Superfund Site Assessment Program Toolbox

September 2019

Site Assessment Focus Group

Acknowledgements

This document was prepared by the Association of States and Territorial Solid Waste Management Officials (ASTSWMO) Site Assessment Focus Group (Focus Group), with assistance from the U.S. Environmental Protection Agency (EPA) under Cooperative Agreement RT-83870001. The contents of this document do not necessarily reflect the views and policies of the EPA, nor does the EPA endorse trade names or recommend the use of commercial products mentioned in this document.

The following Focus Group members participated in the development of this report:

Steven Becker, California Department of Toxic Substances Control (Vice-Chair, 2018)
William Bennett, New York State Department of Environmental Conservation
Patrick Boettcher, Delaware Department of Natural Resources and Environmental Control
Hal Cantwell, Oklahoma Department of Environmental Quality
Merrie Embry, Tennessee Department of Environment and Conservation
Gabriele Hauer, Indiana Department of Environmental Management (Chair, 2017)
Rose Knox, Massachusetts Department of Environmental Protection
Arnold Mayberry, Alabama Department of Environmental Management
Darryl Morgan, Kansas Department of Health and Environment
Maggie Ogden, New Mexico Environment Department
Michelle Payne, Virginia Department of Environmental Quality
Anne Marie Palmieri, Alaska Department of Environmental Conservation (Chair, 2018)
Kyle Sandor, Colorado Department of Public Health and Environment
Gregory L. Small, Minnesota Pollution Control Agency
Dale Urban, Utah Department of Environmental Quality
Valerie Wilder, Missouri Department of Natural Resources

The Focus Group would also like to express its appreciation to the following individuals who provided assistance during the development of the report:

Scott Lauher, Association of State and Territorial Solid Waste Management Officials
Randy Hippen, USEPA/Office of Superfund Remediation and Technology Innovation
Ellyn Fine, USEPA/Office of Superfund Remediation and Technology Innovation

The documents included herein were provided to ASTSWMO by individual States. Some of these documents are available online from the individual States, but others are not. ASTSWMO has not modified these documents. Some of these documents may contain sensitive information such as addresses and telephone numbers.

Table of Contents

Executive Summary

The Superfund Site Assessment Program, under the Comprehensive Environmental, Response, Compensation and Liability Act (CERCLA), is a partnership between the Environmental Protection Agency (EPA) and States and Territories (States). The primary purpose of the Superfund Site Assessment Program (referenced hereafter as "Site Assessment Program") is to identify releases or threats of releases of hazardous substances, pollutants, or contaminants that may endanger human health or the environment, and to determine whether those sites qualify for inclusion on the National Priorities List (NPL). To accomplish this, EPA has developed several variations of the traditional Site Assessment process to allow flexibility for efficiency and reduction of duplicate tasks, i.e., Pre-CERCLA Screening (PCS) with sampling, Preliminary Assessment (PA) with sampling, Combined PA/Site Inspection (SI), and Abbreviated PA (APA). The States' use of these variations were identified as part of a previous document published by the Association of State and Territory Solid Waste Management Officials' (ASTSWMO) Focus Group titled "On Time and Under Budget, Superfund Site Assessment Program Analysis, States' Perspective" published in August 2017. This report provides additional follow-up to the August 2017 report and includes a discussion of the variations identified for these tasks during this effort and provides State examples. The goals of this report are to:

- Report on the States' use of flexible approaches for document preparation during the Site Assessment process;
- Provide examples of the States' variations of traditional Site Assessments documents;
- Provide sample equipment checklists for field sampling activities;
- Provide a discussion of field screening tools used for air, soil, surface water and groundwater sampling; and
- Provide key findings and recommendations regarding the use of flexible approaches for the Site Assessment Program when conducting Site Assessment activities.

The Focus Group is comprised of one State member from each of the ten EPA regions. The broad geographical distribution of the Focus Group members facilitated the collection of nationally representative data about States' use of flexible approaches for documents prepared during the Site Assessment Process. Based on information obtained from States, the Focus Group presents the following key findings, several of were obtained during a previous Research Tool effort and presented in the August 2017 report:

- Of the 43 States who responded to the previous Research Tool, 29 States (67%) indicated that they have flexibility to streamline the documentation process when providing EPA with PCS deliverables;

- Of the 29 responding States indicating flexibility in streamlining the document process, 25 States (86%) have a Superfund Site Assessment Program Cooperative Agreement (CA) with EPA;

- The States' use of current tools to streamline the document process, particularly the PCS, PA, Combined PA/SI, and APA, indicate that these tools are being utilized frequently by States;

- There is a desire to have a sampling checklist for use as part of field sampling efforts;

- There is a strong desire to understand the available field screening tools for use in sampling efforts conducted as part of PCS activities.

