

Request for Bid
Fixed-Price Defined Scope of Work
To Complete Site Characterization

Solicitor

Bruceton Farm Service, Inc.

BFS Carmichaels

Route 88

Carmichaels, PA 15320

PADEP Facility ID #: 30-23878 PAUSTIF Claim #: 2007-0134(F)

Date of Issuance

December 11, 2013

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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 has an open claim with the PAUSTIF and the corrective action work will be completed under this claim. Reimbursement of Solicitor-approved, reasonable and necessary costs up to claim limits for the corrective action work described in this RFB will be provided by PAUSTIF.

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 | January 7, 2014 by 5 p.m. |
| Mandatory Pre-Bid Site Visit | January 8, 2014 at 11 a.m. |
| Deadline to Submit Questions | January 24, 2014 by 5 p.m. |
| Bid Due Date and Time | January 31, 2014 by 3 p.m. |

Contact Information

| ICF International | Solicitor | Technical Contact |
|---|--|--|
| Ronald Moore ICF International 4000 Vine Street Middletown, PA 17057 | Howard Goodstein Bruceton Farm Service, Inc. 1768 Mileground Road Morgantown, WV 26505-3753 | Jim Ackerman, P.G. Excalibur Group, LLC 276 Park Entrance Drive Pittsburgh, PA 15228 (412)352-0791 (cell) jim8642@hotmail.com |

All questions regarding this Request for Bid (RFB) and the subject site conditions must be directed via e-mail 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 “**BFS Carmichaels PAUSTIF #2007-0134(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 answer questions and conduct a site tour for one participant per bidding company. 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 "BFS Carmichaels PAUSTIF #2007-0134(F) – SITE MEETING ATTENDANCE NOTIFICATION"**. The name and contact information of the company participant should be included in the body of the e-mail.

Submission of Bids

To be considered for selection, **one hard copy of the signed bid package and one electronic copy (one 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 # 2007-0134(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 site meeting of an extended due date.

The hour for submission of bids shall remain the same. Submitted bid responses are subject to 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 Request for Bid. 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 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 Scope of Work (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.

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. 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.

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 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 ten.
 - 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 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 of each of the tasks/milestones specified in the Scope of Work, and indicate the timing of all proposed key milestone activities.
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 existing 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.

Site Name / Address / Location: Bruceton Farm Service, Inc. (BFS) Carmichaels, 375 South S.R. 88, Carmichaels, Pennsylvania 15320; PADEP Facility ID #30-23878; USTIF Claim #2007-0134(F). The approximate latitude and longitude of the site are 39d 52m 42.53s / 79d 57m 56.90s. Refer to Figure 1 in Attachment 3a for a location map.

Site Use Description: Site current features include a former station building with two service bays. The dispensers, product lines and underground storage tanks (USTs) were removed in 2007. The facility no longer has fueling retail operations and the building / land is not in use at this time. The property is entirely covered with grass, weathered asphalt and gravel. Below-grade utilities at and near the Site include public water, sewer and natural gas.

Current Petroleum Storage on Site: According to historical tank removal activities and site characterization completed to date, there are no known underground storage tanks within the property boundaries.

Nature of Confirmed Release and Subsequent Activities: The following information is based on the documents provided in Attachment 3. This information has not been independently verified by PAUSTIF or the Technical Contact.

UST System Removal Activities

In July 2007, BFS contracted Precise Tank Modifications, Inc. of Madison, PA (Cert # 1163) to remove six (6) active underground storage tanks (USTs). These included:

- 001 – 4,000-gallon diesel
- 002 – 8,000-gallon gasoline
- 003 – 8,000-gallon gasoline
- 004 – 2,000-gallon gasoline
- 005 – 2,000-gallon gasoline
- 006 – 2,000-gallon kerosene

During the tank removal activities, three (3) abandoned USTs were discovered and removed. These included:

- 007 – 500-gallon waste oil

- 008 – 3,000-gallon gasoline
- 009 – 1,000-gallon former contents unknown

During the removal of the USTs, fuel island and fuel lines, indications of contamination (gasoline odors) were observed beneath the dispensers and near the tank field where there were joints in the pipes. Additional gasoline odors were noticeable during the removal of the two 2,000-gallon registered gasoline USTs and the two 8,000-gallon registered gasoline USTs. Refer to Figure 2 in Attachment 3a for an illustration of the former UST locations.

The soil surrounding the USTs was clay and groundwater was reportedly not encountered during the removal activities. The clay soil was consistently found throughout the excavated area including in a 3-foot deep pit dug through the bottom of the excavation for the two 8,000-gallon USTs. Groundwater reportedly did not enter the 3-foot deep pit.

After conferring with the property owner and the PADEP, over-excavation of the registered USTs tank pit and the dispenser island was performed during August 2007. The over-excavation reportedly continued until field screening results indicated no observable contamination (<100 ppm PID readings), or the limits imposed by the property boundary and the onsite building location were encountered. A total of 959.5 tons of contaminated soil was removed from the site and disposed. Following completion of the UST removals and over-excavation, oxygen releasing compounds (ORC®) were sprinkled into the excavation prior to placement of gravel backfill. Site Investigation results are detailed in the April 2009 Site Characterization Report/Remedial Action Plan provided in Attachment 3 of this RFB.

General Site Geology and Hydrogeology

Data from the monitoring well borings indicate subsurface materials beneath the surface cover consist of brown silty clay to an average depth of approximately 12.5 feet below ground surface (bgs) and weathered shale at depths ranging from approximately 10 to 15 feet. Beneath the weathered shale, bedrock is variously described as sandstone, shale, and claystone to depths of around 63 feet where a 7-foot-thick coal seam was encountered.¹ Siltstone was found beneath the coal seam.

Historical groundwater gauging indicates depth to groundwater ranging from 6 to 24 feet bgs, with average depths in individual wells ranging from approximately 11 to 17 feet bgs. The gauging data also indicate that natural groundwater gradient is toward the northeast under SR-88 (toward MW-6). Values for hydraulic gradient have not been reported in the Site Characterization Report or the quarterly Remedial Action Progress Reports (RAPRs).²

¹ Although not indicated in the claim files, this coal seam appears to be the Waynesburg Coal based on *Geology and Mineral Resources of Green County PA, Pennsylvania Topographic and Geologic Survey, 1932*. This document also indicates the base of the Pittsburgh Coal lies at about 470 feet below the ground surface.

² Due to the long and submerged well screens on many wells, the depth to the water table and the groundwater gradient at the level of the water table are not well understood. This is discussed further in the sections below.

