Generic Master Quality Assurance Project Plan

Winnebago Tribe of Nebraska, Brownfield and Tribal Response Program US EPA Cooperative Agreement No RP-977-26903

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Winnebago Tribe of Nebraska

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A2. Approval Page

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A4. Project Purpose, Problem Definition, and Background

Document List

Title of Document	Date of Document	Pertinence to this GMQAPP
Region 7 Quality Management Plan (QMP)	*April 2020 (or current version)*	*Organizations submitting QAPPs to Region 7 are considered a stakeholder in the Region 7 Quality Program and all QAPPs are to be prepared, submitted, reviewed and approved per the Region 7 QMP.*

Project Purpose and Problem Definition

A Response Program agreement was awarded to the Winnebago Tribe of Nebraska (WTN) to develop a Tribal Response Program that addresses four elements. Reasonable steps to establish these elements can include a limited number of site-specific activities, including conducting assessment/investigation and cleanup at individual sites, most commonly those over which the WTN has jurisdiction. These investigations may include numerous types of environmental investigations including, but not limited to, Phase I and Phase II Environmental Site Assessments (ESAs). The purpose of the Phase I and II (sampling and analysis) investigations within the WTNJ properties is to identify *recognized environmental conditions* (RECs) and confirm the presence or absence of contamination or determine the need for further assessment for the properties. Again, the known and/or suspected historical uses of the areas represent possible RECs for the properties. Based on the results of the data collection during any type of investigation, one of the following determinations may be made:

1. The property is "un-impacted" based on assessed conditions at the site and poses no reasonable hindrance to consideration for redevelopment that would normally be exercised by WTN.

   or,

2. The property is impacted based on measured conditions at the site and, therefore, there is a need for additional evaluation (e.g., determination of contaminant nature and extent, remedial design) or actions (e.g., remediation) prior to redevelopment of the site.

Project Background

The WTN jurisdiction (WTNJ) lies in the northern half of Thurston County in northeastern Nebraska (Figure 1). The largest community in the WTNJ is the Village of Winnebago. Located on the eastern side of the WTNJ, Winnebago is home to most Winnebago tribal members and accounts for almost thirty percent of the resident population. The closest large urban centers are Sioux City, Iowa, about 20 miles north of Winnebago, and Omaha, Nebraska, approximately 80 miles to the south.

The Winnebago reservation covers approximately 112,198 acres of cropland, woodland, and pasture and sits over three different counties that divide the acres as follows: approximately 3,200 acres in the southeast corner of Dixon County, Nebraska, approximately 108,079 acres in the northern part of the Thurston County, Nebraska and approximately 1,918 acres in the southwestern part of Woodbury County, Iowa. The Winnebago reservation southern boundary line coincides with the Omaha reservation northern boundary line. Winnebago's northern boundary line runs parallel to the Dakota-Thurston County line but is south of said line approximately 600 feet. The western boundary line parallels State Highway 16 about two miles to its east. And the eastern boundary line, for the most part, is the Missouri River except for the above-mentioned acreage in Woodbury County. Approximately one-third of the reservation is owned by the tribe and individual tribal members. Non-tribal members, however, farm much of the Indian land.

A5. Project Task Description

The work to be performed under this Generic Master Quality Assurance Project Plan (GMQAPP) includes site investigations and/or remediation. Each site will be governed by this GMQAPP along with a site-specific work plan (WP). This GMQAPP will be valid for the life of the cooperative agreement and will be reviewed annually (from the date of approval) to ensure that it remains up to date. This annual review will be documented, and a summary will be forwarded to all recipients of the QAPP with any updated materials (current laboratory certificates, resumes for new key staff, etc.) for insertion into their copies of the QAPP. If substantial changes are anticipated during the project period (new laboratories, additional analyses, new field methods, etc.), a call will be arranged with all parties that reviewed this QAPP to determine how to revise this document. Figure 1 provides a general location of WTNJ properties.

Sampling and analysis procedures will be designed to achieve the investigation objectives and to follow the data quality objective (DQO) process outlined below. For each investigation, a site-specific WP will be completed. The most likely sampling for these properties includes soil sampling using either Geoprobe®, hollow-stem auger or hand auguring; groundwater sampling using either Geoprobe® points, temporary wells or monitoring wells; and building material sampling as identified in the site-specific WP. The exact method, number, location, and frequency of samples for field activities will be identified in the WP for that property. The rationale for all sampling and

analysis will also be included in the WP. General quality assurance/quality control (QA/QC) procedures will be consistent with this GMQAPP. All site-specific documents will be reviewed and approved by WTN and the United States Environmental Protection Agency (EPA). All personnel conducting the field activities will be required to read and become familiar with this GMQAPP, as well as, the site-specific WP, and Health and Safety Plan (HASP) that they will be implementing. Copies of EPA standard operating procedures (SOPs) that are assumed to be relevant to the sampling events at WTNJ properties are included electronically in Appendix A (CD format) and are also saved in the Project file.

While the potential contaminants of concern (PCOCs) will be identified in the site-specific WP, the objective of the Brownfields investigations will be to determine if PCOCs are present in environmental media, have concentrations exceeding health based, ecological, or other criteria, and if site remediation is warranted based on exceedances of these criteria. The objective of the cleanup part of the Brownfields and Tribal Response Program is to remediate PCOCs present in environmental media with concentrations exceeding health based, ecological, or other criteria. This includes building materials which may contain lead-based paint, asbestos, or mold. Surveys to assess for the presence of these contaminants in building materials will be performed as necessary by a qualified technician to determine if additional site remediation or abatement is warranted based on the levels observed. Lead-based paint (LBP) activities conducted on the WTNJ will reference Title 178 Chapter 23 of the Nebraska Administrative Code (NAC); while asbestos containing material (ACM) activities will reference Title 178, Chapter 22. LBP and ACM activities conducted on the WTNJ are not regulated by these standards, but rather, those are the standards by which the work will be conducted. ACM is defined as any material or product which contains more than 1% asbestos. Lead-based paint is defined as paint or other surface coatings that contain lead equal to or in excess of one milligram per square centimeter or more than five-tenths (0.5) of one percent by weight in a residential dwelling or child occupied facility. There are no state or federal standards for mold activities; however, the EPA website on mold (http://www.epa.gov/mold), and EPA's Mold Remediation in Schools and Buildings will be referenced if mold is encountered.

The following analyses may be required during any or all of the projects:

- Volatile Organic Compounds (VOCs) including petroleum constituents, benzene, toluene, ethylbenzene, and xylenes (BTEX)
- Semi-Volatile Organic Compounds (SVOCs) including polychlorinated aromatic hydrocarbons (PAHs)
- Pesticides
- Herbicides
- Total Extractable Hydrocarbons (TEH)
- Metals

- Lead (only)
- Asbestos
- Mold
- Narcotics

The schedule for each project will be detailed in the site-specific WP. However, in general, investigations and remediations are planned to be initiated within 15 business days of WP approval, if feasible. Each field schedule is dependent on the number and types of samples needed and other requirements of the investigation and/or remediation. Each WP will contain schedules that are specific to that site. Completion of field activities will also be dependent on issues specific to that property, as well as weather. Shipment of samples will be delivered daily to the laboratory by overnight courier when possible. Special provisions will be made for Saturday or holiday delivery, if required. Laboratory analysis of the samples will begin upon receipt by the laboratory and will follow method protocols. Turnaround time for all samples will be standard (28 business days or less), depending on the analysis and requirements of the investigation and/or remediation

A6. Information/Data Quality Objectives and Performance/Acceptance Criteria

DQOs are qualitative and quantitative statements that clearly state the objective of a proposed project, define the most appropriate type of data to collect, determine the appropriate conditions for data collection, and specify acceptable decision error limits that establish the quantity and quality of data needed for decision making. The DQOs are based on the use of the data that will be generated. Different data uses may require different quantities of data and levels of quality.

Analytical Quality Objectives

Analytical quality objectives are used to ensure that the analysis will accurately and adequately identify the contaminants of concern, and to ensure that the analysis selected will be able to achieve method reporting limits (MRLs) that are less than or equal to the target cleanup levels.

Field Screening

Field-screening instruments provide a lower quality of analytical data compared to laboratory equipment in a controlled environment. However, field methods provide rapid “real-time” results for field personnel to help guide field decision-making processes. These techniques are often used for health and safety monitoring, initial site characterization to locate areas for detailed assessment, and preliminary comparison of remedial objectives. This type of field-screening data can include measurements of pH, temperature, conductivity, turbidity or similar monitoring data. Field measurements of pH, temperature, conductivity and turbidity should be collected during groundwater and surface water sampling activities. During sampling and other property assessment activities, the breathing space of site personnel will be monitored for the presence of VOCs using a photoionization detector (PID). A PID may be used to perform field screening of soil

and sediment samples to assist in the selection of samples to be submitted for laboratory analysis for VOCs, petroleum volatile organic compounds (PVOCs), or other types of volatile organic constituents that can be measured using a PID. Generally, the soil interval with the highest PID readings at a boring or sampling location will be submitted to the laboratory for VOC and/or PVOC analysis.

If no VOCs are detected by the PID, samples will be selected for laboratory analysis for VOCs and PVOCs, based on the following:

- Obvious discoloration, odor, or other visible signs of contamination
- If no visible or odorous signs of contamination are evident, a sample from the zone directly above the water table will be submitted
- A sample from a depth corresponding to the zone in the subsurface expected to contain the greatest concentration of contaminants will be submitted. This selection will be based on the type of release and the history of the area being investigated and will be determined by the site assessment consultant.

Depending on site conditions, other field screening equipment may be used as detailed in the site-specific WP and HASP.

Regulatory Analyses

Sample analysis will be performed in a manner consistent with EPA and Nebraska Department of Environment and Energy (NDEE) requirements to assure that data collected as part of Phase II ESAs or site investigations can be used to satisfy the requirements of these guidelines for obtaining case closure from the regulatory agencies.

Existing Data Quality Objectives

The overarching DQOs that must be met are the minimum acceptable criteria for ensuring that existing environmental data are usable for meeting the project objectives. Existing data will be assessed for any limitations and how such limitations may impact the project and any conclusions or decisions based on the use of the existing data.

The criteria for ensuring that quality data are selected and used include but are not limited to the following:

- Phase I ESAs that have been conducted in compliance with ASTM E1527-21 (ASTM 2021)
- Samples collected, preserved and analyzed using EPA and NDEE-approved methods
- Limit use and conclusions generated from sampling data greater than 5-years old, where possible
- Collected from a publicly available source
- Reports that contain the author(s) and the purpose of the report

- Reports that contain referenced sources of information

Limitations when assessing environmental data may include data quality considerations and problems as well as documentation completeness. Data will also be used consistent with any data limitations specified by the original data collector.