- A majority of the responding States (67%) favor streamlining documentation to improve reports, and the presence of a CA does not appear to have a significant effect on this trend; and

- In general, State responses indicated that the biggest area with "room for improvement" is related to communication between EPA and the States. States indicated that they wanted better and timelier interactions with EPA as many felt uninformed on updates and process improvements. Following communication, States indicated that they thought having more flexibility with EPA's processes and corresponding reports would allow States to treat each site differently on a site-specific basis and not treat them as a "one size fits all" requirement.

The Focus Group offers the following recommendations:

- Sharing of approaches utilized by different EPA Regions and States for the Site Assessment Process including the example documents and/or templates provided as part of this report;

- Training and possibly policy clarification efforts to ensure that EPA Regions and States are aware of the options and flexibility available to them under the Site Assessment Program;

- EPA and the States should have an open and more frequent dialogue regarding available flexibility during the Site Assessment Program process to allow States to treat each site differently on a site-specific basis and where possible, not apply "one size fits all" requirements; and

- EPA and ASTSWMO should work together to inform EPA Regions and States of updated EPA guidance and policies offering flexibility during the Site Assessment Program process.

Introduction

The Site Assessment Program (referenced hereafter as "Site Assessment Program") is a partnership between the United States Environmental Protection Agency (EPA) and States and Territories (States). Since its inception in the early 1980s, the Site Assessment Program has been the foundation of the EPA Superfund Program and has assessed more than 53,000 potentially contaminated hazardous substance sites.

The primary purpose of the Site Assessment Program is to identify releases or threats of releases of hazardous substances, pollutants, or contaminants that may endanger human health or the environment and to determine whether those sites qualify for inclusion on the NPL. During the Site Assessment process, EPA and States collect data to identify, evaluate, and rank hazardous waste sites based on Hazard Ranking System (HRS) criteria. The Site Assessment Program addresses the initial steps for the assessment of potential sites that may enter into the Superfund process. EPA manages its own Site Assessment Program where it evaluates sites directly. EPA also provides funding to States through Cooperative Agreements (CAs) for the States to evaluate sites using the EPA process and tools and then report the findings to EPA. According to EPA, for many years, States have developed over 50% of all Superfund assessment milestone documents, and, in FY2018, States produced 68% of the total number of reports. Some States have chosen not to receive funding from EPA for site assessment activities and evaluate sites using their own processes and funding outside of CERCLA.

Types of sites that are evaluated vary from those which present no or minimal risk to human health and the environment where no further action will be taken, to those which present an imminent and substantial risk and/or need remedial cleanup attention which can be addressed by several programs including the EPA Superfund Program (NPL Listing), State and Federal removal programs, State Voluntary Cleanup programs, State Superfund programs, and other State-specific cleanup programs (e.g., State Dry Cleaner programs).

1.0 Background

In August 2017, the ASTSWMO Site Assessment Focus Group (Focus Group) published the report titled: "On Time and Under Budget – Superfund Site Assessment Program Process Analysis: States' Perspectives". In that report, the Focus Group analyzed feedback received from States on the Site Assessment Program and identified specific desired process improvement areas that would bring better efficiency. One of the objectives of the August 2017 report was to illustrate differences in various State Site Assessment Programs so that other States could recognize potential opportunities for improvements within their own programs. The Focus Group conducted its research by using a Research Tool in Spring 2016 and 43 States provided input. When asked the question *"Have you developed any unique, model documents, templates, or otherwise reduced steps to streamline or improve reports?"* 67% of responding States (29 of 43) indicated that they have the flexibility to streamline the documentation process and some States provided specific examples. When asked the question *"Have you developed practices such as*

checklists, field-work, or formal coordination approaches that make your State's program more efficient?" 74% of responding States (32 of 43) responded affirmatively and some States provided specific examples. The Focus Group then asked a question regarding coordination between States or with EPA, *"Do you ever discuss approaches to streamline documents or use innovative practices with other States or EPA?"*, and 42% of responding States (18 of 43) indicated affirmatively. One suggestion provided was that ASTSWMO could assist with coordination of information among the States. The Focus Group also asked a multi-part question regarding use and effectiveness of 18 EPA-developed streamlining tools, and State responses to those individual questions varied.