Soil Investigations

Thirty-seven post-excavation soil samples were collected during UST closure.³ A total of 25 borings were subsequently advanced and sampled; including MW-1 through MW-10, RW-1 through RW-6, SV-3, iSOC-1, iSOC-2, and SP-1 through SP-6. Analytical results at the time of sampling indicated benzene (up to 17.4 mg/kg), toluene (up to 292 mg/kg), ethylbenzene (up to 75.9 mg/kg), naphthalene (up to 30 mg/kg), and MTBE (up to 22.2 mg/kg) all exceeded SHS-MSCs. The soil sampling locations exceeding Statewide Health Standard Medium-Specific Concentrations for used aquifers in a residential setting (SHS-MSCs) are depicted in Figure 3 and the results indicate impacts in and around the UST excavation area at depths ranging from 3 to 14 feet bgs.⁴

Groundwater Investigations

Shallow groundwater was first monitored and sampled at the Site in November 2007 when wells MW-1 through MW-5 were installed as part of the Phase I ESA (see Figure 4 for the locations of existing monitoring wells). On- and off-site wells MW-6 through MW-9 were first sampled in September 2008 to further delineate the dissolved phase hydrocarbon plume. On-site monitoring well MW-10 was first sampled in March 2009. Wells MW-1 through MW-10 range in depth from approximately 31 to 35 feet bgs (MW-1, MW-2, MW-7), 40.5 to 45.5 feet bgs (MW-3, MW8, MW-9), and 65 to 75 feet bgs (MW-4, MW-5, MW-6 and MW-10). Each of these wells has been monitored and sampled mostly on a quarterly basis through the First Quarter 2013 (most recent quarterly monitoring information available) resulting in a significant groundwater database (see Attachment 3r).

Unfortunately, the submerged wells screens and varying depths of construction of the monitoring wells complicates understanding and drawing reliable conclusions on the past and current condition of site groundwater contamination (Table 1). Most of the wells have excessively long well screen intervals and most have well screens that are submerged below the water table. Because of the well network construction, it is uncertain what the analytical results of groundwater samples from these wells represent. Presently, it is not known with any reasonable certainty whether groundwater exists in the overburden. Submerged screens preclude detection of SPL and produce biased samples not focused on the smear zone where highest dissolved contaminant levels can be expected. MW-4, MW-5 and MW-10 could normally be considered points of compliance (POC). MW-6 is an off-site well and, therefore, would also be considered a de facto POC. Based on well construction information, MW-4, MW-5, MW-6 and MW-10 are monitoring a deeper zone or a mix of shallow and deep due to long

³ See UST Closure Report dated 11/4/2007 and SCR/RAP dated April 2009 in Attachment 3.

⁴ It appears that soil in the southern tank cavity in the area around the two former 8,000 gallon gasoline tanks was further excavated subsequent to confirmatory soil sample collection. As a result, three samples that had exceeded SHS-MSCs in this area based on confirmation sampling (Samples D4K Mid 11', D4K End 11", and D8K Fill 11") do not appear to be representative of soils left in place.

screens. Therefore, there are no nearby shallow groundwater POC monitoring wells to assess the shallow groundwater condition.

Table 1 – Site Monitoring Well and Groundwater Depth Summary

| Well | Well Depth (feet) | Top of Screen Depth (feet) | DTW, min-max (feet) | Screen Length (feet) | Submerged Screen |
|-------|-------------------|----------------------------|---------------------|----------------------|------------------|
| MW-1 | 31.5 | 21.5 | 9 – 22 | 10 | Yes (mostly) |
| MW-2 | 35.5 | 15.5 | 10 - 19 | 20 | Often |
| MW-3 | 40.5 | 20.5 | 8 - 18 | 20 | Yes |
| MW-4 | 75 | 25 | 5 - 25 | 50 | Yes |
| MW-5 | 71 | 46 | 12- 24 | 25 | Yes |
| MW-6 | 75 | 40 | 9 - 24 | 35 | Yes |
| MW-7 | 30 | 15 | 10 -24 | 15 | Periodically |
| MW-8 | 42 | 15 | 8 - 17 | 27 | Yes (mostly) |
| MW-9 | 45.5 | 15 | 7 - 16 | 30 | Yes (mostly) |
| MW-10 | 65.5 | 40 | 9 - 22 | 25 | Yes |
| RW-1 | 78 | 58 | unknown | 20 | Yes |
| RW-2 | 79 | 59 | unknown | 20 | Yes |
| RW-3 | 38 | 23 | unknown | 15 | Yes |
| RW-4 | 73 | 53 | unknown | 20 | Yes |
| RW-5 | 33 | 13 | unknown | 20 | No |
| RW-6 | 73 | 53 | unknown | 20 | Yes |

Notwithstanding the above, since the initial assessment in 2007, apparent groundwater quality generally seems to have gradually improved overall. These improvements in groundwater quality largely occurred before the remediation system began operating in June 2011 (see section below for discussion on the existing remediation system). Based on a review of the

analytical data, there has been no obvious acceleration of the groundwater cleanup since the June 2011 remediation system start up; however, the gradual decrease in dissolved contaminant levels appears to be continuing. Natural attenuation / degradation of petroleum compounds appears to have been the biggest factor in improved groundwater quality over the past five years.

Separate Phase Liquid (SPL)

SPL was reportedly found in remediation wells RW-4 and RW-5 in December 2009. It is worth noting that RW-4 is screened tens of feet below the water table so the reported appearance of product in this well is odd but was not explained in historical documentation. Two 24-hour vacuum truck extraction events (bioslurping) were conducted at RW-4 and RW-5 between December 2009 and May 2010. Reportedly, SPL has not been observed in these two wells since bioslurping was performed. However, it should be noted that groundwater elevation in the areas surrounding RW-4 and RW-5 are at or above the top of screen in these wells, and it is possible that SPL could still be present in the area surrounding these wells, but has not reappeared because the SPL is at an elevation above the well screens.

Overview of Remedial System Components / Configuration

Remediation wells RW-1 through RW-6, ozone sparge points SP-1 through SP-6, and iSOC wells #1 and #2 were all installed in October 2009. The remediation system equipment was installed December 2010, but due to delays in getting discharge permit approval, the system was not started until June 2011. Figure 5 illustrates the approximate piping layout and remediation well locations.

The remediation system has been out of operation since at least February 2013. The system generally consists of one Tuthill PD 3210 rotary lobe blower equipped with an EG&G moisture knockout unit (35 gallon). Extracted vapor is treated through two 180-pound vapor-phase active carbon units. Differential pressure gauges are installed on the trailer wall, presumably for vapor flow rate readings via a pitot tube, annubar, or orifice plate. There are reportedly six Grundfos Redi-Flo 3 electric pumps assumed to be installed in RW-1 through RW-6. Water pumped from the recovery wells is designed to be treated through a series of bag filters prior to entering a Carbon Air Stat 15 air stripper. The stripper blower is designed to supply 80 cubic feet of air per minute. Water is pumped from the 16 gallon air stripper sump through two additional bag filters and then through two 200-pound fiberglass, high-pressure, liquid phase carbon units. Water discharged to the sanitary sewer system is quantified through a totalizing flow meter.

According to the file, the remediation system was installed with the intent of: extracting both groundwater and soil vapor from RW-1 through RW-6; periodic sparging with ozone in SP-1 through SP-6; and passive oxygen delivery in the two up-gradient iSOC wells. To date: (a) ozone sparging has not been performed; and (b) the iSOC units have not been installed up-gradient. Additionally, based on recorded groundwater levels in the monitoring wells, it is unlikely that soil vapor has been extracted from any of the RWs (with the possible exception of

RW-5) because the deeply submerged recovery well screens (see Table 2 below) would likely not allow soil vapor to be drawn into them. It appears there is a potential for vapor extraction to have been periodically achieved only at RW-5, which seasonally may have approximately 3 feet of exposed well screen in the vadose zone and potentially more if the water table depression pump was working. Refer to Attachment 3 for available Progress and Corrective Action Reports for the period between 2009 and 2013.