It should be noted that data which do not meet the objectives listed above may be used for assessment of select sites; however, such data would be qualified as data with potential use limitations as described in Section D2.

Project Quality Objectives

The project quality objectives process is a series of planning steps designed so that the type, quantity, and quality of environmental data used in decision-making are appropriate for their intended application. There are five steps in the project quality objectives process, which include problem statement, decision identification, decision inputs, assessment boundary, and the decision process. The details of these steps are provided in the following sections.

Problem Statement

WTN intends to use grant funds to conduct environmental assessments and investigations on brownfields properties with redevelopment potential. Sites of limited redevelopment potential that are otherwise identified as being priority sites for assessment may also be investigated. WTN will review the list of brownfields sites and sites of interest to help the consulting team prioritize potential sites. The evaluation process will include a review of site locations, along with discussions of neighboring property usage, relevance to WTN redevelopment interests, etc. After the evaluation process, WTN will classify each of the sites as “Not a Priority Site” or “Potential Priority Site”. Funds will be used to conduct Phase I and Phase II ESAs based on this prioritization. Phase I ESAs will identify potential environmental liabilities that may impede redevelopment or present threats to human health and/or the environment. Site-specific WPs will detail the proposed methods for identifying contaminants and assessing the hazards posed by these contaminants. The site-specific WPs will include development of a preliminary conceptual site model that will be used to inform the sampling design. Data obtained during site investigations will be used to refine the conceptual site model and improve the understanding of the environmental conditions and receptor pathways for each individual site. Exposure assessments and proposed redevelopment use of each property will be discussed in the site-specific WPs.

Decision Identification

Available information will be used to determine whether subject properties have been contaminated. To assess the potential impacts of contamination on the feasibility of property redevelopment, WTN will ask the following questions:

- Do contaminant levels exceed applicable soil, sediment, groundwater, and surface water standards outlined by EPA, NDEE, and/or risk-based cleanup standards? (Note: Applicable cleanup standards will be defined in site-specific WPs.)
- Can the contaminants be managed by eliminating exposure pathways through engineering and institutional controls?
- Will the property require remediation prior to redevelopment?
- If remediation is too costly based on the expected land use, can the property be developed for another use?

Decision Inputs

Samples of soil, sediment, groundwater, surface water, soil vapor, ACM, mold, and LBP will be collected for analysis as described in the WPs to assess the level of contamination. Analytical results will be compared to applicable cleanup standards (defined in the site-specific WP). Samples will be collected to either assess the data gaps identified from work previously completed or assess RECs noted during the Phase I ESAs. By definition, a REC is the presence or likely presence of any petroleum or hazardous substance on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any petroleum or hazardous substances into structures on the property or into the ground, groundwater, or surface water of the property or nearby properties.

Such data gaps or environmental conditions may answer the following:

- What is the level of potential exposure to surface or subsurface soils at the property?
- What is the level of potential exposure to surface water and associated sediments at the property?
- What is the level of potential exposure to groundwater at the property?
- Have past uses of the property (or adjacent properties) impacted the soil, sediment, surface water, or groundwater?
- Did past handling or storage activities, if any, impact the property?
- If any former underground storage tanks (USTs) existed on the property, does contamination exist near the area of the identified tank?
- Have former aboveground storage tanks impacted the surrounding media at the property?
- Does fill material (such as slag) used at the property contain contaminants that may impact soil, sediment, surface water, or groundwater?
- Has uncontrolled dumping or landfilling activities occurred at the property, and if so, have they impacted the soil, sediment, surface water, or groundwater?
- What is the potential for ACM, mold and/or LBP to be present?

The existing data collected for the project will be used primarily to achieve the following:

- Inform the prioritization, assessment, cleanup, and subsequent reuse of selected properties
- Develop a cleanup action plan (CAP) to reduce the risks associated with contaminated soils affecting groundwater
- Develop a CAP to reduce the risks associated with contaminated vapors adversely affecting structures or utilities
- Estimate CAP costs
- Identify environmental assessments already completed
- Identify brownfield properties where no assessments or cleanups have taken place
- Identify environmental data gaps
- Suggest abatement strategies
- Suggest possible infrastructure reuse
- Help determine viable reuses for the brownfield sites

Throughout the duration of the project, WTN will reference all existing data or information generated outside of the current project activity that will be used to make environmental decisions for the project. The following information regarding environmental data reviewed will be referenced and/or discussed in the project reports assessing existing environmental data:

- Data type
- Data source(s) (i.e., originating organization, title, and date of report/data)
- Data generator(s) (i.e., originating organization, dates)
- How data were used
- Date use limitations

Limitations when assessing environmental data may include data quality considerations/problems as well as documentation completeness. Data will also be used consistent with any data limitations specified by the original data collector.

Assessment Boundary

A site map showing the assessment boundary will be provided in each WP. Since target properties will be selected based on the results of Phase I ESAs and the nature of environmental impacts will be site-specific, detailed information regarding the assessment boundaries cannot be determined currently. However, once the target properties are identified, information regarding the assessment boundaries will be included in the associated WPs. The assessment boundary information in each WP will include the property boundaries, potential exposure areas, and sample locations and depths.

Decision Process

Cleanup planning decisions will be made on a site-by-site basis and take into consideration the nature of the release and the site, including the following factors:

- Type of potential contaminants
- Location of the site in relation to the surrounding population
- Presence of free product
- Presence and proximity of municipal utilities
- Potential for migration of vapors
- Hydrogeology of the site and groundwater use
- Use and location of wells potentially affected by the release
- Future site use

All sampling will be performed in accordance with applicable EPA Environmental Response Team (ERT) sampling SOPs to assess contaminant concentrations relative to EPA Regional Screening Levels (EPA 2024), NDEE Voluntary Cleanup Program (VCP) standards (e.g., *VCP Guidance Document Attachment A- VCP Remediation Goal Lookup Tables*) or applicable NAC standards

LBP activities conducted on the WTNJ will reference Title 178 Chapter 23 of the NAC; while ACM activities will reference Title 178, Chapter 22. LBP and ACM activities conducted on the WTNJ are not regulated by these standards, but rather, those are the standards by which the work will be conducted.

If sample results exceed the applicable cleanup standards, the response actions at any individual site will be determined not only by remedial requirements, but a wide range of considerations, restrictions, and legal and other requirements. A general approach is outlined below for the decision-making process that will be used for sites where the property owner makes a decision to proceed with the remedial alternatives process:

- If contaminant levels exceed the applicable criteria, then the property owner may opt to resample the specific locations associated with elevated contaminant levels. If any of the resample results confirm the original data, the property owner will consider the second option listed below. If all the resample results are below the applicable limits, or there is a significant disparity in the resample results, additional sampling may be performed as appropriate to confirm the reported levels.
- If soil, sediment, groundwater, surface water soil vapor, asbestos or LBP contaminant levels exceeding applicable criteria are associated only with a specific exposure pathway, the property owner may then conduct a site-specific risk assessment and pursue an exclusion of exposure pathways through the use of engineering and institutional controls.
- If an exposure pathway cannot be eliminated through engineering or institutional controls, then the property owner may develop a CAP to meet the needs of the proposed future use of the property.

Quality Assurance Objectives for Measurement

The overall QA objective for each project is to develop and implement procedures for field sampling, chain-of-custody (COC), laboratory analysis, and reporting in accordance with the State of Nebraska protocols for physical or chemical parameters subject to NDEE and EPA regulatory authority. Specific procedures for sampling, COC documentation, laboratory instrument calibration, laboratory analysis, reporting of data, internal QC, audits, preventative maintenance of field equipment, and corrective action are described in other sections of this GMQAPP.

DQOs for measurements during this project will be addressed in terms of precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS). The numerical PARCCS parameters will be determined from the project DQOs to ensure that they are met. The DQOs and resulting PARCCS parameters will require that the sampling be performed using standard methods with properly operated and calibrated equipment and conducted by trained personnel.

Precision

Precision is the degree of agreement among repeated measurements of the same parameter under the same or similar conditions. Precision is reported as either relative percent difference (RPD) or relative standard deviation, depending on the end use of the data.

Field Precision Objectives

Field precision will be assessed through the collection and analysis of field duplicate samples. RPDs will be calculated for the detected analytes from investigative and field duplicate samples. Air and water matrix samples can be readily duplicated due to their homogeneous nature; conversely, the duplication of soil and sediment samples is much more difficult due to their non-homogeneous nature. Due to this difficulty, RPDs of ±30 percent for air and water and ±50 percent for soil sample field duplicates will be used as advisory limits for analytes detected in both investigative and field duplicate samples at concentrations greater than or equal to five times its quantitation limit. RPDs for samples with reported results that are less than five times its MRL, non-detect, or estimated or rejected based on blank contamination are considered non-representative and will not be calculated. Per regulatory requirements or guidance, field duplicate samples may be provided for each matrix (sediment, surface water, etc.) sampled. The minimum number of field duplicate samples recommended for each round of sampling is one for every 20 samples. However, if there are fewer than 20 samples per matrix, one field duplicate per matrix may be submitted.

Laboratory Precision Objectives

For the analytical laboratories to be used for this project, precision of laboratory analyses will be based upon laboratory matrix spike/matrix spike duplicate (MS/MSD) and laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) analyses. Precision is reported as RPD or relative standard deviation, and the equation to be used to determine precision is presented in Section D2. LCS/LCSD and MS/MSD analyses will be performed either at a rate of one per 20 samples per matrix received by the laboratory or in accordance with laboratory SOPs.

Accuracy

Accuracy is the extent of agreement between an observed or measured value and the accepted reference, or true, value of the parameter being measured.

Field Accuracy Objectives

The objective for accuracy of the field sample collection procedures will be to ensure that samples are not affected by sources external to the sample, such as sample contamination by ambient conditions or inadequate equipment decontamination procedures. Sampling accuracy will be assessed by evaluating the results of equipment and trip blank samples for contamination.

Trip blanks will accompany sample containers and be subjected to the same handling procedures as the field samples, but will not be opened and will be shipped back to the laboratory with the samples. Trip blanks are required only when VOCs will be analyzed. Trip blanks should be submitted at the rate of one trip blank per shipping container containing field samples for laboratory VOC analysis. The trip blank samples will provide a measure of potential cross-contamination of samples by VOCs during shipment and handling.

Equipment blanks will be collected only from decontaminated, reusable field equipment, such as stainless steel split spoons. Equipment blanks will be collected by pouring laboratory-prepared water or distilled water over or through reusable field sampling equipment and collecting the rinsate in the proper analytical containers. Equipment blanks should be collected following decontamination procedures and will not be collected for dedicated or disposable field equipment. Equipment blanks will be submitted to the laboratory with the associated investigative samples and are analyzed for the same parameters as the investigative samples. The minimum required under EPA is one per 20 field samples per matrix or if less than 20 samples are collected, one equipment blank per day per sample matrix. Where possible, the use of disposable, one-time use field equipment will be emphasized.