As a follow-up project to the August 2017 report, the Focus Group decided that compiling a 'toolbox' of tools, practices, and documents developed by individual States in order to share with all States would be beneficial. The Focus Group reexamined the responses to the Research Tool and identified specific States which had developed tools, practices, and documents which have brought efficiencies to their programs. This toolbox includes a collection of tools from checklists to example reports that can serve as insight on how various States operate and may be a potential aid to other State programs. This toolbox is not all inclusive but provides a window into what other States use. Clear and effective communication amongst States and between States and EPA is the most valuable tool.

This document outlines the Focus Group's method for selecting tools/areas of focus, link the results of the August 2017 report to each section of the toolbox, and provide a brief discussion and example documents for the selected tools. The toolbox is organized into six sections that pertain to different parts of the Site Assessment Program. These sections include: Pre-CERCLA Screening (PCS), Abbreviated Preliminary Assessment (APA) reports, Combined Preliminary Assessment/Site Inspection (PA/SI) reports, Table of Contents for various traditional Site Assessment report deliverables, Sample Equipment Checklists for field sampling activities, and Field Screening Tools.

Toolbox Project Research Methods

The purpose of the Toolbox Project was to further explore six primary areas of focus identified in the Focus Group's August 2017 report and provide a discussion of those areas and include examples.

The Focus Group began by reviewing the States' responses to the questions posed by Research Tool issued in 2016. Using the responses to the multi-part question regarding 18 EPA-developed process streamlining tools, the Focus Group evaluated each tool based upon how many States use it and how effective they believe it is. In an effort to keep this toolbox streamlined and effective, the Focus Group selected three (3) of the specific tools or practices reported in the August 2017 report to include in this report. These tools are: APA reports, Combined PA/SI reports, and Field Screening equipment. APA reports were rated in the top third of all tools or approaches, but this tool was not widely used amongst States with a CA with EPA. When APA report's value was measured by only States that used this tool, it was rated very highly. In fact, it was rated nearly as high as using a standardized Quality Assurance Project Plan (QAPP) when only

considering States that use a standardized QAPP. Combined PA/SI was rated in the bottom third of all tools or approaches. This tool has the second lowest rate of use amongst the 18 and was generally unknown if it was acceptable to use within the State's region. However, of the States that use this tool, it too was rated nearly as highly as a standardized QAPP. In addition, there were several comments made about the effectiveness of this tool in the received responses.

Included in this toolbox is a Sample Equipment (field supplies) checklist and a presentation on the use of Field Screening tools. Field Screening techniques were rated as the most effective tool but is not as widely used as a standardized QAPP. States that provided answers to open-ended questions mentioned several additional approaches that they have found to help streamline the Site Assessment process. These included checklists for sampling events, the use of mapping software, and forms to help the pre-CERCLA Screening process. Some tools were ranked as highly effective but will not be featured in this toolbox. For example, using a standardized QAPP with a Site-specific Sampling and Analysis Plan (SAP) was the second highest ranked tool. However, this tool was already reportedly used by most of the responding States. Several States also mentioned use of Geographic Information Systems (GIS)-based mapping to evaluate data trends or provide figures for reports. The Focus Group plans to delve more deeply into how States use GIS to support Site Assessment activities in a subsequent project.

After selecting the following items to include in the toolbox, PCS, APA reports, Combined PA/SI reports, Site Assessment report deliverable examples, Sample Equipment (field supplies) checklist, and Field Screening Tools, the Focus Group contacted the States that indicated that they have used the various tools and inquired as to whether the State would be willing to provide an example to place in the toolbox.

After reviewing the examples of the various tools provided by the States, the Focus Group compiled this document as a resource for States to use. Each tool is provided as a separate section within this document and the tool examples are embedded within the respective section. Other States may have similar types of tools that were not included within this document solely due to the fact that the Focus Group was unaware of their usage. One of the conclusions from the August 2017 report was that different EPA Regions may allow different types of submittals and, thus, communication with the appropriate EPA Region is suggested in order to determine if a tool is available for use by a specific State and if the elements included in the provided example are acceptable.

2.0 Pre-CERCLA Screening

A PCS is a relatively low-cost initial collection and review of existing information for a potential Superfund Site. This first step in an assessment process can act as a gateway into the Superfund program or other State regulatory cleanup program(s) as appropriate.