Table 2 – Remediation Well Information

| Remediation Well ID | Total Depth (feet) | Screen Interval (feet) | Average Depth to Water in Proximal MWs (feet) |
|---------------------|--------------------|------------------------|---|
| RW-1 (4-inch dia.) | 78 | 58' – 78' | 16.0 |
| RW-2 (4-inch dia.) | 79 | 59' – 79' | 16.9 |
| RW-3 (4-inch dia.) | 38 | 23' – 38' | 17.0 |
| RW-4 (4-inch dia.) | 73 | 53' – 73' | 16.0 |
| RW-5 (4-inch dia.) | 33 | 13' – 33' | 16.0 |
| RW-6 (4-inch dia.) | 73 | 53' – 73' | 16.3 |

Soil Vapor

Although soil vapor sampling points have reportedly been installed (SV-1, SV-2, and SV-3, see Figure 4 for location) soil vapor or indoor air sampling / analyses have not been conducted at this site or at the neighboring properties.

Current Issues: Past investigations had identified a considerable amount of petroleum compounds in soil not fully remediated by the over-excavation, and groundwater exceeding SHS-MSCs were found both onsite and offsite across SR 88 to the northeast. Current groundwater impacts are primarily in the areas of MW-1, MW-5, and MW-10 located at the downgradient side of the former UST systems, and off-site across the road at MW-6 with concentrations having declined somewhat over time. A key issue currently is the construction of existing monitoring and remediation wells which is confounding proper representation of shallow versus deeper groundwater impacts and how to most cost effectively close the site in accordance with Solicitor’s goals.

Cleanup Goals: Project documentation indicates Solicitor’s past remedial goal has been attainment of SHS. Based on the site characterization and remediation issues that have arisen

at this site, Solicitor is reconsidering the cleanup goals to possibly include partially or fully site-specific cleanup standards. Solicitor intends to render a final decision on the cleanup standards to be pursued once the site characterization including risk assessment and remedial alternatives evaluation is completed under this RFB.

Scope of Work (SOW)

This RFB seeks competitive bids from qualified contractors to perform the activities in the Scope of Work (SOW) specified herein. PADEP has reviewed and approved the SOW

Objective

The objective of the work will be to correct data gaps in site characterization in order to properly understand groundwater contaminant distribution and plan corrective action work going forward. More specifically, the work will include modification of the groundwater monitoring system to properly measure and monitor shallow versus deep groundwater impacts and measure separate phase liquid; determination of current residual impacts to soil following operation of the existing remediation system and application of ORC; and completion of a vapor intrusion evaluation. This is a Defined Scope of Work RFB. Currently the remedial goal is to achieve closure of this site by demonstrating attainment of the PADEP Act 2 used aquifer Statewide Health Standard Medium-Specific Concentrations (SHS-MSCs) for soil and groundwater in a residential setting.

Constituents of Concern (COCs)

The constituents of concern (COCs) at this site are the substances on the current PADEP short list for unleaded gasoline (benzene, cumene, ethylbenzene, MTBE, naphthalene, toluene, total xylenes, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene).

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:⁵

- 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. 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. As appropriate, project management costs shall be included in each bidder's pricing to complete the milestones specified below.
- 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 of 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 of per PADEP's Southwest Regional Office guidance.** Investigation derived wastes include personal protective equipment, disposable equipment, soil and drill cuttings and groundwater obtained through monitoring well development and

⁵ As such, all bids shall include the costs of these activities and associated functions within the quote for applicable tasks/milestones.

purging, as well as equipment decontamination fluids. Investigation derived wastes must be containerized in DOT-approved drums and staged on-site in a pre-determined location, pending results of laboratory analyses and selection of final disposal method(s). Each container must be labeled to indicate contents, site location and date of generation. It is the selected consultant's responsibility to conform with current PADEP Southwest Regional Office guidance requirements.

- 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.

Site-Specific Milestones

Milestone A – Soil Characterization / Delineation. The objective of this milestone will be to identify and delineate the remaining contaminant source area(s) associated with the former UST systems that exceed SHS-MSCs. Under this task, bidders shall provide a fixed-price cost for advancing sixteen (16) soil borings within the general area indicated on Figure 6. (In addition, one background soil boring shall be collected - see paragraph below for requirements regarding the background boring.) Bidders should propose some portion of the 16 borings to verify current soil concentrations in areas of previously known impact based on post-excavation and site investigation soil sampling results. (See Figure 6 for the locations of post-excavation / investigation soil samples that exceeded SHS-MSCs.) Available data suggests contaminated soils may have been left in place following UST closure in the area of the former dispensers, along the lines leading from the dispensers to the 2,000 gallon premium gasoline tanks, and in the area surrounding these tanks. Investigation soil borings indicated soil impacts to the northeast of the UST system, but the total extent of impact is unclear and the subsequent effects of ORC application and remediation system operation on previously contaminated soils is unknown. Bidders should be mindful that the risk assessment (Milestone H) for the utility and construction workers in the road right-of-way will require an estimate of soil contaminant levels along the road.

Bids must indicate the proposed soil boring locations on a site drawing along with rationale for the locations. Bids shall describe the methods to be used to investigate and locate below-grade utilities so that this work can be accomplished safely and without risking damage to any below-grade utilities and remediation system infrastructure.

In addition to contacting PA One Call and using other services and methods to locate all on-site below grade utilities, bidders shall assume clearing the initial five (5) feet of each boring location using a hand auger.

Each soil boring shall achieve a depth that ensures vertical delineation of unsaturated and periodically saturated soils. For costing purposes, bidders shall assume that each boring will be advanced using direct push sampling methods and completed to an average depth of 15 feet below grade (depth to bedrock). Continuous soil samples shall be collected beginning immediately beneath the asphalt surface cover (if present) for description of lithologic characteristics, groundwater occurrence, and staining/odor indicative of petroleum impacts. The soil samples shall be screened in the field using an appropriately calibrated photoionization detector (PID) and standard headspace methods. Two soil samples shall be collected from each boring, including one sample from the shallow 0-2 feet below grade interval, and one sample from the deeper 2 to 15 feet below grade interval. Soil samples shall be collected within each interval at the depth that produces the greatest PID response, or, in the absence of a PID response, at the 1-foot depth for the surface soil interval and at the bedrock interface for the deeper zone.

Soil samples shall be analyzed for the current PADEP short list of unleaded gasoline parameters to be tested in soil, i.e., benzene, toluene, ethylbenzene, xylenes (total), cumene (isopropylbenzene), MTBE, naphthalene, 1,2,4-trimethylbenzene (1,2,4-TMB), and 1,3,5-trimethylbenzene (1,3,5-TMB). Appropriate quality assurance/quality control (QA/QC) samples shall also be obtained for laboratory analysis.⁶ Based on the analytical results, the approximate dimensions and volume of remaining source material exceeding the SHS-MSCs for soil shall be estimated.

In addition to the 16 soil borings described above, one additional boring shall be completed at a background location. One saturated or intermittently saturated soil sample shall be collected from this boring for fraction organic carbon (FOC) analysis to assist with the fate-and-transport modeling effort (Milestone I). A sample shall also be analyzed for the current PADEP short list of unleaded gasoline parameters to verify background conditions. In addition, one Shelby tube sample shall be obtained from this boring to be analyzed by an accredited geotechnical laboratory for porosity and soil bulk density.