Laboratory Accuracy Objectives

Laboratory accuracy will be assessed by determining percent recoveries from the analysis of LCS/LCSD, MS/MSD, or standard reference material samples. MS/MSD samples should be collected for organic and inorganic analyses at a minimum frequency of one per 20 or fewer samples per matrix. The equation used to determine the analytical accuracy for this project is presented in Section D2.

The accuracy of organics analyses will also be monitored through analysis of surrogate compounds. Surrogate compounds are added to each sample, standard, blank and QC sample prior to sample preparation and analysis. Surrogate compounds are not expected to be found occurring naturally in the samples but behave analytically similar to the compounds of interest. Consequently, surrogate compound percent recoveries will provide information on the effect that the sample matrix exhibits on the accuracy of the analyses.

Representativeness

Representativeness is a qualitative term that describes the extent to which a sampling design adequately reflects the environmental conditions of the site. It also reflects the ability of the sample team to collect samples and laboratory personnel to analyze those samples in such manners that the data are generated accurately and precisely reflect the conditions at the site.

Measures to Ensure Representativeness of Field Data

Representativeness will be achieved by ensuring that sampling locations are properly selected. Representativeness is dependent upon the proper design of the sampling program and will be accomplished by ensuring that this GMQAPP, the site-specific WPs, and standard procedures are followed. The QA goal will be to have all samples and measurements representative of the media sampled. Field testing for pH, temperature, and specific conductivity stabilization prior to groundwater sampling will ensure that representative samples are collected. Sufficient suspected ACM, mold, and LBP samples will be collected to accurately represent the bulk sample.

Measures to Ensure Representativeness of Laboratory Data

Representativeness of laboratory data cannot be quantified. However, adherence to the prescribed analytical methods and procedures, including holding times, blanks, and duplicates, will ensure that the laboratory data are representative.

Completeness

Completeness is defined as the measure of the quantity of valid data obtained from a measurement system compared to the quantity that was expected under normal conditions. While a completeness goal of 100 percent is desirable, an overall completeness goal of 90 percent may be realistically achieved under normal field sampling and laboratory analysis conditions.

Field Completeness Objectives

The field-sampling team will take measures to have data generated in the field be valid data. However, some samples or sample containers may be lost or broken during handling and transit. Therefore, field completeness goals for this project will be to have 90 percent of all samples be valid data. The equation for calculating completeness is presented in Section D2.

Laboratory Completeness Objectives

Laboratory completeness will be a measure of the quantity of valid data measurements and analyses obtained from all the measurements and analyses completed for the project. The laboratory completeness goal is for 90 percent of the samples analyzed to be valid data. The procedure for determining laboratory data validity is provided in Section D2. The equation for calculating completeness is also presented in Section D2.

Comparability

The confidence with which one data set can be compared to another is a measure of comparability. The ability to compare data sets is particularly critical when a set of data for a specific parameter is compared to historical data for determining trends

Measures to Ensure Comparability of Field Data

Ensuring that this GMQAPP and the site-specific WPs are adhered to and that all samples are properly handled and analyzed will satisfy the comparability of field data. Additionally, efforts will be made to have sampling completed in a consistent manner by the same sampling team using the same methodologies.

Measures to Ensure Comparability of Laboratory Data

Analytical data are comparable when the data are collected and preserved in the same manner followed by analysis with the same standard method and reporting limits. Data comparability is limited to data from the same environmental media. Analytical method quality specifications have been established to help ensure that the data will produce comparable results.

Sensitivity

Sensitivity is the ability of a method or instrument to detect a parameter to be measured at a level of interest.

Measures to Ensure Field Sensitivity

The sensitivity of the field instruments selected to measure pH, conductivity, dissolved oxygen, temperature, and turbidity of groundwater for this project will be measured by analyzing calibration check solutions, where appropriate, that equate to the lower end of the expected concentration range. The sensitivity of the PID used to screen samples for organic vapors is relative to background readings in ambient air.

Measures to Ensure Laboratory Sensitivity

The sensitivity requirements for laboratory analyses are to meet the site-specific action levels established for the site and NDEE and EPA standards, if applicable. If analytical methods are deemed to be insufficiently sensitive, alternative analytical methods may be used. Additionally, minimum laboratory detection limits that exceed applicable standards will be evaluated by determining whether the compound is expected to be a chemical of concern based on present and historical soil and/or groundwater data. Alternate analytical methods with lower detection limits may be used, and additional samples may be collected to provide an adequate usable data set to evaluate the potential presence and extent of chemicals of concern.

A7. Distribution List

Name, Title	Project Role	Organization	Contact Information
Tarah Vaughn Project Manager	Project Officer/QA Manager	EPA Region 7	11201 Renner Blvd. Lenexa, KS 66219 Phone: 913-551-7628 tarah.vaughn@epa.gov
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Brian Fettin	Consultant Project Manager	Alfred Benesch & Company	14748 West Center Road, Suite 200 Omaha, NE 68144-2029 402-333-5792 bfettin@benesch.com
Chin Lim QA Officer	Consultant QA Manager	Alfred Benesch & Company	825 'M' Street Lincoln, NE 68508 402-479-2200 clim@benesch.com

A8. Project Organization

Project activities will be organized and conducted in accordance with the Response Program cooperative agreement, this GMQAPP, and site-specific Work Plans (WPs). The WTN will retain a qualified Consultant to perform environmental consulting services for the WTN Brownfields and Tribal Response Program. This GMQAPP has been developed for WTNJ properties to address specific QA/QC requirements for these sites. The entity that will conduct the investigation and/or remediation activities for each property is referred to in the remaining part of this GMQAPP as the "Consultant." The individuals involved with the grant and their specific responsibilities are outlined below.

Ms. Victoria Kitcheyan, Tribal Chairwoman, WTN: Ms. Kitcheyan is the Tribal Chairwoman for the WTN. Her signature ensures Tribal Council knowledge and approval of the GMQAPP document.

Ms. Gerri Lyons, Brownfields / Tribal Response Specialist, WTN Brownfields and Tribal Response Program: As WTN's lead executive, Ms. Lyons will direct, approve, and coordinate all technical aspects of the grant including ensuring preparation of all deliverables meet applicable requirements of this GMQAPP. She will also manage day-to-day activities of the grant to ensure all tasks are executed in accordance with the grant and associated plans. Ms. Lyons' duties also include coordination with supporting agencies and organizations.

Ms. Tarah Vaughn, Project Manager, EPA Region 7: The EPA Region 7 Project Manager for the grant. She is responsible for grant oversight and technical assistance and ensuring that the cleanup- and investigation-related deliverables are completed in accordance with the terms and conditions of the grant. She is responsible for approving this GMQAPP and future site-specific WPs and assisting the WTN Brownfield Coordinator in ensuring that cleanup- and investigation-related deliverables are completed in accordance with the approved GMQAPP and corresponding WPs.

Ms. Diane Harris, Regional Quality Assurance Manager, EPA Region 7: The EPA Regional Quality Assurance Manager (RQAM) is Ms. Diane Harris. Ms. Harris will oversee the EPA Region 7 Quality Assurance program, which includes review and approval of this GMQAPP, as well as, conducting field audits of individual projects at the EPA Project Manager's request.

Mr. Frank Uhlarik, GMQAPP Project Manager, Stantec: The Stantec Project Manager for this GMQAPP is Frank Uhlarik. He is responsible for overseeing the preparation and approval of this GMQAPP. Mr. Uhlarik (or equivalent) will implement the final, approved version of the GMQAPP.

Ms. Sarah Von Raesfeld, GMQAPP QA Manager, Stantec: Ms. Von Raesfeld is the Stantec QA Manager and is responsible for preparing this GMQAPP. Ms. Von Raesfeld (or equivalent) is responsible for the preparation of all revisions to this GMQAPP and ensuring that review and approval are finalized.

Brian Fettin, Project Manager, Alfred Benesch & Company: The Project Manager is responsible for ensuring that field sampling and analysis are conducted in accordance with the EPA-approved plan(s) and the terms and conditions of the grant. Other responsibilities include coordination and preparation of the required reports, and assignment of technical responsibilities to appropriate personnel or subcontractors.

Chin Lim, Project Quality Assurance Manager, Alfred Benesch & Company: The Project Quality Assurance Manager (PQAM) is independent from personnel collecting or using data and is

responsible for the overall quality and consistency with respect to chemistry procedures and analytical reports. Additionally, they will provide guidance on quality control operations for field and laboratory activities related to sampling and analysis. The PQAM will coordinate with the analytical laboratories, as appropriate, to ensure readiness to implement project specific requirements, and may also conduct in-house audits of field and/or laboratory operations, conduct or oversee data validation, and prepare data usability summary report.

Field Team Leader (to be determined): The Field Team Leader will oversee all field activities and will ensure that all sampling and field activities are conducted in accordance with the WP and applicable standard operating procedures (SOPs). He or she will also oversee all Consultant Sampler and Subcontractor field activities. This person will coordinate with and report directly to the Project Manager.

Field Sampler (to be determined): The Field Sampler is responsible for all field sampling activities and will ensure that all activities are conducted in accordance with the applicable SOP. This person will coordinate with and report directly to the Field Team Leader, and will work with the Subcontractor when sampling activities are involved.

Other Subcontractors (Drillers, etc., to be determined): Subcontractors will coordinate with the Consultant Field Team Leader and/or Consultant Project Manager, and will work with the Consultant Sampler when applicable. Subcontractors may include but are not limited to drillers, dirt work personnel, and haulers.

Laboratory Project Manager: The Laboratory Project Manager will coordinate shipment, check-in, analysis and delivery of results for the project. The project manager will coordinate the receipt of the samples at the laboratory, select the analytical team and ensure internal laboratory audits are conducted per standard procedures.