Efforts made by EPA in the PCS phase of work are useful as they provide a flexible approach in pre-CERCLA efforts. The EPA has published updated information which includes a Pre-CERCLA

Screening Guidance document published in December 2016 and more recently, an on-line fillable PCS Checklist completed in February 2018.

Historically, after a site was "discovered" and a PA had been completed, the Site Assessment Program would conduct a SI to determine the types and levels of contaminants that may be remaining at or near the suspected release site. As additional constraints have been placed on grant and other program funding sources and programs having limited staff available to work within the Site Assessment Program, many States have been turning more towards innovative and streamlined approaches to collecting environmental information.

Many States use the PCS option as a first cost-effective step and a timelier approach in the CERCLA process to determine the relative risk of a site before officially "discovering" the site for the EPA Site Assessment program. In the August 2017 report, 17 of 36 States, or 47%, indicated that they conduct PCSs with Sampling. Twenty-Four States indicated that PCS is an important tool, four (4) States were neutral, and eight (8) indicated that it is not an important tool.

A common approach in a PCS is to utilize field screening techniques such as an X-ray Fluorescence analyzer (XRF) to detect the relative concentrations of heavy metals that may be present in the shallow soils at a suspected release site. For release sites that have other chemicals of concern such as chlorinated solvents or mixed waste sites, multi-meters may be used to quickly (real-time responses) determine levels of volatile organic hydrocarbons and some chlorinated solvents in the ambient air. These easy to use hand-held meters can also help determine the best locations to collect indoor air samples to send to an analytical laboratory for testing, using a Summa^{R} canister or another type of evacuated canister. Some PCSs may include environmental samples analyzed by a fixed analytical laboratory to quantify the concentrations of the chemicals of concern at the suspected release site. Field Screening Tools are further discussed in Section 7 of this report.

Some States recommended discussion with EPA regarding the inclusion of analytical samples in a PCS, specifically the issue of paying for analysis. Some EPA Regions insist upon the use of contract laboratory program (CLP) protocols for all sample analysis. A PCS might not have an EPA-assigned Superfund Enterprise Management System (SEMS) tracking number which is required for sample analysis by an EPA laboratory using contract laboratory program (CLP) protocols as part of the chain-of-custody documentation. The lack of a SEMS number has become an impediment to sample analysis and use of State funds to pay for the analysis may not be possible. Some States have included funding for analysis through private analytical laboratories in their CAs so that this laboratory testing cost is not borne solely by the State. Regardless of whether a State uses a commercial environmental laboratory, their own state laboratory, or the EPA CLP, proper data validation (i.e., Level I through IV QA/QC protocols) is still recommended (and may be required by your EPA Region) to meet basic data quality objectives of the PCS sampling plan.

The Focus Group has concluded that advances in the overall PCS process can be obtained by ongoing efforts by State programs in collaboration with their federal EPA program counter-parts,

to be innovative in their approaches resulting in a cost-effective approach to continuous improvement in these challenging times of limited resources.

Some examples of PCS reports are included below with the intention that they may provide insights to other State programs that are looking for ways to streamline their own internal environmental investigative process and make it an easy and cost-effective approach to screening potential CERCLA sites. A PCS letter report can vary in size from less than 10 pages to several hundred, depending upon the information available. The examples below range from brief, EPA form-based PCSs to more complex PCSs with extensive appendices.

Minnesota - Example PCS Form Format
Alabama PCS
South Carolina Expanded PCS
Georgia PCS
North Carolina PCS
Tennessee PCS
Tennessee PCS QAPP
Missouri PCS
Utah PCS Work Plan
Utah PCS

3.0 Abbreviated Preliminary Assessment Reports

According to the 1999 EPA APA fact sheet (https://semspub.epa.gov/work/HQ/174004.pdf), EPA developed the APA tool in an effort to increase efficiency and shorten the PA process. The objective of an APA is to screen sites using less information than a full PA in order to make a decision about the need for future EPA action. In the August 2017 report, APAs were rated in the top third of all tools or approaches evaluated (56%, 20 of 36 States). However, nearly half of the States with an EPA CA did not use it (16 out of 36). For 13 of the States with a CA, it was unknown if their State's region would allow the use of an APA. On a scale of 1 to 10 with 10 being the highest (most positive) value available, the average score for this tool was 7. However, based only on the scores of the States that use this tool, the average score was 8, and of the States that do not know if they can use this tool, the average score was a much lower 5. This tool highlights one of the greatest potentials for streamlining State programs; however, use of this tool must be acceptable to the respective EPA Region.