Optional Cost Adders under Milestone A:

To accommodate the possible need to advance the planned 16 soil borings deeper than 15 feet (on average) resulting in total drilling of more than 240 feet combined (16 borings x 15 feet assumed per boring), and in the event that additional soil samples are necessary and appropriate based on field observations and in order to delineate the vertical extent of soil

⁶ Each bidder's approach to implementing this milestone shall clearly identify the number of samples, QA/QC measures, analytes, and other key assumptions affecting the bid price.

contamination, bidders shall provide the following unit costs on the Bid Cost Spreadsheet (Attachment 2).

- Optional Cost Adder Milestone A1: Price per each additional foot of soil boring beyond the assumed cumulative 240 feet for all soil borings added together (\$/foot, inclusive of boring advancement, logging, screening, & abandonment).
- Optional Cost Adder Milestone A2: Price per each additional soil sample collection & laboratory analysis for PADEP short list parameters beyond the 32 (16 borings x 2 samples per boring) assumed (\$/sample).
- Optional Cost Adder Milestone A3: If during implementation of Milestone A, gross soil impacts are evident based on field screening data and observations and one or more additional soil borings (beyond 16) are found to be necessary for characterizing and delineating soil impacts, reimbursement for these additional borings will be handled under Optional Cost Adder Milestone A3. Bidder shall quote a firm, all-inclusive fixed price for advancing one (1) additional soil boring during the mobilization for Milestone A, including sampling and analysis of two (2) soil samples and laboratory analysis for PADEP short list parameters. (\$ / boring).

Written emailed approval from Solicitor and PAUSTIF will be required before beginning any optional milestone work and the requisite milestone-specific supporting documentation identified in the executed contract will be required for reimbursement.

Each bidders fixed-price cost for this milestone shall also account for: (i) identifying subsurface utilities and other buried features of concern including, but not necessarily limited to contacting the PA One Call System, Inc.; (ii) clearing each soil boring location using a hand auger; (iii) sealing each boring with bentonite and an asphalt or concrete surface patch after completion; (iv) professional surveying of the soil boring locations and elevations for inclusion on the site plan and geologic cross sections; and (iv) management of investigation derived waste (IDW) in accordance with PADEP-Southwest Regional Office (SWRO) requirements. Methods and results shall be detailed in the Site Characterization Report Addendum (SCRA) (Milestone I).

Milestone B - Monitoring Well Installation. The objective of this task is to define the lateral and vertical extent of groundwater impacts and develop an understanding of overburden and bedrock groundwater flow. To accomplish this, the existing groundwater monitoring system will be modified so that overburden, shallow bedrock and deeper bedrock groundwater zones (also referred to as “aquifers” for the purposes of this RFB) can be distinguished and provide appropriate monitoring points for measuring SPL (if present). A total of eight (8) wells shall be abandoned and twenty-one (21) new monitoring wells shall be installed under the following

three sub-milestones, which divide the work between the facility property and the two off-site properties.⁷

Milestone B1 - Monitoring Well Replacement Onsite. Under this task, bidders shall provide a firm fixed-price cost quote for abandoning six (6) existing wells and installing sixteen (16) new wells, as follows. (See Figure 4 for the current monitoring well locations referred to below.)

- Properly abandon existing wells MW-5 and MW-10 and replace each of these wells with a set of shallow overburden (0-15 feet), shallow bedrock (15 to 25 feet) and deeper bedrock (58 to 62 feet) wells in separate boreholes. The overburden wells shall be installed to total depths of 15 feet below grade, and shall be screened over the lower 10 feet. The shallow bedrock wells shall be installed by first sealing / grouting surface casing in place to 15 feet below grade, then installing the well casings through the surface casing to a total depth of 25 feet with 10 feet of screen. The deeper bedrock wells shall be installed by first sealing/grouting surface casing in place to depths of 40 feet bgs, then installing the well casings through the surface casing to total depths of 62 feet, with 5 feet of well screen. The replacement wells shall be designated MW-5RO, MW-5RS, MW-5RD, MW-10RO, MW-10RS, and MW-5RD. (See below for additional well installation requirements).
- Properly abandon existing wells MW-1, MW-2, MW-3, and MW-4 and replace them with overburden and shallow bedrock well pairs. The replacement overburden wells shall be installed to total depths of 15 feet below grade and shall be screened over the lower 10 feet. The replacement shallow bedrock wells shall be installed by first sealing / grouting surface casing in place to 15 feet below grade, then installing the well casings through the surface casing to a total depth of 25 feet with 10 feet of screen. The replacement wells shall be designated MW-1RO, MW-1RS, MW-2RO, MW-2RS, MW-3RO, MW-3RS, MW-4RO, and MW-4RS. (See below for additional well installation requirements.)
- Install one new overburden and shallow bedrock well pair (MW-11O and MW-11S) within the former UST cavity near the south end of dispensers to monitor overburden mounding and contaminant levels in shallow bedrock. The overburden well shall be installed to a total depth of 15 feet below grade and shall be screened over the lower 10 feet. The shallow bedrock well shall be installed by first sealing / grouting surface casing in place to 15 feet below grade, then installing the well casing through the surface casing to a total depth of 25 feet with 10 feet of screen.

Bids must identify the proposed well locations on a site drawing. Bidders shall anticipate that the final well locations may need to be adjusted by the selected consultant to avoid subsurface

⁷ Note that observation wells for aquifer testing and soil vapor extraction testing will also need to be installed. See Milestones E2 and F.

obstacles based on information gained from the utility location work and other existing information. Bidders shall assume advancing all monitoring well borings using standard hollow-stem auger and continuous split-spoon sampling drilling methods through the soil zone, and air-rotary / hammer-rotary drilling methods through rock, as needed.

Overburden wells shall be constructed of 2-inch diameter Schedule 40 PVC casing and 10 feet of well screen. A silica sand filter-pack of appropriate grain size for the formation screened and screen slot size used shall extend to a height of approximately two (2) feet above the top of the screen section, followed by a minimum two (2) to three (3) feet of hydrated bentonite pellets as a well seal. The remaining annulus shall be filled with an appropriate cement/bentonite grout mixture to within approximately one (1) foot below grade. Bidders shall assume surface finishing consisting of an expandable locking cap fitted to the top of the PVC riser and a flush-mounted traffic-rated manhole with a bolt-on lid set into a concrete pad.

Shallow bedrock wells shall be double-cased with a permanent outer surface casing installed to a depth of 15 feet and grouted in place to seal-off impacted groundwater before the boring is advanced to its total target depth through the surface casing. The surface casing grout must be allowed to cure for at least 24 hours before the borehole is completed to the target depth. The monitoring well shall be installed through the surface casing using 2-inch diameter Schedule 40 PVC casing and 10 feet of well screen. Other well construction details shall be as described above for the overburden wells.

Deeper bedrock wells shall be double-cased with a permanent outer surface casing installed to a depth of 40 feet and grouted in place to seal-off impacted groundwater before the boring is advanced to its total target depth through the surface casing. The surface casing grout must be allowed to cure for at least 24 hours before the borehole is completed to the target depth. The monitoring well shall be installed through the surface casing using 2-inch diameter Schedule 40 PVC casing and 5 feet of well screen. Other well construction details shall be as described above for the overburden wells.