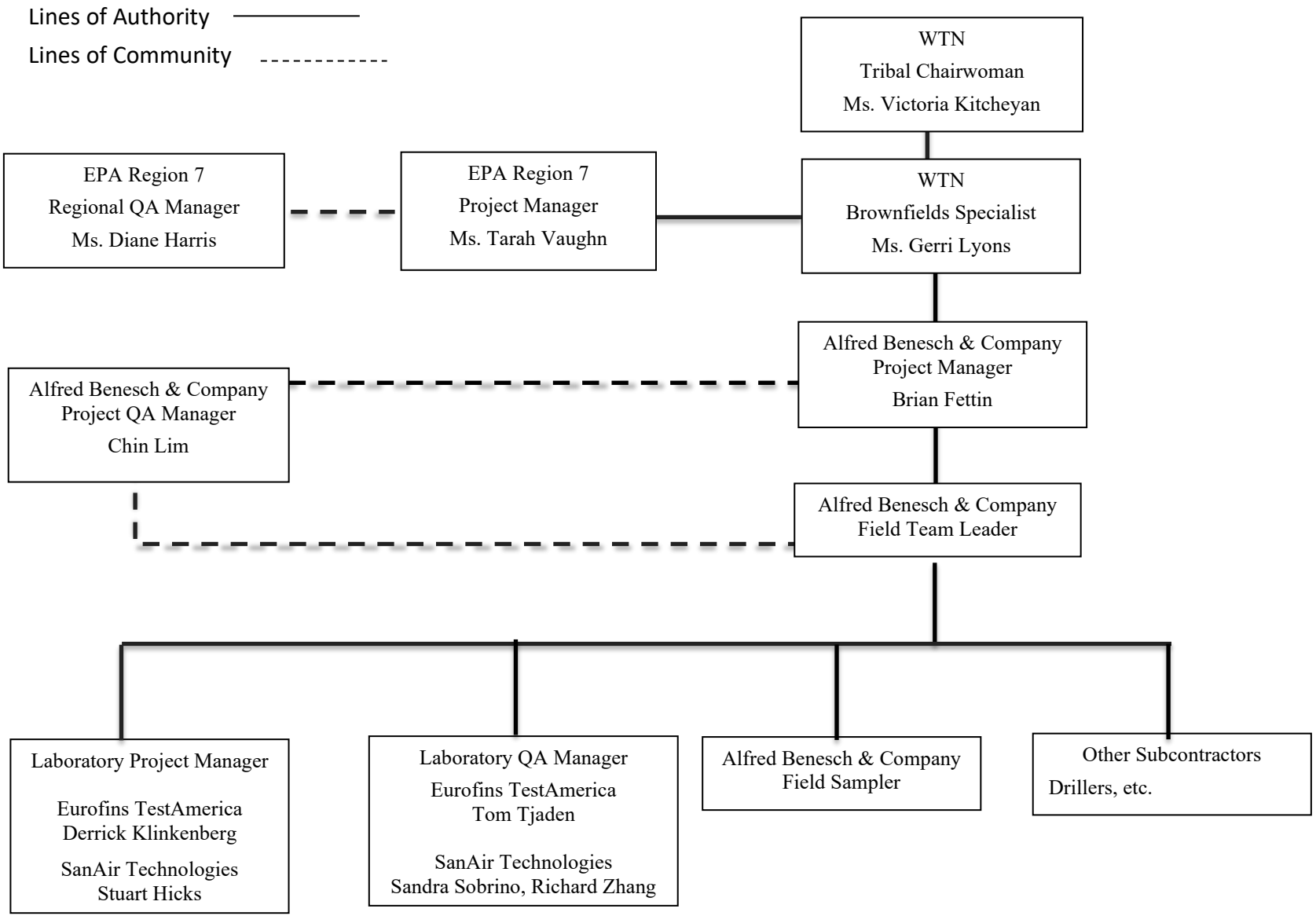
Laboratory Quality Assurance Manager: The Laboratory Quality Assurance Manager (LQAM) will coordinate laboratory validation of the data. The LQAM will ensure internal laboratory audits are conducted per the laboratory QA Manual and distribute the applicable sections of the GMQAPP and subsequent revisions/addenda to members of the analytical team. The LQAM will also report problems, if any, affecting the project data to the Consultant Project Manager and PQAM (or equivalent).

A10. Project Organization Chart and Communications

Responsibilities of key project personnel are outlined in this section. All Project team communication, management activities, and technical direction will follow this organizational arrangement. EPA Project Officer direction and/or communications will be provided to the WTN Project Manager. The WTN Project Manager will subsequently communicate these items to the

Project Manager. The Project Manager will coordinate with the team, analytical laboratories, and other subcontractors. A Project organization chart is presented below.

Figure 2 Project Organization Chart



Lines of Communication, Communication Pathways and Communication Mechanisms

Communication Driver	Individual Responsible	Mechanism	Procedure (timing, pathway, documentation, etc.)
Regulatory agency interface	WTN Project Manager	In an email	Act as liaison between NDEE and EPA. Review and approve necessary documents associated with sampling and results. Provide written notice to proceed with and approval of reports.
All project related tasks	WTN Project Manager	Can be verbal or in an email	Act as Project Manager on behalf of WTN; liaison between EPA and NDEE. Retains environmental Consultant and manages related tasks. Provide review of all site documents.
All project related tasks	Consultant Project Manager	Can be verbal or in an email	Act as Consultant to WTN, Project Technical Lead and primary point of contact for WTN for the project. Coordinate generation and review all site documents, including GWQAPP updates.
All project management related tasks	Consultant Project Manager	Can be verbal or in an email	Act as Consultant to WTN, Project Manager and secondary point of contact to WTN.
All field related tasks	Consultant, Field Team Leader	Can be verbal or in an email	Act as Consultant to WTN - lead field efforts for activities identified in this GMQAPP. Initiate corrective action on identified issues immediately or as defined during review.
Field support and Health and safety issues	Consultant, Field Team Leader	Can be verbal or in an email	Act as Consultant to WTN - conduct daily health and safety meetings and make decisions regarding health and safety issues. Communicate with Project Manager and Health and Safety Manager as appropriate.
Laboratory interface, GMQAPP updates	Consultant QA Manager	Can be verbal or in an email	Act as Consultant to WTN - implement GMQAPP and review/update GMQAPP annually. Coordinate laboratory address laboratory issues and non-conformances.

Communication Driver	Individual Responsible	Mechanism	Procedure (timing, pathway, documentation, etc.)
Data verification/ validation and management	Consultant QA Manager	Written	Act as Consultant to WTN - receive and review data packages before data is used. Initiate data validation laboratory data.

A11. Personnel Training/Certification

Sampling personnel will have completed 40-hour Hazardous Waste Operations and Emergency Response training (HAZWOPER) training, with 8-hour annual refresher training, as required by OSHA regulations (29 CFR 1910.120). Personnel conducting ACM and/or lead based paint surveys or abatement will be a certified inspector as required by the Nebraska Department of Health and Human Services (NDHHS). A sampling team consisting of a minimum of two people will perform the sampling. Project HASP(s) will be developed prior to initiating field procedures. The Consultant Project Manager and/or PQAM will be responsible for initial development of the plan. Personnel responsible for the implementation of the plan will be outlined in each HASP. On-site meetings will be conducted between consultant and subcontractor field personnel before beginning field activities to discuss the work plan, objectives of the field activities, and the HASP. The HASP will be on site during the field activities, and all personnel will be required to read and sign the HASP before conducting the associated field activities. The Consultant's Project Manager is responsible for ensuring that Project site personnel complete their annual Hazardous Waste Operations and Emergency Response refresher training. Required training will be conducted by outside vendors.

Additionally, site personnel will be properly trained in the procedures for collecting, labeling, packaging, and shipping of liquid and solid environmental samples. The Consultant Project Manager will maintain personnel training records. Field personnel will be trained to use monitoring devices and other equipment used in the field. Additional required training, certifications, and licensures will be evaluated based on the specific work to be performed (e.g., confined space, trenches, etc.).

Selected laboratories will be National Environmental Laboratory Accreditation Program, AIHA Laboratory Accreditation Program and/or A2LA certified.

Onsite drilling personnel shall have completed the applicable OSHA training. Additionally, drilling personnel will be required to comply with all site safety regulations covered in site-specific HASPs to be prepared by the site assessment consultant for each priority brownfield site for which subsurface environmental samples are collected as part of the project. Copies of HASPs will be provided to the drilling companies, which will be responsible for developing and implementing their own HASPs. Additional drillers and other subcontractors may be used for site-specific requirements (e.g., specialty drilling methods, test pits, surveys, etc.).

A12. Documents and Records

Sample Collection Documents and Records	**On-site Analysis Documents and Records**	**Off-site Analysis Documents and Records**	**Data Assessment Documents and Records**	**Other**
Field Forms / Logbooks Chain of Custody Records Air Bills Field Change Request Forms Boring Logs Standard forms from SOPs, as applicable **Generator:** Consultant Field Lead **Verification:** Consultant Project Manager and QA Manager **Storage Location:** Consultant Project File	Equipment Calibration logs Field Data Collection Logs Photographs Well Construction Diagram **Generator:** Consultant Field Lead **Verification:** Consultant Project Manager and QA Manager **Storage Location:** Consultant Project File	Sample Receipt, Custody, and Tracking Records Standard Traceability Logs Equipment Calibration Logs Sample Prep Logs Run Logs Equipment Maintenance, Testing and Inspection Logs Deviation Reports Corrective Action Forms Reported Sample Results Reported Results for Standards, QC Checks, and QC Samples Instrument Printouts (raw data) for Field and QC Samples, QC Checks Laboratory Case Narrative Lab Qualifier Definitions MDL Study Results Data Package Completeness Checklists Extraction/Cleanup	Field Sampling Audit Checklists Fixed Laboratory Audit Checklists Corrective Action Forms Analytical Sample Results Laboratory QA Plan QC Audit Reports Data Validation SOPs Data Validation Reports Data Package Completeness Checklist Validated Data Reports Self-Assessment Checklist Data Quality Assessments **Generator:** Consultant QA Manager and Laboratory QA Officer **Verification:** Consultant Project Manager **Storage Location:** Consultant Project File	Photos, maps, drawings Reports associated with work **Generator:** Consultant Team Lead and Task Manager **Verification:** Consultant Project Manager **Storage Location:** Consultant Project File

Sample Collection Documents and Records	On-site Analysis Documents and Records	Off-site Analysis Documents and Records	Data Assessment Documents and Records	Other
		Records Raw Data (stored on electronic media) Sample Disposal Records Telephone Logs, E-mail & Written Correspondence **Generator:** Laboratory **Verification:** Laboratory QA Officer **Storage Location:** Laboratory and Consultant Project File		

Section B – Implementing Environmental Information Operations

List of Guidance, Tools, Templates Used to Develop the GMQAPP

1	*GMQAPP Standard.pdf*
2	*Region 7 Basic GMQAPP Guidance and Template*, current version
3	*Guidance for the Data Quality Assessment, Practical Methods for Data Analysis*. EPA QA/G-9, QA00 Update (EPA 2000)
4	*Guidance for Quality Assurance Project Plans, (EPA QA/G-5*). EPA/240/R-02/009. Office of Environmental Information (EPA 2002).
5	*EPA Region 9 Guidance for Quality Assurance Program Plans* (R9QA/03.2) (EPA 2012)
6	*EPA Standard, Directive No. ClO 2105-S-02.1. Quality Assurance Project Plans* (EPA 2024)
7	*National Functional Guidelines for Inorganic Superfund Methods Data Review*. EPA-540-R-2020-004. Office of Superfund Remediation and Technology Innovation (EPA

	2020a)
8	*National Functional Guidelines for Organic Superfund Methods Data Review*. EPA-540-R-20-005. Office of Superfund Remediation and Technology Innovation (EPA 2020b)

B1. Identification of Project Environmental Information Operations

Sample locations, analytical parameters, and frequency of sampling are discussed in the site-specific WPs. The WP will identify procedures that will be followed should some sampling sites be inaccessible. Laboratory test parameters for the sampling program will include analysis for one or more of the parameters listed in the analytical methods table (Table 2).