Of the initial 18 tools evaluated in the original report, only 33% (12 of 36 States) used the APA for obvious No Further Remedial Action Planned (NFRAP) sites. Of the 24 States who do not use this tool, three (3) States indicated that the tool is allowed under their CA, however it is not used. Three (3) States indicated that this tool was not allowed to be used, and 18 States indicated "unknown".

States providing examples of APA documents that are included in this report include the following: Alaska (Region 10), Idaho (Region 10), and Missouri (Region 7). Idaho also provided a

link to its webpage which contains all of its APAs on abandoned mine sites, http://deq.idaho.gov/preliminary-assessments. The hope is that these documents will provide valuable examples of APAs that can be discussed by other States with their respective EPA region for possible use in Site Assessment activities.

Findings

Based on a review of the example documents provided by the States identified above, GIS is becoming more frequently utilized in the APAs prepared by some regions. In addition to the use of GIS, some States have conducted a focused sampling effort which is incorporated into the APA and aids in making a determination regarding further federal action needed or referral to a State. The level of detail provided in APAs appears to vary as well.

Recommendations

In the August 2017 report, one of the recommendations was to review the various formats used for APAs and collaborate with EPA to potentially revise the APA form to allow for more flexibility and take advantage of changes in technology as well as the general approach in the preparation of these documents. Additionally, reviewing the necessary level of detail required for these documents would allow better consistency to be applied nation-wide.

Provided below are examples of APAs from Alaska, Idaho, and Missouri.

Alaska APA
Idaho APA
Missouri APA

4.0 Combined PA/SI Reports

Combined PA/SI reports are simply the blending of the processes involved in a PA, such as the gathering of historical information and the site reconnaissance, with the activities of the SI, such as the review of existing data, the development of the field work plans, field sampling, the filling of data gaps, and data evaluation. By combining these two components, a thorough, concise and continuous site investigation can be conducted in one step, reducing the amount of time and resources needed to assess a potentially contaminated property and determining whether further federal or other regulatory agency involvement is warranted.

In the August 2017 report, the Combined PA/SI tool was rated in the bottom third of all tools or approaches used at a site. This tool had the second lowest rate of use amongst the 18 and it was generally unknown if it was acceptable to use within the State's region. However, of States that use the Combined PA/SI tool, its effectiveness was rated fairly highly. Of the initial 18 tools in the report, nine (9) of 36 States or 25% use this tool. Of the 27 States who do not use the Combined PA/SI tool, three (3) States indicated that the tool is allowed under their CA, however it is not used. Ten (10) States indicated that this tool was not allowed to be used, and 14 States indicated "unknown". Fifteen (15) States said that this is an important tool, eight (8) were neutral, and 11 said it was not important.

Use of a Combined PA/SI offers flexibility and can result in savings in costs and time when compared to conducting separate PA and SIs, especially for a complex site that will most likely score high enough for the NPL. One State commented that if a State's CA is structured so that EPA pays a fixed dollar amount per report, then that use of a Combined PA/SI is a less attractive tool as a combined PA/SI report requires more staff time than a standalone PA.

Provided below are an example of a Combined PA with a SI SAP from Maryland and a Combined PA/SI Report from Missouri.

Maryland Combined PA/SI SAP
Missouri Combined PA/SI Report

5.0 Site Assessment Report Deliverable Examples

In the August 2017 report, a number of States provided comments regarding requirements for traditional Site Assessment reports. The Focus Group has assembled a number of example deliverable documents and related checklists to assist States with developing document deliverables. These documents vary widely in content and are not necessarily exhaustive; however, they may prove to be helpful for document development. A wide range of different example documents were selected for inclusion in this toolbox so that States will have various elements to consider for use.

Preliminary Assessment

The purpose of the PA is to further assess sites that have been placed in the SEMS database, but little information is known. The PA is often compared to the level of assessment included in a Phase I Environmental Site Assessment (ASTM E1527, EPA All Appropriate Inquiry, etc.). Generally, the PA draws upon information that already exists (site information submitted by potentially responsible parties, voluntary cleanup parties, other regulatory agencies, etc.). However, it is not uncommon for the PA to include recently collected site data. Regardless, one of the key topics for discussion in the PA is an assessment of the potential exposure pathways. The example PA information included here draws upon a number of different styles, presents extensive background and historical environmental investigation activities, recent agency environmental assessment activities and then assesses the potential exposure pathways.