Drilling and construction of the groundwater monitoring wells shall be in accordance with the PADEP Groundwater Monitoring Guidance Manual. During advancement of the well borings, continuous split-spoon soil samples shall be examined in the field for the purpose of lithologic description, noting groundwater occurrence, and potential staining/odor indicative of hydrocarbon contamination. Additionally, the split-spoon soil samples shall be screened in the field with a PID. Bidders shall assume collecting one soil sample from each overburden well boring (total of 10 samples from well borings) for laboratory analysis using the methods previously discussed under Milestone A.

Abandonment of monitoring wells shall be consistent with PADEP's 2001 Groundwater Monitoring Guidance Manual. This milestone shall include photo-documentation of the well abandonment work and completion of well abandonment forms to be submitted to the

appropriate state agency. Copies of the photographs and forms shall also be provided for the Solicitor's and PAUSTIF's files.

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

Milestone B2 - Monitoring Well Replacement at Offsite MW-6. Bidders shall quote a firm fixed price to properly abandon well MW-6 and replace it with one overburden well, one shallow bedrock well, and one deeper bedrock well, in separate boreholes. (Note: Bidders shall assume that the well replacement work will be performed either on the same property where MW-6 is currently located, or on the public space right-of-way for SR-88 as close to MW-6 as possible. Due to the offsite location, reasonable and necessary charges for work required to negotiate and gain property access for well abandonment and replacement of MW-6 will be reimbursed a under time and materials arrangement.) The replacement overburden well shall be installed to a total depth of 15 feet below grade and shall be screened over the lower 10 feet. The shallow bedrock well shall be installed by first sealing / grouting surface casing in place to 15 feet below grade, then installing the well casings through the surface casing to a total depth of 25 feet with 10 feet of screen. The deeper bedrock well shall be installed by first sealing/grouting surface casing in place to a depth of 40 feet bgs, then installing the well casing through the surface casing to a total depth of 62 feet, with 5 feet of well screen. The replacement wells shall be designated MW-6RO, MW-6RS, and MW-6RD. See Milestone B1 for general well installation requirements.

Milestone B3 - Monitoring Well Replacement at Offsite MW-7. Bidders shall quote a firm fixed price to properly abandon well MW-7 and replace it with one overburden well and one shallow bedrock well. (Note: Due to the offsite location of this work, reasonable and necessary charges for work required to negotiate and gain property access for well abandonment and replacement of MW-7 will be reimbursed a under time and materials arrangement.) The replacement overburden well shall be installed to a total depth of 15 feet below grade and shall be screened over the lower 10 feet. The replacement shallow bedrock well shall be installed by first sealing / grouting surface casing in place to 15 feet below grade, then installing the well casings through the surface casing to a total depth of 25 feet with 10 feet of screen. The replacement wells shall be designated MW-7RO, MW-7RS. See Milestone B1 for general well installation requirements.

Milestone C – Professional Site Survey. Under this milestone, bidders shall provide a firm, fixed-price quote to update the survey of the subject property and appropriate surrounding

features by a professional surveyor licensed in the Commonwealth of Pennsylvania. This task shall include preparation of a scaled base map of the site, including, at a minimum, property boundaries, buildings, existing UST locations, dispenser islands, canopies, utility manholes, sanitary sewer lines, septic systems, storm sewer catch basins, storm water lines, water supply lines, natural gas lines, electric utility poles, and overhead electric/telephone/cable lines. Work under this milestone shall also include:

- Obtaining tax maps of the subject property and surrounding adjoining & adjacent properties;
- Surveying in locations and ground surface elevations for the soil borings completed under Milestone A; and
- Surveying in the ground surface (top of surface cover) and the top-of-casing (PVC riser pipe) elevations and locations for groundwater monitoring wells completed under Milestone B.

Monitoring well and soil boring locations should include northing and easting coordinates. All elevations should be relative to the North American Vertical Datum of 1988 (NAVD 88) and measured to the nearest 0.01 foot. Results of the professional survey should be displayed on an appropriately scaled site plan (including an accurate bar scale) to be included in the combined SCR.

Milestone D – Groundwater Monitoring. Under this task, bidders shall provide a firm fixed-price to complete two (2) rounds of groundwater monitoring and sampling (**Milestones D1 and D2**). The wells to be monitored shall include the twenty-one (21) new wells installed under Milestone B, and the two (2) remaining existing wells MW-8 and MW-9 (23 wells in total). During each monitoring event, water levels shall be measured in existing SV-1, 2, and 3 if these can be accessed.

In the event that one or more wells cannot be sampled during Milestones D1 and D2 due to well access issues or lack of adequate water in a well, see Optional Milestone D4 below for a unit cost per well adjustment (downward) to the fixed price per sampling round.

The initial monitoring event shall be performed within two (2) weeks of installing and developing the new wells, but no sooner than one (1) week after the wells have been developed. The subsequent confirmation event shall be conducted no less than four and no more than six weeks after the initial event. The remediation system shall be deactivated at least 24 hours prior to each groundwater monitoring event. During each monitoring event, the depth to groundwater and any potential SPL shall be gauged in each of the monitoring wells before purging and sampling activities are initiated. Groundwater level measurements obtained from the monitoring wells during each sampling event shall be converted to groundwater elevations for assessing groundwater flow direction and hydraulic gradient.

Each well shall be purged and sampled utilizing standard low-flow techniques and in accordance with the PADEP Groundwater Monitoring Guidance Manual and standard industry practices. Any well exhibiting more than a sheen of SPL shall not be purged and sampled.⁸ Bidders shall manage IDW, including equipment decontamination fluids and groundwater generated by the well purging and sampling activities, in accordance with PADEP SWRO requirements.

Groundwater samples collected during these sampling events shall be analyzed for the current PADEP short list of unleaded gasoline parameters to be tested in groundwater, i.e., benzene, toluene, ethylbenzene, xylenes (total), cumene (isopropylbenzene), MTBE, naphthalene, 1,2,4-TMB, and 1,3,5-TMB by an 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.⁹ In addition, field measurements and laboratory analyses for natural attenuation parameters shall be performed during the initial and confirmation events. Field parameters to be measured for each of the new wells shall consist of pH, temperature, specific conductance, dissolved oxygen (measured in-situ), and oxidation/reduction potential (measured in-situ). Laboratory analysis of the following natural attenuation parameters shall be conducted on three wells: manganese (total and dissolved), ferrous iron, nitrate nitrogen, total phosphorus, sulfate, total organic carbon, alkalinity, and microbial plate counts (heterotrophic and gasoline degraders). The natural attenuation parameter analyses shall be performed on samples collected from one well located upgradient of the contaminant plume, one well located within the core of the plume, and one well located downgradient of the plume.

The conduct and results of these sampling events shall be documented in the SCRA and shall at least include a description of the following: narrative description of the sampling procedures and results; tabulated data collected from the monitored wells documenting the depth to groundwater and thickness of any free product encountered; groundwater elevation contour maps depicting groundwater flow direction; tabulated quantitative groundwater analytical results; laboratory analytical report(s); one site-wide iso-concentration contour map for each compound detected in any one well above the SHS-MSCs during the sampling events (if needed); and treatment and disposal documentation for waste generated.

Optional Cost Adders under Milestone D.

Provide the following unit costs to complete additional groundwater monitoring, or adjust the lump sum quotes under Milestones D1 and D2, if required. The scope of work for this groundwater sampling should follow Milestone D.