Analytical parameters will be chosen based on representative contaminants most commonly associated with the former activities and/or identified areas at each property.

Sampling may occur as a stepwise process. As described in Section A6, Field Screening, appropriate field screening methods will be used to direct the investigation and select samples for laboratory analysis, thereby minimizing future field deployments. During initial sampling activities, it is expected that a variety of chemicals of concern will be analyzed. The initial results may indicate that only certain chemicals of concern are present. Therefore, later rounds of sampling will include only those specific compounds or class of compounds present in the initial sampling events.

QA/QC samples should be submitted in accordance with the GMQAPP protocols presented in the following sections.

B2. Methods for Environmental Information Acquisition

The purpose of the GMQAPP is to produce reliable data that will be generated throughout the project by doing the following:

- Ensuring the validity and integrity of the data
- Ensuring and providing mechanisms for ongoing control of data quality
- Evaluating data quality in terms of PARCCS
- Providing usable, quantitative data for analysis, interpretation, and decision making

Sampling Process Design

Sample locations, analytical parameters, and frequency of sampling are discussed in the site-specific WPs. The WP will identify procedures that will be followed should some sampling sites be inaccessible. Laboratory test parameters for the sampling program will include analysis for one or more of the parameters listed in the analytical methods table (Table 2).

Analytical parameters will be chosen based on representative contaminants most commonly associated with the former activities and/or identified areas at each property.

Sampling may occur as a stepwise process. As described in Section A6, Field Screening, appropriate field screening methods will be used to direct the investigation and select samples for laboratory analysis; thereby minimizing future field deployments. During initial sampling activities, it is expected that a variety of chemicals of concern will be analyzed. The initial results may indicate that only certain chemicals of concern are present. Therefore, later rounds of sampling will include only those specific compounds or class of compounds present in the initial sampling events.

QA/QC samples should be submitted in accordance with the GMQAPP protocols presented in the following sections. Requirements for QA/QC samples are presented in Table 1.

Analytical Methods Requirements

To preserve the integrity of samples both before and during analyses, specific analytical methods and requirements for those methods will be followed. Samples will be collected, prepared, and analyzed in accordance with the analytical methods outlined in the individual laboratory SOPs.

Proper sample containers, preservation, holding times, and volumes for each analytical parameter are outlined in Table 2. The laboratories will provide sample containers and preservatives for all samples collected for this project. Soil samples to be analyzed for VOCs will be collected and preserved in accordance with one of the four methods listed under EPA Method 5035.

All sample containers supplied by the laboratories will be cleaned according to EPA standards. QC documentation will be supplied with the sample containers and preservatives to verify their purity. The containers and preservatives can be traced back to their certificate of analysis from their lot number. The QC documentation/certificate of analysis shall be maintained on file with the project laboratories. Additionally, the project laboratories shall provide the field team with trip blanks for any VOC analyses and laboratory-grade water for rinsing field equipment and instruments.

Sample Handling and Custody Requirements

Proper sample handling and custody procedures are crucial to ensuring the quality and validity of data obtained through field and laboratory analyses. For example, the admissibility of environmental data as evidence in a court of law is dependent on the custody of the data. Custody procedures will be used to document the authenticity of data collected during the Project. The data requiring custody procedures include field samples and data files that can include field books, logs, and laboratory reports. An item is considered in custody if it is as follows:

- In a person's possession
- In view of the person after being in their possession
- Sealed in a manner that it cannot be tampered with after having been in physical possession

- In a secure area restricted to authorized personnel

Sample Collection Documentation

Sample-handling procedures include field documentation, COC documentation, sample shipment, and laboratory sample tracking. Various aspects of sample handling and shipment, as well as the proposed sample identification system and documentation, are discussed in the following sections.

Unless noted in the site-specific WPs, sampling at the locations associated with this GMQAPP will follow the applicable EPA Environmental Response Team (ERT) sampling SOPs listed below:

- #2001 General Field Sampling Guidelines, Rev. #: 0.0, 08/11/1994
- #2007 Groundwater Well Sampling, Rev. #: 1.0, 11/01/2007
- #2011 Chip, Wipe, and Sweep Sampling, Rev. #: 0.0, 11/16/1994
- #2012 Soil Sampling, Rev. 4.0, 06/11/2020
- #2013 Surface Water Sampling, Rev. #: 5.0, 12/23/2021
- #2016 Sediment Sampling, Rev. #: 1.0, 07/31/2016
- #2017 Waste Pile Sampling, Rev. #: 1.0, 07/31/2016

Other ERT SOPs that may be followed during field work include the following:

- #2006 Sampling Equipment Decontamination, Rev. #:0.0, 08/11/94
- #2043 Manual Water Level Measurements, Rev: 0.0, 02/11/00
- #2044 Monitor Well Development, Rev: 0.1, 10/23/01
- #2048 Monitor Well Installation, Rev. #: 0.0, 07/12/2001

Field Books

Detailed records of the field activities will be maintained in field books dedicated to the project. Entries will be dated and signed by personnel recording the data. The entries will be made in ink. Each field book will have a unique numerical identifier permanently attached, and each page will be numbered, permitting indexing of key data. At a minimum, information recorded in the field books will include documentation of sample locations, sampling times, types of samples collected, weather conditions, and any other information pertinent to the assessment or monitoring activity.

Field Identification System

Each sample collected during monitoring activities will be given a unique identification code, which will be defined in the site-specific WP.

Sample bottle labels appropriate for the size and type of containers shall be provided by each laboratory. The sample containers will be labeled at the time of sample collection but prior to being filled. Each label should include the following information:

- Sample identification

- Date/time of sample collection
- Sampler's initials
- Required analysis
- Type of preservative

Labels will be completed in waterproof ink.

Field Sample Handling

The possession and handling of samples will be documented from the time of collection to delivery to the laboratory. The field team leader is responsible for ensuring that COC procedures are followed. Field personnel will maintain custody of all samples until they are relinquished to another custodian, the laboratory, or the freight shipper.

All samples must be catalogued on a COC form using sample identification codes. The date and time of collection will be recorded on the form, as well as the number of sample containers, the method of preservation, and the type of analysis.

Field Sample Packaging and Shipping

Samples will be packaged and transported in a manner that maintains the integrity of the samples and permits the subsequent analyses to be performed within the prescribed holding times. Prior to shipment, each sample container will be inspected for a label with the proper sample identification code.

Samples will be either hand delivered or shipped via overnight express shipment to the laboratories. The laboratories will be contacted in advance to expect shipment so that holding times of the samples will be conserved. The COC forms will be sealed in a plastic bag and transported inside the sample cooler. In addition, any shipping receipts will be incorporated into the COC documentation. Samples will be packed in the cooler using bubble-wrap packing materials and gel-ice (a minimum of eight pieces per 48-quart cooler). Any samples suspected of being highly contaminated will additionally be sealed in a Ziploc-type bag. The cooler will be taped closed using custody seals provided by the corresponding laboratories to prevent tampering during transport. Custody seals will be placed over the front and rear of the cooler on opposing sides. Upon relinquishing the sample cooler to the project laboratories, field personnel will sign custody of the samples over to the laboratory by signing and dating the bottom of the COC form. One copy of the COC documentation will be retained by the data manager, and a second copy will be retained by the laboratory. The integrity of the custody seals shall be noted by the laboratories on the COC form upon arrival along with the ambient cooler temperature and/or temperature of the temperature blank. In addition, the shipping label will be included with the COC form retained by the data manager.

Field Documentation

Field COC procedures will ensure the proper documentation of each sample from collection in the field to delivery at the laboratory. Custody of samples shall be maintained and documented at all times. The documentation for each sample will include the following information:

- COC form
- Sample label with sample identification code
- Shipping documents

This documentation will allow for proper identification and verification of all samples upon arrival at the project laboratories performing the analyses on a particular set of samples.

Laboratory Chain of Custody

The project laboratories will perform laboratory custody procedures for sample receiving and log-in, sample storage, tracking during sample preparation and analysis, and storage of data in accordance with their SOPs. The laboratory project managers will be responsible for ensuring that laboratory custody protocol is maintained.

Final Evidence Files Custody Procedure

Each Project consultant will be responsible for their own custody of the evidence files and maintain and update the contents of the files during the project. The evidence files will include all records relevant to sampling and analysis activities such as field books, photographs, subcontractor reports, laboratory data deliverables, COC forms, and data reviews. The files will be retained for a period of at least 5 years following the formal completion date for the project as a whole.

B4. Quality Control

The QC requirements ensure that the environmental data collected are of the highest standard feasible as appropriate for the intended application. Facets of the QC requirements are provided in the following sections.

Field Quality Control Requirements

Where applicable, QC checks will be strictly followed during the assessment through the use of replicate measurements, equipment calibration checks and data verification by field personnel. Field-sampling precision and data quality will be evaluated through the use of sample duplicates, equipment blanks, and trip blanks. Sample duplicates provide precision information regarding homogeneity, handling, transportation, storage, and analysis. Equipment blanks will be used to ensure that proper decontamination procedures have been performed and that no cross contamination has occurred during sampling or transportation. Trip blanks will be used with VOCs only, to ensure that transportation of samples has not contaminated the samples. If there is any discrepancy in the sample data, the site-assessment consultant's project manager will be notified and, if deemed necessary, resampling of the questionable point will be scheduled. Requirements for field QA/QC samples are listed in Table 1. QA/QC sample quantities will also be identified in the site-specific WPs.

Laboratory QC Requirements

The laboratory QA managers will be responsible for ensuring that each laboratory's data precision and accuracy are maintained in accordance with specifications. Internal laboratory duplicates and

calibration checks are performed on one of every 20 samples submitted for analysis. Other internal laboratory QA/QC is performed according to individual laboratory SOPs. Soil, sediment, soil vapor, and water samples that are submitted for laboratory MS/MSD or duplicate analyses will have two additional sets of sample containers collected from the same location.

B5. Instrument/Equipment Calibration, Testing, Inspection, and Maintenance

The calibration procedures to be employed for both the field and laboratory instruments used during the project are referenced in this section. Measuring and test equipment used in the field and laboratory will be subjected to a formal calibration program. The program will require equipment of the proper type, range, accuracy, and precision to provide data compatible with the specified requirements and the desired results. Calibration of measuring and test equipment may be performed internally using in-house reference standards or externally by agencies or manufacturers.