Minnesota Elements of the PA
Minnesota PA Report Topical Outline
Tennessee PA Report
Kansas PA Report
Texas PA Template

Preliminary Exposure Pathway Assessment

Assessing the potential for exposure to site contaminants is a process that lends itself well to a certain level of systemization and automation. The Minnesota Pollution Control Agency (MPCA) has developed a process called the Preliminary Exposure Pathway Assessment. Although developed as a separate element within the Toolbox, the Preliminary Exposure Pathway Assessment is typically incorporated into the PA and is revisited in subsequent deliverable stages (such as, SI and Expanded Site Inspection (ESI)) as new information becomes available or further data refinement is needed. The resident populations are based upon the data provided by the most recent US Census Bureau data, unless more recent population information is available. Many States license or register child day-care facilities, pre-schools, and schools and the licensing/registering agencies often have a wealth of data regarding locations, users, etc. that can be used to assess the potential for exposure to these sensitive populations. Similarly, many States keep data regarding water wells installed within the State. This well data can be extremely helpful in determining if there are potential well receptors within the site area. Often, the well data can be used to determine the number of private residential drinking water wells, commercial/industrial wells, wells used in food production, municipal supply, and so on. Similarly, many States track the use of surface water for drinking water, the data being very helpful for assessing the potential for human exposure via the (surface water) drinking water pathway. The example includes the Sensitive Receptor Table and the accompanying maps showing those data graphically.

Minnesota Sensitive Receptor Table
Minnesota Schools Table
Minnesota Wells Table
Minnesota Example PEPA Maps

Site Inspection

The purpose of the SI is to further assess sites that, based on the PCS/PA reports need further site/exposure-pathway field assessment actions. Frequently, field sampling activities involve laboratory testing conducted by EPA CLP lab facilities and generally include extensive data validation for that CLP lab data. Furthermore, the SI is intended to collect the data necessary to demonstrate 1) a release of hazardous substances has occurred; 2) there is a significant potential for human or environmental exposure to hazardous substances via one of the recognized exposure pathways; 3) the release appears to be substantial enough that the site may rise to the level of an NPL caliber site. The example documents include a description of the elements of the SI (Minnesota), an example topical outline of an SI Report (Minnesota), an example SI report (New Jersey) and templates for both a SI Work Plan and SI Report (Texas).

Minnesota - Description of Elements of the SI
Minnesota - SI Report Topical Outline
New Jersey - SI Report
Kansas – SI Report
Texas SI Work Plan Template
Texas SI Template
Tennessee ESI QAPP

Quality Assurance Project Plan (QAPP) for Sampling and Analysis Plan (SAP)

Decisions regarding risk and potential exposure are made based upon site-specific data. The manner in which the data was collected is critical to developing a conceptual site model and exposure potential assessment. A QAPP provides detailed information regarding quality and management processes ensure that the data will be collected and evaluated in accordance with approved methods and standards. Typically, in the Superfund process, this QAPP is developed for each site and is periodically updated as the project progresses. Within the Site Assessment process, some EPA Regions require the States to prepare separate QAPP documents for each site. Other Regions have streamlined the process, allowing the States to develop a Site Assessment Program QAPP that is applied at all sites with the addition of a site-specific SAP. There are advantages to each approach. Preparing a QAPP for each site allows the QAPP to be focused on the needs of a particular site and the activities planned. This can lead to developing a relatively brief QAPP. However, this QAPP may not be appropriate for use on other sites. By developing a program-wide QAPP, it is possible to streamline execution of site events because time will not be needed to develop a site-specific QAPP. However, the program-wide QAPP will, necessarily, be a considerably longer document as it must account for all the potential sampling, analysis, and evaluation scenarios possible at a variety of sites. In any event, all QAPPs should be reviewed and revised on a periodic basis. One State in EPA Region 5 noted that all QAPP documents must be reviewed and revised at a frequency no less than once every 5 years. Some example QAPPs for SAPs are included below.

Minnesota QAPP
Ohio QAPP

6.0 Sample Equipment Checklist

In the August 2017 report, States that provided answers to open-ended questions, mentioned several additional approaches that have helped streamline the Site Assessment process. One successful streamlining approach was the development of sample equipment checklists for field sampling events. The completed sample equipment checklist ensures the field crew have packed and accounted for the required sampling equipment for pre-CERCLA and CERCLA investigations. This process streamlines field mobilization and coordination of the field crews to ensure a more efficient investigation.

In response to the Focus Group's request for documents, some States provided more generalized checklists for field work and for a specific vapor intrusion interior building survey form. The Focus Group has provided all of these checklists below.