⁸ If measurable SPL is discovered, any work to address this SPL would be considered a new condition under the Fixed-Price Agreement, and will require Solicitor and PAUSTIF approval of a work plan and cost estimate before beginning any work.

⁹ Each bidder's approach to implementing this Milestone shall clearly identify the number of sampling events, number of wells / samples per event, well purging and sampling method(s), purge water disposal methods, QA/QC measures, analytes, and other key assumptions affecting the bid price.

- Milestone D3: Unit cost for completing one (1) groundwater monitoring and sampling event at all monitoring wells specified under Milestone D.
- Milestone D4: In the event one or more wells cannot be sampled due to access issues or lack of adequate water in a well, provide a cost per monitoring well (not sampled) to be deducted from the fixed-price costs quoted under Milestones D1 and D2. This unit cost shall be inclusive of all labor, equipment, laboratory analysis, waste handling/disposal, etc.

Written emailed approval from Solicitor and PAUSTIF will be required before beginning any optional milestone work and the requisite milestone-specific supporting documentation identified in the executed contract will be required for reimbursement.

Milestone E – Aquifer Testing.

Milestone E1 – Slug Testing. Bidders shall provide a firm fixed-price cost to conduct single-well slug tests on six (6) newly installed overburden and shallow aquifer monitoring wells. The results shall be used to establish hydraulic parameters in support contaminant fate and transport modeling and to assist with developing a conceptual site model. Rising head slug tests shall be performed on three (3) of the newly installed overburden wells, and three (3) of the newly installed shallow bedrock wells. The firm fixed-price cost for this milestone shall include all steps required for setting up and conducting the tests and evaluating the data. Each bid must identify the wells to be used for slug testing, rationale, and provide a description of the proposed slug test procedures and the planned techniques for reducing the data. The slug tests shall be performed according to accepted industry standards and the data shall be reduced/evaluated using appropriate methods (e.g., A Slug Test Solution for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells, Bouwer and Rice, June 1976). Documentation of the slug testing methods, results, and conclusions shall be provided in the SCRA, and the results shall be utilized in the fate-and-transport modeling (Milestone I).

Milestone E2 – Constant-Rate & Vacuum-Enhanced Pumping Test. The bidder shall provide a fixed-price cost to conduct a constant-rate and vacuum-enhanced pumping test and evaluate the test data. The objective of the pumping test is to estimate the sustainable yield of the shallow bedrock aquifer under gravimetric head and vacuum enhanced conditions and estimate effective hydraulic conductivity and other applicable parameters as input to the Remedial Alternatives Analysis (RAA) under Milestone I. Raw data from the pumping test shall be reduced using aquifer pump test analysis software such as Infinite Extent (or equivalent), and the test methods and conclusions shall be described in the SCRA.

One shallow bedrock pump test well shall be installed at the approximate location indicated on Figure 7. This well shall be installed to a total depth of 30 feet and be constructed of 4-inch diameter Schedule 40 PVC casing and 10 feet of well screen. A silica sand filter-pack of

appropriate grain size for the formation screened and screen slot size used shall extend to a height of approximately two (2) feet above the top of the screen section, followed by a minimum three (3) feet of hydrated bentonite pellets as a well seal. The remaining annulus shall be filled with an appropriate cement/bentonite grout mixture to within approximately one (1) foot below grade. Bidders shall assume surface finishing consisting of an expandable locking cap fitted to the top of the PVC riser and a flush-mounted traffic-rated manhole with a bolt-on lid set into a concrete pad.

In its proposal, each bidder shall specify which of the existing monitoring and remediation wells are to be used as observation wells during the pumping test and indicate the distances to the test well. Bidders should assume RW-3 will be available for use as an observation well by the time field work on this milestone begins. In addition, bidders shall quote the following unit cost and include it in the Bid Cost Spreadsheet in Attachment 2.

- Optional Cost Adder Milestone E3: In the event one or more observation wells need to be installed for the purpose of achieving proper observation well configuration for the pump test, bidders shall quote an all-inclusive unit price for installation of one (1) observation well as part of the initial mobilization for well installation. Installation of an observation well shall follow the guidelines for shallow bedrock wells under Milestone B1.

An aquifer step-drawdown (or stepped-rate) test shall first be conducted within the extraction well to estimate a sustainable flow rate for the pumping test. Note: Should the step test indicate the sustainable yield is too low to provide a reasonable pump test, other site well(s) shall be step tested to locate a better candidate for the constant-rate test. During the stepped-rate test, groundwater levels in the extraction well and in at least in four (4) surrounding observation wells of appropriate depth and distance from the test well shall be monitored. After pumping for the stepped-rate test has been discontinued, the extraction well and observation wells shall be monitored until water levels recover to at least 90 percent of test drawdown.

Following the stepped-rate test, a constant-rate 8-hour (minimum pump time) pumping test shall be conducted. Before beginning the test, groundwater levels shall be monitored over a minimum 24-hour period within the selected extraction well and all observation wells to identify natural background fluctuations. During the pumping test, groundwater levels in the extraction well and the surrounding observation wells shall be continuously monitored. After the well has been pumped for a minimum period of 8 hours, a vacuum of at least 60 inches of water shall be simultaneously applied to the pumping well head and maintained for at least 1 hour. During this time, the selected consultant shall evaluate the extent to which the applied vacuum increased sustainable yield and hydraulic responses in surrounding wells.

After the vacuum enhanced pumping evaluation is complete, the test operations shall be terminated and the wells allowed to recover. During the recovery phase, groundwater levels in

the extraction well and all observation wells shall be monitored until water levels recover to at least 90 percent of test drawdown.

Monitoring of the selected extraction well and observation wells shall be performed using electronic pressure transducers and data logging equipment. Extracted groundwater flow rate and cumulative volumetric totals shall be metered and recorded regularly within each hour of the pilot study operations. Additionally, the bidder shall assume that extracted groundwater will be containerized on-site initially and then transported offsite for proper disposal at a permitted facility. Unless its research suggests otherwise, bidders shall assume the existing groundwater analytical data can be used for waste disposal characterization purposes, and that 1,600 gallons of wastewater will be generated and require proper disposal.

In addition, bidders shall quote the following unit cost and include it in the Bid Cost Spreadsheet in Attachment 2.

- Optional Cost Adder Milestone E4: All-inclusive unit price per gallon to be charged for the transportation and proper disposal of water generated in relation to pump testing in excess of the 1,600 gallons included under the fixed price for Milestone E2.

Written emailed approval from Solicitor and PAUSTIF will be required before beginning any optional milestone work and the requisite milestone-specific supporting documentation identified in the executed contract will be required for reimbursement.

Milestone F – Soil Vapor Extraction Pilot Study. A one-day soil vapor extraction (SVE) pilot study shall be conducted to evaluate the technology's feasibility and to provide system design parameters should the pilot testing confirm SVE is a potentially effective means of addressing residual soil impacts. The pilot study shall be conducted in undisturbed overburden soils sufficiently outside the previously excavated areas to ensure that the test will not be affected by the excavation backfill material. See Figure 6 for the suggested area for SVE pilot testing.

MW-10RO, installed as part of the current work, may be used as the vapor extraction point. Three (3) 2-inch diameter vacuum influence monitoring wells shall be installed for the pilot testing. Distances between the designated extraction well and each of the influence monitoring wells shall be measured and reported with the pilot study results. The annular space above the screens shall be sealed to prevent short-circuiting of air through the bore holes. The three influence monitoring wells shall be installed at distances of approximately 5, 10 and 15 feet from the extraction well.