The responsibility for the calibration of laboratory equipment rests with the laboratories performing the analyses. Each consultant's field personnel are responsible for the calibration of their own field equipment and field equipment provided by their subcontractors.

Documented and approved procedures will be used for calibrating measuring and testing equipment. Widely accepted procedures such as those published by EPA and ASTM or procedures provided by manufacturers in equipment manuals will be adopted.

Calibrated equipment will be uniquely identified by the manufacturer's serial number, an equipment identification number, or by other means. This identification, along with a label indicating when the next calibration is due (only for equipment not requiring daily calibration), will be attached to the equipment. If this is not possible, records traceable to the equipment will be readily available for reference. It will be the responsibility of all equipment operators to check the calibration status from the due date labels or records prior to using the equipment.

Measuring and testing equipment will be calibrated at prescribed intervals and/or as part of operational use. Frequency will be based on the type of equipment, inherent stability, manufacturer's recommendations, values given in national standards, intended use and experience. Equipment will be calibrated whenever possible using reference standards having known relationships to nationally recognized standards or accepted values of physical constants. If national standards do not exist, the basis for calibration will be documented.

Physical and chemical reference standards will be used only for calibration. Equipment that fails calibration or becomes inoperable during use will be removed from service, segregated to prevent inadvertent use, and tagged to indicate the fault. Such equipment will be recalibrated and repaired to the satisfaction of the laboratory personnel or field personnel, as applicable. Equipment that cannot be repaired will be replaced.

Records will be prepared and maintained for each piece of calibrated measuring and test equipment to document that established calibration procedures have been followed. Records for

consultant and subcontractor field equipment will be kept in the project files. The project laboratories will maintain their individual laboratory calibration records.

Field Instrument Calibration

Instruments used to gather, generate, or measure field environmental data will be calibrated with sufficient frequency and in such manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. Field measurement instruments may include but are not limited to PID units used to detect VOCs, pH meters, conductivity meters, and temperature probes. As applicable, field instruments will be calibrated daily prior to use. The calibration will be consistent with the standard procedure.

Calibration procedures will be documented in the field logbook and field sampling sheets. Documentation will include the following:

- Date and time of calibration
- Identity of the person performing the calibration
- Reference standard used, if applicable
- Reading taken and adjustments to attain proper reading
- Any corrective action.

Trained personnel will operate field measurement equipment in accordance with the appropriate standard procedures or manufacturer's specifications. The field technical staff members will examine field measurement equipment used during field sampling to verify that they are in operating condition. The field team leader will periodically audit the calibration and field performance of the field equipment to ensure that the system of field calibration meets the manufacturer's specifications.

Laboratory Instrument Calibration

The proper calibration of laboratory equipment is a key element in the quality of the analysis done by the laboratory. Each type of instrumentation and each EPA-approved method have specific requirements for the calibration procedures, depending on the analytes of interest and the sample medium.

The calibration procedures and frequencies of the equipment used to perform the analyses will be in accordance with requirements established by EPA. The laboratory QA managers will be responsible for ensuring that the laboratory instrumentation is maintained in accordance with specifications. Individual laboratory SOPs will be followed for corrective actions and preventative maintenance frequencies. Laboratory QC, calibration, corrective action, and instrument preventative maintenance procedures are discussed in the laboratory QA manuals (Appendix E).

B6. Inspection/Acceptance of Supplies and Services

Sampling containers and preservatives will be provided by the Laboratory and their supply receiving agent will do the initial review and acceptance of the supplies to verify the supplies were received as ordered. Subcontractors and laboratories must have written procedures for inspecting

and accepting supplies and consumables in their Quality Management Plans or Quality System Manuals. Personnel performing field-testing and sampling will inspect sample containers for cracks, ill-fitting lids, and obvious defects. Sample containers with obvious defects will not be used. Manufacture guidelines for proper storage of controls, reagents, and calibrators and ethanol will be strictly followed. All consumable containers will be inspected for obvious defects upon arrival by the Field Team Leader. Any consumable items that appear to be compromised in any way will be disposed of or returned to the manufacture for refund or replacement. Safety Data Sheet for each reagent/chemical will be maintained in a 3-ring binder for the project. The Field Team Leader will date and initial all supplies upon receiving and opening. Those consumables with shortened storage life after opening will have expiration dates written on the outside of the containers.

B7. Environmental Information Management

The field technical staff members will manage raw data during field activities. Data such as geologic profiles, pH readings, and pump test results, will be recorded on the appropriate field forms or in field logbooks. The Project data manager will periodically collect, verify and validate data gathered during assessment activities in order to maintain results. As appropriate, the data manager will coordinate transfer of raw data to computer formats such as Microsoft Excel, Microsoft Access or EQuIS to better organize and track incoming data. This will enable the project team to identify any data gaps. Any flaws in field QA/QC will be brought to the attention of the PQAM.

The project managers at the individual laboratories will be responsible for laboratory data management. Procedures for data review and data reporting are discussed in the individual laboratories' QA manuals. Analytical data reports generated by the laboratories will present all sample results, including all QA/QC samples. The data reports will include the following:

- A laboratory narrative for the data set describing any out-of-control analyses and their effect on sample results
- All sample results include the percentage moisture content for soil samples
- An explanation of all laboratories applied data qualifiers
- The spike and duplicate analysis results (or MS/MSD results) including the percentage recoveries and RPDs
- Surrogate results including percent recoveries (as applicable for analysis)
- Method blank results
- Laboratory control sample results including percent recoveries

The following data must be available upon request from the laboratory on a case by case basis, if data issues arise:

- Summaries of daily calibration check samples (including notation of any outliers)
- Calibration blank results

Soil results will be reported on a dry weight basis. All data, including QA/QC results, will become part of the project files and will be maintained by the site assessment consultant's data manager. Upon report delivery, the site assessment consultant's personnel will analyze laboratory data in accordance with accepted statistical methodologies.

Documentation of activities and data generated during Phase I ESA, Phase II ESA, site investigation, and monitoring activities will be stored electronically on both the WTN's and the Consultant's servers. Records to be used for project documentation include field forms, field books, laboratory data sheets, COC forms, and technical guidance documents. The Consultant and WTN will retain records generated during this project for a minimum of three years following the completion of this project. Draft copies of reports will be saved in Microsoft Word format, and final copies will be saved in the Adobe Acrobat Portable Document Format. Draft copies of spreadsheets will be saved in Microsoft Excel format, and final copies will be saved in the Adobe Acrobat Portable Document Format. All documents are available to WTN, even after contract expiration.

Section C – Assessment and Oversight

Performance and system audits will be completed to ensure that the field sampling activities and laboratory analyses are performed following the procedures established in this GMQAPP, including the attached SOPs and the site-specific WPs. The audits may be both internally and externally led, as further described below.

C1. Assessments and Response Actions

Technical Systems Audits

Generally, system audits are a qualitative measure of adherence to sampling QA measures overall, including sample collection handling, decontamination procedures, COC protocols, and recording requirements in the field, as well as sample receiving, log-in, and instrument operating records in the laboratory.

Field Data

A field technical staff member (usually trained as geologists, hydrogeologists, scientists or engineers) will be present at the site during sampling activities. The field technical staff member will provide the onsite supervision required during the project. The field technical staff member will be in daily contact with the field team leader, who will then review compliance with the project objectives and sampling protocol outlined in this GMQAPP. Any anticipated modifications to the sampling or measuring procedures will be reported to the site assessment project manager and EPA project officer. Field technical staff members will report modifications to the site assessment project manager and document the modification in the field logbook.

Sample data precision will be determined by the collection and subsequent analysis of sample duplicates, equipment blanks, and trip blanks to verify reproducibility.

Field Screening Instruments

Field technical staff members will audit and maintain the performance field-screening instruments. All field instruments will be maintained and calibrated per manufacturer specifications or applicable SOPs.

Report Preparation

All technical reports and plans completed under this grant will undergo a peer review by an experienced staff member, a final review by the project manager, and a QA/QC review prior to submittal to WTN. All components of the report will be checked and initialed by a designated team member. To expedite review times and streamline the review process, WTN may concurrently review reports or plans for select assessment sites prior to submittal to EPA.

Laboratory Data

Laboratory results will be reviewed for compliance against the DQO criteria for the level of reporting required.

Performance Evaluation Audits

Generally, performance audits are a quantitative measure of field sample collection and laboratory analyses quality.

Field Audits

Field audits will be conducted as needed to ensure that field activities are performed in compliance with project guidance documents. The field audits will focus on appropriateness of personnel assignments and expertise; adherence to project SOPs; sample collection, identification, handling, and transport; use of QA samples; COC procedures; equipment decontamination, and documentation.

The PQAM and/or Project Manager will conduct audits of field activities. At least one field audit will be completed near the beginning of the sample collection activities for the project. If more than a six month gap in field data collection activities occurs during implementation of the grant, following the initial phase, then a second field audit will be completed. Field audits may also be utilized when personnel new to the project are performing initial field investigation activities. EPA may also conduct an independent field audit.

The field audit will include the following checklist:

Item	Description of Field Audit Activities	QA Manager Initials
1.	Review of field-sampling records	
2.	Review of field-measurement procedures	

3.	Examination of the application of sample identifications following the specified protocol	
4.	Review of field instrument calibration records and procedures	
5.	Recalibration of field instruments to verify calibration to the manufacturer's specifications	
6.	Review of the sample handling and packaging procedures	
7.	Review of COC procedures	

If any deficiencies are observed during the audit, each deficiency shall be noted in writing, and a follow-up audit may be completed if deemed necessary by the PQAM and/or Project Manager. Corrective action procedures may need to be implemented due to the findings from the audit. The Consultant PQAM is responsible for corrective actions resulting from field audits. Such actions will be documented in the field logbook.

Laboratory Audits

The laboratories used to perform analytical services are appropriately certified, with documentation presented in Appendix C. The laboratory QA managers will be responsible for ensuring that the laboratory data precision and accuracy are maintained in accordance with specifications and laboratory SOPs.

C2. Oversight and Reports to Management

For long-term sampling projects, the Consultant Project Manager will meet at least weekly with field crews to discuss any problems and ensure that all planned samples are being collected. Contract laboratories will participate in Performance Evaluation studies as required to satisfy accreditation requirements. The PQAM will check the results of every sampling event for precision and completeness. Assessment and response actions will be documented and submitted to the WTN and EPA as part of a final project report.

For the duration of the project, quarterly financial and progress reports will be prepared by the Consultant project manager and submitted to the Grantee project director/manager and the EPA project officer. These reports will serve to inform WTN and EPA of the project progress and any significant interim findings that have been identified. This will streamline the process of addressing issues as they arise and adjusting the program to better achieve project objectives. The quarterly reports will be submitted in written memo form.