Utah Field Checklist
Kansas Field Checklist
Montana Field Checklist
Utah Vapor Intrusion Checklist

7.0 Field Screening Tools

Typically, sites within the Site Assessment Program will have site characterization performed to determine the nature and extent of hazardous substances that may be present in the soil or groundwater at or near the site. As resources such as time and money are often limited, regulators have become innovative and have found ways to streamline the traditional methods of sample collection and analysis, using field screening tools more often, as discussed herein. Field assessment tools can range from hand-held screening instruments, such as XRF and the MiniRAE©, to actual mobile laboratory units (e.g., Environmental Team Trace Atmosphere Gas Analyzer (TAGA)). A mobile laboratory can provide the same quality of data as a fixed laboratory with faster turnaround times. This section focuses on field screening instruments which can be used to select opportunity or confirmation sample locations, as well as be compared to results from fixed laboratories to determine a correlation factor between the two.

Some of the more common methods used for simple field screening to determine relative concentrations in air, land and/or water are discussed below.

Air Sampling

Multi-meters can be used to quickly (real-time responses) determine levels of volatile organic compounds (VOCs) and some chlorinated solvents in the ambient air. These devices use photoionization detection (PID) technology to excite and then measure organic molecules in air. PID meters are not selective for specific organic compounds, however, depending on the manufacturer and model, a PID has a minimum detection range from 0.0005 parts per million (ppm) to 1 ppm, or higher. Because of the high detection limits (relative to laboratory analysis) and non-specific identification of contaminants, these handheld meters can best be used to determine locations to collect indoor air samples, using an evacuated canister or another type of container like a Tedlar© bag, to send to an analytical laboratory for testing. Manufacturers of PID meters include, MiniRAE©, Graywolf, Dräger and Ion Science.

Another field screening tool to measure levels of contaminants in air is the FROG 5000™ (FROG), developed by Defiant Technologies. The FROG can directly measure VOCs and SVOCs in air as well as in surface water and groundwater. This instrument is a portable gas chromatograph (GC) with a built-in photoionization detector (PID) chemical sensor and is used in the field in conjunction with a specialized software program. The FROG is further discussed below under Surface Water and Groundwater Sampling.

Soil Sampling

Many past industrial operations such as mining, pesticide application, metal production, smelting, and refining, may have released heavy metals such as arsenic and lead into the environment. XRF handheld analyzers can provide quantitative concentrations of heavy metals that may still be present in the soils.

There are three major parts in XRF analyzers that affect performance and capabilities. First, an x-ray source known as an x-ray tube emits an x-ray beam into the sample being analyzed. This

beam excites and displaces electrons in the metal atoms, resulting in a release of energy as the electron is replaced. The wavelength of the electromagnetic radiation (energy) released is unique for each type of metal. A detection system collects and analyzes this energy. The type of detection system varies in each model, providing different benefits that suit a particular testing need. The last component is the software package, which is based on algorithms developed for specific applications, and processes the information collected by the detection system.

XRF analyzers are popular for their ease of use. The purchase or rental price of an XRF analyzer is high. However, XRF analysis is cost effective compared to laboratory analysis when a large number of soil samples need to be sampled for metals. XRF analyzers also save time and money by eliminating the need to prepare and send analytical samples to laboratories. XRF sampling preparation protocols are straightforward. XRF analyzers allows for a quick identification of samples that may require further laboratory analysis.

XRF analyzers have become the instrument of choice for soil analysis when characterizing, remediating and monitoring large-scale sites contaminated with metals. With just 30 to 60 seconds needed to use the XRF analyzer to "shoot" each soil sample location, XRF analyzers can provide fast and accurate data for a site in hours rather than weeks, ensuring that a project meets its deadline and does not go over budget. Sampling density is the key factor in profiling contamination and addressing the inherent heterogeneity of soil. Best practices include sending ten (10) percent of samples analyzed with the XRF in the field to the laboratory for confirmation of contaminant concentrations.

Portable XRF analyzers allow you to take the battery-operated analyzer to the sample rather than bringing the sample into the lab. XRF analyzers can be used on soil ex-situ or in-situ. Ex-situ sampling in a portable field stand is an effective technique for characterizing sites. Ex-situ samples typically take 30-60 seconds to analyze. In-situ sampling is an effective technique for remediating and monitoring remediation sites. In-situ of open excavation or surface soil by placing the XRF directly on the soil surface typically takes 10 seconds at each sampling point. In situ results allow for determination of contamination boundaries as well as identification of areas where soil confirmation samples should be collected, prepared and analyzed by a laboratory to confirm the quantitative analysis.