The SVE pilot study shall:

1. Use the PID readings in extracted soil vapors from each location to help evaluate the distribution of overburden impacts in the test area;
2. Determine the vacuum / vapor yield relationship at each of the four test well locations;

3. Measure the capacity to induce soil vapor flow / pneumatic responses at various distances from the extraction test well; and
4. Determine VOC mass recovery potential from the extraction test well.

The pilot testing blower shall have a *minimum* vacuum generation / operational capacity of 100 inches of water. Bids shall identify the equipment and equipment capacity proposed to achieve this requirement. Flow shall be measured in units of standard cubic feet per minute and baseline & influence vacuums shall be measured down to the nearest 0.01 inches of water.

Prior to beginning the pilot testing, the depth to groundwater (if present) and baseline vacuum / pressure shall be measured in all 4 pilot study wells. The pilot testing shall then proceed by removing soil vapor from the designated extraction well in three sequential steps. During Step 1, one third the maximum vacuum will be applied to the extraction well and sustained for approximately one hour. During Step 2, the well head vacuum will be increased to two thirds the maximum vacuum and maintained for one hour. During Step 3 the maximum vacuum will be applied and sustained for 1 hour. Measurements conducted during each step of the pilot testing shall include: 1) extracted vapor flow rate that shall be converted to standard cubic feet per minute; 2) changes in extracted soil vapor contaminant concentrations in parts per million (using a PID); and 3) pneumatic influence at the three surrounding influence vacuum wells. At the conclusion of each of step, a sample of the extracted air shall be collected and sent to the laboratory for VOC analysis mass per volume units (e.g., ug/m³). The laboratory shall report concentrations of individual PADEP short-list constituents for unleaded gasoline and total hydrocarbons. The location of the laboratory sampling point on the pilot system set-up shall be consistent with where the extracted air flow PID measurements are taken.

Once Steps 1, 2 and 3 have been completed and subsurface vacuum conditions have returned to background, the blower shall be connected in turn to each of the 3 influence monitoring points. While connected to each influence monitoring point, the blower shall be operated at maximum attainable vacuum for 1 hour. During this time, the extracted soil vapors shall be measured for flow rate (yield), VOC concentration (using a PID), and influence vacuums. Additionally, influence vacuums shall be measured at each of the other influence monitoring wells.

During the pilot testing, extracted soil vapors shall be treated using granular activated carbon (GAC) prior to discharge to the atmosphere or otherwise handled to comply with PADEP SWRO requirements, regulations, guidance and directives.

The pilot study data shall be evaluated to estimate (a) the effective radius of influence; (b) the initial VOC contaminant mass recovery rate potential; and (c) soil vapor extraction rate that can be expected relative to an optimal applied vacuum. All SVE pilot study data and analyses shall be presented and written up in narrative form and included in the SCRA report.

Milestone G – Vapor Intrusion Study. Under this task, bidders shall provide a fixed-price cost for conducting a soil vapor intrusion study on the property *if* warranted after applying the decision matrices in the *Land Recycling Program Technical Guidance Manual – Section IV.A.4, Vapor Intrusion into Buildings from Soil and Groundwater*, and as dictated by factors such as the presence of SPL and/or the location / depth of any identified preferential pathways. Consequently, should a soil vapor study prove unnecessary, the fixed-price bid for this task will be deducted from the Total Fixed Price referenced in the Fixed-Price Agreement.

If the soil vapor study proves necessary, the successful bidder shall seek PADEP concurrence on the scope of the study before implementing the work. The soil vapor study shall be conducted in a manner consistent with the requirements, guidance, and decision matrices in the *Land Recycling Program Technical Guidance Manual – Section IV.A.4, Vapor Intrusion into Buildings from Soil and Groundwater*. Bidders shall assume installing four (4) soil vapor monitoring points to depths of 5 feet, and completing two (2) sampling/analysis events separated by a period of at least four weeks. The selected consultant shall position the soil vapor sampling points appropriately based on current understanding of the location and magnitude of contamination following soil sampling and the first round of groundwater sampling.

In addition, bidders shall quote the following unit cost and include it in the Bid Cost Spreadsheet in Attachment 2.

- All-inclusive unit price (installation and two rounds of sampling) per soil vapor monitoring point should additional monitoring points be needed.

Each soil vapor sample shall be collected in pre-certified 6-liter Summa canisters supplied by the analytical laboratory. The Summa canisters must be fitted with a properly calibrated regulator to ensure sampling rates not to exceed 200 ml/min. Soil vapor samples shall be submitted to an accredited laboratory for analysis of unleaded gasoline short-list constituents (benzene, toluene, ethylbenzene, total xylenes, cumene, MTBE, naphthalene, 1,2,4-TMB, and 1,3,5-TMB) using appropriate analytical methods and detection levels. Soil vapor samples shall be analyzed by Method TO-15. Appropriate QA/QC samples shall also be collected and analyzed for the same constituents.¹⁰ The methods and results for the soil vapor study, if conducted, shall be described in the SCRA along with any recommendations regarding the necessity for an expanded vapor intrusion assessment inclusive of indoor air quality sampling, as appropriate.

Milestone H - Risk Assessment. Under this task, bidders shall provide a fixed-price cost for completing a risk assessment that uses appropriate and standardized risk assessment methodologies and reporting consistent with 25 PA Code 250.409. The risk assessment shall encompass an exposure assessment, toxicity assessment, and risk characterization. The

¹⁰ Each bidder's approach to implementing this Milestone shall clearly identify the number of sampling events, number of samples per event, purging and sampling method(s), QA/QC measures, analytes, and other key assumptions affecting the bid price.

identification of exposure pathways shall be based upon guidance from the American Society for Testing and Materials (ASTM) and the United States Environmental Protection Agency (USEPA), as required by Act 2, Section 250.404.

The risk assessment deliverable shall include three separate Exposure Pathway Flowchart graphics for (a) on-Site; (b) off-site; and (c) roadway right-of-way human exposure pathways in support of the risk assessment text. These charts shall graphically depict the thought process used to identify the potentially complete pathways for each of the three areas. The exposure evaluation charts shall depict the exposure pathway sequence from Constituent Source, to Receiving Media, to Transport Mechanisms, to Exposure Routes and current and future human receptors (i.e., facility workers, construction workers, trespassers, residents, recreational users, and others)

The risk assessment shall identify the site soil and groundwater samples used in the risk assessment, show how the constituents of interest (COI) were identified¹¹ and present the COI for each contaminated media with a potentially complete pathway to a human receptor. Additionally, the risk assessment shall show how the risk assessment exposure point concentrations (EPCs) were calculated¹² for each contaminated media with a potentially complete human exposure pathway and summarize the calculated EPCs.

For each potentially complete exposure pathway, the level of carcinogenic risk shall be quantified and the total cumulative carcinogenic risks shall be calculated. Non-carcinogenic risks shall be calculated using the hazard index. Exposure and toxicity assumptions shall be presented and well documented in the risk assessment report along with an uncertainty analysis.