At the completion of the assessment a final project report will be issued At a minimum, the Phase II ESA report submittal packages will include the following:

- Text describing field-sampling methodologies, analytical results, conclusions, and recommendations.
- Figures showing property location, property boundaries, sampling locations, and summaries of impacted areas.
- Tables comparing laboratory data to the applicable standards.
- Tables summarizing QA/QC analytical results.
- Complete laboratory data reports, including copies of COC records.
- Copies of soil boring, groundwater, sediment, and surface water sampling logs.
- Other relevant material needed to support property redevelopment.
- Data Assessment Report that discusses and compares overall field duplicate precision data from multiple data sets collected for the project for each matrix, analytical parameter, and concentration level.

D – Environmental Information Review and Usability Determination

D1. Environmental Information Review

This section describes the process for documenting the degree to which the collected data meet the project objectives. The site assessment consultant will estimate the potential effect that each deviation from this GMQAPP may have on the usability of associated data items, its contribution to the quality of reduced and analyzed data, and its effects on the decision. Any quality deficiencies, non-conformances, issues, and limitations, will be documented.

The following procedures will be implemented to verify and validate data collected during the project:

- *Sampling Design* – How closely a measurement represents the actual environment at a given time and location is a complex issue. Each sample will be checked for compliance with the specifications, including type and location. Deviations from the specification will be noted and discussed with the EPA project officer.

- *Sample Collection Procedures* – Sample collection procedures identified in this GMQAPP will be followed. If field conditions require deviations, they will be discussed with the EPA project officer.

- *Sample Handling* – Deviations from the planned sample handling procedures should be noted on the COC forms and in the field logbooks. Data collection activities will indicate the events that occur during sample handling affecting the integrity of the samples.

Field technical staff members will evaluate the sample containers and the preservation methods used and ensure that they are appropriate to the nature of the sample and the type of data generated from the sample. Checks on the identity of the sample will be made to ensure that the sample continues to be representative of its native environment as it moves through the analytical process.

- *Analytical Procedures* – Each sample will be verified to ensure that the procedures used to generate the data were implemented as specified. Data validation activities will be used to determine how seriously a sample deviated beyond the acceptance limit so that the potential effects of the deviation can be evaluated.

- *Quality Control* – QC checks that are to be performed during sample collection, handling, and analysis are specified in an earlier section of this GMQAPP. For each specified QC check, the procedures, acceptance criteria, and corrective action should be specified. During data validation, the corrective actions that were taken, which samples were affected, and the potential effect of the actions on the validity of the data will be documented.

- *Calibration* – Field and laboratory instrument calibrations will be documented to ensure that calibrations achieved the following:
  - Were performed within an acceptable time prior to generation of measurement data
  - Were performed in proper sequence
  - Included the proper number of calibration points
  - Were performed using a standard that bracketed the range of reported measurement results
  - Had acceptable linearity checks and other checks to ensure that the measurement system was stable when calibration was performed

  When calibration problems are identified, any data produced between the suspect calibration event and any subsequent recalibration will be flagged to alert data users.

- *Data Reduction and Processing* – Checks on data integrity will be performed to evaluate the accuracy of raw data and include the comparison of important events and duplicate rekeying of data to identify data entry errors.

Instructions for Validation and Verification Methods

This section describes the process that will be followed to verify and validate the project data.

Verification

Field data will be verified by the site assessment consultant by reviewing field documentation and COC records. Data from direct-reading instruments used to measure conductivity, dissolved oxygen, and other field parameters will be internally verified by reviewing calibration and operating records. The laboratory data will be verified in respect to the COC, units of measure, and citation of analytical methods. Data verification procedures will include reviewing and documenting sample receipt, sample preparation, sample analysis (including internal QC checks), data reduction, and reporting. Any deviations from the acceptance criteria, corrective actions taken, and data determined to be of limited usability (i.e., laboratory-qualified data) will be noted in the case narrative of the laboratory report. The QA manager will also verify the use of blanks and duplicates. All applicable reference and identification codes and numbers will be reviewed as part of the documentation.

Validation

Data validation will be conducted consistent with the procedure identified in Section A6. The data verification/validation procedure will identify data as being acceptable, of limited usability, qualified or estimated, or rejected. The conditions that result in data being qualified or estimated or rejected are identified in Section A6. Data will be reviewed, validated, and qualified (flagged U, UJ, J, or R) in accordance with EPA guidelines for inorganic and organic data review (EPA 2020a and 2020b). The results of the data verification/validation will be provided in data validation memoranda that are provided to the project manager and are included in the QA Management Reports and DUSRs. All sampling, handling, field analytical data, and laboratory data will be validated by entities external to the data generator. The validation procedure will specify the verification process of every QC measure used in the field and laboratory.

Each analytical report will be reviewed for compliance with the applicable method and for the quality of the data reported. Data determined to be unusable may require that corrective action be taken. Potential types of corrective action may include resampling by the field team or reanalysis of the samples by the laboratory. The corrective actions taken are dependent upon the ability to mobilize the field team and whether the data are critical for the project DQOs to be achieved. If a situation requiring corrective action is identified during data verification/validation, the site assessment consultant will be responsible for approving the implementation of the corrective action.

D2. Useability Determination

This section describes the scientific and statistical procedures/methods that will be used to determine whether data are of the right type, quality, and quantity to support environmental decision making for the project.

The Data Quality Assessment (DQA) process is described in *Guidance for the Data Quality Assessment, Practical Methods* for *Data Analysis*, EPA QA/G-9, QA00 Update, July (EPA 2000). EPA QA/G-9 will be used to guide the data assessment on this project. The DQA process will consist of five steps:

1. Review DQOs and sampling design
2. Conduct preliminary data review
3. Select statistical test
4. Verify assumptions
5. Draw conclusions from the data

While the formal DQA process presented in the guidance may not be followed in its entirety, a systematic assessment of the data quality will be performed. This process will include a preliminary data review. Data will be presented in tables and figures to identify the trends, relationships, and anomalies.

The overall usability of the data for the project will be assessed by evaluating the PARCCS of the data set to the measurement performance criteria in Section A6 of this GMQAPP using statistical quantities as applicable. The procedures and statistical formulas to be used for these evaluations are presented in the following sections.

Precision

To meet the needs of the project, data must meet the measurement performance criteria for precision. Project precision will be evaluated by assessing the RPD data from the field duplicate samples. Analytical precision will be evaluated by assessing the RPD data from either duplicate spiked sample analyses or duplicate sample analyses. The RPD between two measurements is calculated using the following simplified formula:

$$\text{RPD} = \frac{\left| R_1 - R_2 \right|}{(R_1 + R_2)/2} \text{ X } 100$$

where: R_1 = value of first result

R_2 = value of second result

Overall precision for the sampling programs will be determined by calculating the mean RPD for all field duplicates in a given sampling program. This will provide an evaluation of the overall variability attributable to the sampling procedure, sample matrix, and laboratory procedures in each sampling program.

The overall precision requirement will be the same as the project precision. It should be noted that the RPD of two measurements can be very high when the data approach the MRL of an analysis. The calculation of the mean RPD will include only the RPD values for field duplicate sample analyte data that are greater than or equal to five times the MRL for an analysis.

Poor overall precision may be the result of one or more of the following:

- Field instrument variation
- Analytical measurement variation
- Poor sampling technique
- Sample transport problems
- Heterogeneous matrices

To identify the cause of the imprecision, the field-sampling design rationale and sampling techniques should be evaluated by the reviewer, and both field and analytical duplicate/replicate sample results should be reviewed. If poor precision is indicated in both the field and analytical duplicates/replicates, then the laboratory may be the source of error. If poor precision is limited to the field duplicate/replicate results, then the sampling technique, field instrument variation, sample transport or heterogeneous sample matrices may be the source of error.

If the Data Validation Report indicates that analytical imprecision exists for a particular data set, then the impact of that imprecision on data usability must be discussed in the DUSR. It should be noted that the Data Validation Report is considered to be the QA/QC report supplied by the analytical laboratory, and the DUSR will be prepared by the data validator and submitted as part of the Phase II ESA report document.

When project-required precision is not achieved and project data are not usable to adequately address environmental questions and to support project decision making, then the DUSR should address how this problem will be resolved and discuss the need for resampling or additional data qualification beyond that provided in the laboratory Data Validation Report.

Accuracy and Bias

To meet the needs of the data users, project data will follow the measurement performance criteria for accuracy and bias as described in Section D2.

Sample Contamination

Data for QC check samples will be reviewed to evaluate the accuracy and potential bias of sample results. If field contamination exists, then the impact of field contamination on data usability will be discussed in the DUSR, and the project manager and field team leader should be notified. The data may be used to differentiate between possible contamination introduced during field sample collection and transport, and contamination introduced at the time of sample preparation and analysis. It should be noted that sample contamination may result in either a negative or a positive bias. For example, improperly cleaned sample containers for metals analysis may result in the retention of metals on interior container walls. This would result in lower metals concentrations being reported than are actually present in the environmental sample, which is a negative bias. A positive bias would occur when sample container contamination results in an additive effect, meaning that the reported analyte concentrations are higher than the true sample concentrations for that analyte.

Analytical Accuracy/Bias

The data from method/preparation blank samples, equipment blank samples, trip blank sample, surrogate spikes, MS/MSD samples and LCSs will be used to determine accuracy and potential bias of the sample data. If the DUSRs indicate that contamination and/or analytical inaccuracies/bias exist for a particular data set, then the impact of that contamination and/or analytical inaccuracies/bias on data usability will be discussed on the DUSR.

Overall Accuracy/Bias

The data from the method/preparation blank samples provide an indication of laboratory contamination that may result in bias of sample data. Sample data associated with method/ preparation blank contamination will have been identified during the data verification/validation process. Sample data associated with method/preparation blank contamination are evaluated during the data validation procedure to determine if analytes detected in the samples and the associated method/preparation blanks are “real” or are the result of laboratory contamination. The procedure for this evaluation involves comparing the concentration of the analyte in the sample to the concentration of the method/preparation blank, taking into account adjustments for sample dilution and dry-weight reporting. For example, if the sample result is less than five times (ten times for common laboratory contaminants) the method/preparation blank concentration, the result is qualified by elevating the MRL to the concentration detected in the sample and flagged as undetected at the adjusted MRL.

The data from the field blanks and trip blanks provide an indication of field and transportation conditions that may result in bias of sample data. Sample data associated with contaminated field and trip blank samples have been identified during the data verification/validation process. The evaluation procedure and qualification of sample data associated with field blank and trip blank contamination is performed in the same manner as the evaluation procedure for method blank sample contamination, taking into account the difference in units for aqueous field blank samples collected during soil sampling programs.

