown Borough
    m. Analytical results for water quality samples collected from Stewartstown Borough supply well #6
    n. Results from the late April-early May 2015 water-level monitoring for possible influence on the dissolved-phase constituent plumes by the pumping of supply #6 operated by Stewartstown Borough
    o. PADEP comments on the November 2014 Human Health Risk Assessment Report and follow-up correspondence between the current consultant and the PADEP case manager addressing comments on the report