The risks shall be assessed under two separate potential scenarios:

1. Potentially complete on- and off-site exposure pathways without any institutional controls (i.e., current conditions); and
2. Potentially complete on- and off-site exposure pathways with certain institutional controls in place. Under this scenario bidders shall determine which of the following on-site restrictions would be necessary to reduce the on-site human health risks to acceptable levels:
 - No potable water wells;
 - No residential land use;
 - Vapor barrier on future building construction;
 - Vapor mitigation (engineering control) on existing structures (e.g., radon type venting) if current vapor intrusion risks are excessive; and

¹¹ Constituent concentrations are to be screened against the USEPA RSLs and not against the PADEP Statewide Health Standards (SHS-MSCs). Only those constituents that do not screen out against the risk-based screening levels remain as COIs for the exposure pathway analysis and/or demonstrating attainment of the SHS-MSCs or a risk-based numeric Site Specific Standard.

¹² EPCs shall be derived for COIs by statistical analysis (maximum concentrations shall not be used for EPCs).

- Soil management plan for future digging on excessively contaminated portions of property.

Bidders shall assume that the PADEP will provide groundwater use covenant waivers for roadways adjoining the property.

In addition, an ecological screening assessment shall be completed to determine if the site poses an unacceptable risk to ecological receptors. The screening assessment shall be conducted in accordance with Section IV.H of the Pennsylvania Land Recycling Program's Technical Guidance Manual and USEPA Region 3 risk assessment screening criteria insofar as is necessary for determining any potential ecological risk.

After completing the exposure analysis / risk assessment, the selected consultant shall present its draft Risk Assessment Report 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 before being finalized and incorporated as an attachment to the SCRA. The successful bidder will be responsible for producing a risk assessment that is approved by PADEP.

Milestone I – Prepare a Draft and Final Site Characterization Report Addendum. Upon completing the tasks described above, the selected consultant shall prepare a Site Characterization Report Addendum (SCRA) in draft form for review and comment by the Solicitor and PAUSTIF. The SCRA shall contain all necessary information required under 25 PA Code §§245.309 and 245.310. Each bidder's project schedule shall provide two weeks for Solicitor and PAUSTIF review of the draft document. The final SCRA shall address comments received from the Solicitor and PAUSTIF on the draft report before it is submitted to the PADEP for its review.

The SCRA shall describe the methods and findings for the work performed under the remediation agreement and shall incorporate any relevant findings from the previous site documentation along with the necessary figures, tabulated data, and appendices.¹³

Included under this task will be development of a quantitative contaminant fate-and-transport model inclusive of all dissolved-phase constituents exceeding the PADEP Act 2 SHS-MSCs (used aquifer/residential). Due to the location of contaminated groundwater primarily within bedrock, bidders shall propose using MT3D / MODFLOW models for this task. Documentation shall consist of model input/output along with a thorough explanation of model construction, justification for all input parameters, and a detailed discussion of the modeling results, relevant model predictions, and conclusions regarding plume stability.

¹³ "New conditions" may prompt adjustments to the scopes of work specified herein for any of the preceding milestones or if additional site characterization may prove necessary. Should this occur, the selected consultant should assume that: (a) the schedule for completing this Milestone will need to be adjusted (assuming the PADEP grants the necessary extensions), and (b) any added cost involved in documenting the additional activities in the SCRA shall be incorporated into the costs for the adjusted/added scope of work under the specific task.

This task shall include development of a complete conceptual site model (CSM) for the site and vicinity based on an evaluation of historical site characterization data and the results from the site characterization tasks outlined above. Information considered in developing the CSM shall consist of, but not necessarily be limited to, stratigraphic and lithologic characteristics/relationships, groundwater elevations and flow direction, hydrogeologic controls on groundwater movement and contaminant transport, intrinsic aquifer parameters, and the distribution of hydrocarbon contaminants in soil and groundwater.

The SCRA shall include a risk assessment. See Milestone H for details on risk assessment requirements.

Bidders shall assume that the PADEP will provide groundwater use covenant waivers for roadways adjoining the property. Additionally, bidders shall assume that a postremediation care monitoring plan is an option to address future potentially complete pathways for off-site properties.

The SCRA shall also include a remedial alternatives analysis (RAA) that evaluates remedial alternatives and presents estimated remedial costs for the following closure scenarios:

1. Closure under Statewide Health Standards (residential, used aquifer) for both onsite and offsite properties
2. Closure under Site-Specific Standards assuming no engineering controls are implemented.
3. Closure under Site-Specific Standards assuming onsite engineering controls are implemented as needed and a postremediation care plan is implemented as needed for offsite properties.

The RAA must address remediating known sources of contamination, mitigating impacted media, and potential migration and exposure pathways within a reasonable time frame. Detailed conceptual discussions for all remedial alternatives considered must be provided with reasonable justification for either retaining or eliminating certain options in light of the updated conceptual site model. As appropriate, the RAA shall specify at least two, or preferably three, remedial options per closure scenario that are considered reasonably viable and effective based on the conceptual site model. The RAA shall include a tabulated summary of estimated total cleanup costs associated with each remedial scenario, employing reasonable engineering assumptions.

The SCRA document 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 and documented in the report). The fixed-price cost shall also include addressing any PADEP comments on the report.

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 milestone tasks identified in the bid. The standard practice of tracking total cumulative costs by milestone will also be required to facilitate invoice review. 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 identified in this RFB. 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. All necessary modifications to the executed Remediation Agreement will require the prior written approval of the Solicitor and the PAUSTIF. PADEP approval may also be required.

List of Attachments

1. Remediation Agreement
2. Bid Cost Spreadsheet
3. Site Information/Historic Documents
 - a. Figures
 - i. Figure 1 - Site Location
 - ii. Figure 2 - Excavation and Confirmation Soil Sample Map
 - iii. Figure 3 – Known Soil Sample Locations Exceeding Standards
 - iv. Figure 4 – Existing Monitoring Well Locations
 - v. Figure 5 – Existing Remediation System Layout
 - vi. Figure 6 - Suggested Investigation Areas
 - vii. Figure 7 - Suggested Area for Pump Test Well
 - b. UST Closure Report, 11/4/2007
 - c. Site Characterization Report/Remedial Action Plan, April 2009
 - d. Progress and Corrective Actions Report, 2nd through 4th Quarter 2009, January 2010
 - e. Progress and Corrective Actions Report, 1st Quarter 2010, April 2010
 - f. Progress and Corrective Actions Report, 2nd Quarter 2010, July 2010
 - g. Progress and Corrective Actions Report, 4th Quarter 2010, January 2011
 - h. Progress and Corrective Actions Report, 1st Quarter 2011, April 2011
 - i. Progress and Corrective Actions Report, 2nd Quarter 2011, August 2011
 - j. Progress and Corrective Actions Report, 3rd Quarter 2011, October 2011
 - k. Progress and Corrective Actions Report, 4th Quarter 2011, January 2012
 - l. Progress and Corrective Actions Report, 1st Quarter 2012, May 2012
 - m. Progress and Corrective Actions Report, 2nd Quarter 2012, July 2012
 - n. Progress and Corrective Actions Report, 3rd Quarter 2012, November 2012
 - o. Progress and Corrective Actions Report, 4th Quarter 2012, February 2013
 - p. Progress and Corrective Actions Report, 1st Quarter 2013, June 2013
 - q. Progress and Corrective Actions Report, 2nd Quarter 2013, September 2013
 - r. Groundwater Monitoring Summary Table