Being careful and consistent with soil sampling preparation (such as drying the sample to reduce any moisture content and using sieves to obtain a uniform grain size), when compared with split samples sent to a fixed base laboratory, can yield correlations of metal concentrations as high as 99.96% (data from a site sampled in Park City, Utah). EPA Region 4 has developed a Field Operations Guide (FOG) for use of the XRF. The intent of the FOG is to provide a methodology for collecting defensible data on lead and arsenic using the XRF (but may also be appropriate for other metals).

Some limitations of using the field portable XRF analyzer may include one or more of the following: 1) moisture content in soil samples may result in a biased low reading; 2) there may be limited usefulness for detecting some specific metals due to cross interference by other metals

with similar attributes or characteristics; and 3) a specific filter may be necessary for some metals, such as barium, cadmium and silver.

XRF analyzer technology has continued to improve over the last 20 years. XRF analyzers have become more compact and user friendly during this time. Metal detection limits have been lowered substantially, and post-processing algorithms have also improved. Historically, XRF analyzers had been used primarily at lead sites, but now due to advances in technology XRF analyzers have proven effective at accurately detecting arsenic, copper, iron, lead, nickel, and zinc at applicable regulatory levels. Some manufacturers of XRF analyzers require proof of adequate training for staff prior to sale of the equipment and some States require a permit or license be obtained prior to use of the XRF analyzer in the field.

EPA XRF Field Operations Guide

Surface Water and Groundwater Sampling

There is a limited amount of field portable or handheld instruments that have the capability of directly measuring concentrations of hydrocarbons or chlorinated solvent compounds in the dissolved phase in surface water bodies or in groundwater.

As previously discussed under Air Sampling, one such instrument is a portable gas chromatography/mass spectrometer (GC/MS) called the FROG developed by Defiant Technologies. The FROG is an analytical screening device capable of direct chemical analysis (VOCs and SVOCs) of sample media for soil, water, and air (including soil gas). The FROG is a portable GC with a built-in PID chemical sensor. The FROG is used in the field in conjunction with a specialized Ellvin GC software program (installed on a computer). FROG analysis data can automatically be uploaded to a laptop computer during sample collection; as real-time data is generated, it is depicted on a graph. The FROG can be calibrated to screen for volatile and semi-volatile organic compounds. One sample analysis and blank run takes approximately 22 minutes to complete and may increase depending on the media being sampled, concentrations detected, and the analytes that are being assessed. Direct analysis and real-time screening enable personnel to make educated decisions in the field regarding plume delineation or monitoring well placement for example. Groundwater samples can be detected at concentrations that are sub ppb. After the initial investment, this device can alleviate some sampling costs associated with time, shipping, and laboratory analysis.

8.0 Conclusions and Recommendations

The identification and discussions of document variations identified for Site Assessment tasks and the use of a sample checklist and field sampling tools when conducting activities under the Site Assessment Program process contained in this report are intended to create an increased level of awareness and discussion between EPA and the States regarding areas or processes that would benefit from additional collaboration, training, and possibly policy clarification efforts. These efforts could result in a more streamlined and flexible Site Assessment Program which

would reduce the resources required, thereby reducing costs and maximizing the value of work conducted to address a site with the appropriate program in a timely manner to protect human health and the environment. This would result in a win-win situation for both EPA and the States in these times of decreasing funding where limited resources need to be leveraged as much as possible. It is important to note that many States have employed innovative ways to maximize resource leveraging; however, an increased level of awareness of various resource leveraging techniques employed to date by States would result in an increase of resource leveraging opportunities.

The Site Assessment Program would benefit on a national level from an increased level of awareness by EPA and the States regarding the current status and future developments of the Site Assessment Program areas, policies, or processes. That awareness could be achieved by additional and timely communication, coordination and collaboration (e.g., webinar presentations or training to provide a consistent and uniform message to EPA Regions and the States, and updates and notifications via the EPA Site Assessment Program website). EPA and the States should have an open and more frequent dialogue regarding available flexibility during the Site Assessment Program process to allow States to treat each site differently on a site-specific basis and not apply "one size fits all" requirements. Additionally, EPA and ASTSWMO should work together to inform EPA Regions and States of updated EPA guidance and policies offering flexibility during the Site Assessment Program process. The overarching goal is to work towards a more uniform streamlined and flexible Site Assessment Program for all States.