Surrogate spike recoveries provide information regarding the accuracy and bias of the organic analyses on an individual sample bias. Surrogate compounds are not expected to be found in the samples and are added to every sample prior to sample preparation/purging. The percent recovery data provide an indication of the effect that the sample matrix may have on the preparation and analysis procedure. Sample data exhibiting matrix effects will have been identified during data verification/validation process.

MS sample data can provide information regarding the accuracy/bias of the analytical methods relative to the sample matrix. MS samples are field samples that have been fortified with target analytes prior to sample preparation and analysis. The percent recovery data provide an indication of the effect that the sample matrix may have on the preparation and analysis procedure. Sample data exhibiting matrix effects will have been identified during data verification/validation process.

Analytical accuracy/bias will be determined by evaluating the percent recovery data of LCSs. LCSs are artificial samples prepared in the laboratory using a blank matrix that is fortified with analytes

from a standard reference material that is independent of the calibration standards. LCSs are prepared and analyzed in the same manner as the field samples. The data from LCS analyses will provide an indication of the accuracy and bias of the analytical method for each target analyte.

Percent recovery is calculated using the following formula:

$$\% \text{ Recovery} = \frac{SSR - SR}{SA} \quad X\ 100$$

where: SSR = Spiked Sample Result

SR = Sample Result or Background

SA = Spike Added

The percent recovery of LCSs is determined by dividing the measured value by the true value and multiplying by 100.

Overall accuracy and bias for the sampling events will be determined by calculating the percent accuracy measurements that meet the measurement performance criteria specified in Section A6. Overall accuracy for the sampling event will be considered acceptable if the surrogate percent recoveries are met for at least 75 percent of the samples, the LCS percent recoveries are met for all samples, and the MS/MSD percent recoveries are met for at least 75 percent of the samples. Accuracy of the results for individual samples will be evaluated based on EPA standard data validation and data review protocol.

The DUSR will discuss and compare overall contamination and accuracy/bias data from multiple data sets collected for the project for each matrix, analytical parameter, and concentration level. The DUSR will describe the limitations on the use of the project data if extensive contamination and/or inaccuracy/bias exist or when it is limited to a specific sampling or laboratory analytical group, data set, analytical parameter, or concentration level. If project performance evaluation samples are analyzed, any false positive or false negative results should be reported, and the impact on data usability will be discussed in the DUSR.

When project-required accuracy and bias is not achieved and project data are not usable to adequately address environmental questions and to support project decision making, then the DUSR will address how this problem will be resolved and the potential need for resampling.

Sample Representativeness

To meet the needs of the data users, project data must meet the measurement performance criteria to sample representativeness specified in Section A6.

Representativeness of the samples will be assessed by reviewing the results of field audits and the data from field duplicate samples. If field duplicate precision checks indicate potential spatial variability, then this may trigger additional scoping meetings and subsequent resampling to collect data that are more representative of a non-homogeneous site. Overall sample representativeness will be determined by calculating the percent of field duplicate sample data that achieved the RPD

criteria specified in Section A6. Overall sample representativeness will be considered acceptable if the results of the field audits indicate that the approved sampling methods or alternate acceptable sampling methods were used to collect the samples, and the field duplicates RPD data are acceptable for at least 75 percent of the samples.

The DUSR will discuss and compare overall representativeness for each matrix, parameter, and concentration level. DUSRs will describe the limitations on the use of project data when overall non-representative sampling has occurred or when non-representative sampling is limited to a specific sampling group, data set, matrix, analytical parameter, or concentration level. If data is not usable to adequately address environmental questions and/or support project decision making, then the DUSR will address how this problem will be resolved and discuss potential need for resampling.

Sensitivity and Quantitation Limits

To meet the needs of the data user, project data must meet the measurement performance criteria for sensitivity as specified. Low point calibration standards should produce a signal at least ten times the background noise levels and should be part of a linear calibration curve (non-linear if allowed in the analytical method). The procedures for calculating method detection limits and MRLs should be documented.

The MRLs for the sample data will be reviewed to ensure that the sensitivity of the analyses was sufficient to achieve any applicable NDEE or EPA standards. The method/preparation blank sample data and LCSs percent recovery data will be reviewed to assess compliance with the measurement performance criteria specified in Section A6.

Overall sensitivity will be assessed by comparing the sensitivity for each monitoring program to the detectability requirements for the analyses. Overall sensitivity will be considered acceptable if MRLs for samples are less than the acceptable evaluation criteria.

It should be noted that MRLs may be elevated as a result of high concentrations of target compounds, non-target compounds, and matrix interferences (collectively known as sample matrix effects). In these cases, the sensitivity of the analyses will be evaluated on an individual sample basis relative to the applicable evaluation criteria. The need to investigate the use of alternate analytical methods may be required if the sensitivity of the analytical methods identified in this GMQAPP cannot achieve the evaluation criteria because of sample matrix interference.

If Data Validation Reports indicate that sensitivity and/or MRLs were not achieved, then the impact of that lack of sensitivity and/or higher MRLs on data usability will be discussed in the DUSR.

The DUSR will discuss and compare overall sensitivity and MRLs from multiple data sets collected for the project for each matrix, analytical parameter, and concentration level. The DUSR will describe the limitations on the use of the project data if project-required sensitivity and MRLs were not achieved for all project data or when it is limited to a specific sampling or laboratory/analytical group, data set, matrix, analytical parameter or concentration level.

When project related MRLs are not achieved and project data are not usable to adequately address environmental questions and to support project decision making, then the DUSR will address how this problem will be resolved and discuss the potential need for resampling. In this case, the DUSR will clearly differentiate between usable and unusable data for the users.

Completeness

To meet the needs of the data users, project data will follow the measurement performance criteria for data completeness outlined in Section A6.

Completeness will be assessed by comparing the number of valid (usable) sample results to the total possible number of results within a specific sample matrix and/or analysis. Percent completeness will be calculated using the following formula:

$$\% \text{ Completeness} = \frac{\text{Number of Valid (usable) measurements}}{\text{Number of Measurements Planned}} \text{ X } 100$$

Overall completeness will be assessed by calculating the mean percent completeness for the entire set of data obtained for each sampling program. The overall completeness for the project will be calculated when all sampling and analysis is concluded. Overall completeness will be considered acceptable if at least 90 percent of the data are determined to be valid.

The DUSR will discuss and compare overall completeness of multiple data sets collected for the project for each matrix, analytical parameter, and concentration level. The DUSR will describe the limitation on the use of the project data if project-required completeness was not achieved for the overall project or when it is limited to a specific sampling or laboratory/analytical group, data set, analytical parameter, or concentration level.

When project-required completeness is not achieved, and sufficient data are not available to adequately address environmental questions and support project decision making, then the DUSR will address how this problem will be resolved and discuss the potential need for additional resampling.

Comparability

To meet the needs of the data users, project data will follow the measurement performance criteria for comparability outlined in Section A6.

The comparability of data sets will be evaluated by reviewing the sampling and analysis methods used to generate the data for each data set. Project comparability will be determined to be acceptable if the sampling and analysis methods specified in this GMQAPP and any approved GMQAPP revisions or amendments are used for generating the soil, groundwater, sediment, and surface water data. Consistency in using the same standard methods, using the same sampling protocol, and the same analytical laboratories is critical in assessment comparability. The DUSR will discuss and compare overall comparability between multiple data sets collected for the project for each matrix, analytical parameter, and concentration level. The DUSR will describe the limitation on the use of project data when project-required data comparability is not achieved for

the overall project or when it is limited to a specific sampling or laboratory/analytical group, data set, matrix, analytical parameter, or concentration level.

Data Limitations and Actions

Sources of sampling and analytical error will be identified and corrected as early as possible to the onset of sample collection activities. An ongoing data assessment process will be incorporated during the project, rather than just as a final step, to facilitate the early detection and correction of problems, ensuring that project quality objectives are met.

Data that do not meet the measurement performance criteria specified in this GMQAPP will be identified, and the impact on the project quality objectives will be assessed and discussed within the final project report. Specific actions for data that do not meet the measurement performance criteria depend on the use of the data and may require that additional samples are collected or the use of the data to be restricted.

Tables

Table 1: Data Quality Indicators						
Analytical Parameter	**Method**	**Data Quality Measurements**				
		Precision	**Accuracy**	**Representativeness**	**Completeness**	**Comparability**
SOLID						
All chemical analyses	See Table 2	Per analytical method and/or NFGs, as applicable	Per analytical method and/or NFGs, as applicable	Blank samples and sample locations/methodologies will be used to determine if sample results are representative of site conditions.	90%, Critical samples will be identified in site-specific WPs	Standardized procedures for sample collection and analysis will be used to ensure comparability
AQUEOUS						
All chemical analyses	See Table 2	Per analytical method and/or NFGs, as applicable	Per analytical method and/or NFGs, as applicable	Blank samples and sample locations/methodologies will be used to determine if sample results are representative of site conditions	90%, Critical samples will be identified in site-specific WPs	Standardized procedures for sample collection and analysis will be used to ensure comparability
BUILDING MATERIAL AND SOLID (for Asbestos Analysis)						
Asbestos and Mold	See Table 2	Per analytical method and/or Standard Operating Procedure	Per analytical method	Blank samples and sample locations/methodologies will be used to determine if sample results are representative of site conditions	90%, Critical samples will be identified in site-specific WPs	Standardized procedures for sample collection and analysis will be used to ensure comparability

Note: Laboratory method criteria will be used when the NFGs reference these criteria or if there are no criteria in the NFGs for an issue (e.g., holding times required by the method will be used when there is no holding time requirement in the NFGs).

Table 2: Analytical Parameters, Methods, Containers, Preservation, and Holding Times

Analytical Parameter	Method (SW-846 unless otherwise noted)	Matrix	Container	Preservation	Extraction Holding Time	Analytical Holding Time
VOCs	8260D	Aqueous	2x40 ml vials with PTFE-lined septum	Cool to 4 °C (+/- 2°C), HCl to pH < 2	NA	14 days
VOCs	8260D	Solid	(1) Terracore Kit	(2) NaHSO4, (1) CH3OH, Cool to 4 °C (+/- 2°C)	NA	14 days
SVOCs	8270E	Aqueous	2 x 1-L amber glass container with PTFE-lined lid	Cool to 4 °C (+/- 2°C)	7 days	40 days
SVOCs	8270E	Solid	4 oz glass container with PTFE-lined lid	Cool to 4 °C (+/- 2°C)	14 days	40 days
Pesticides	8081B	Aqueous	2 x 1-L amber glass container with PTFE-lined lid	Cool to 4 °C (+/- 2°C)	7 days	40 days
Pesticides	8081B	Solid	4 oz wide-mouth glass container with PTFE-lined lid	Cool to 4 °C (+/- 2°C)	14 days	40 days
Herbicides	8151A	Aqueous	4 x 1-L amber glass container with PTFE-lined lid	Cool to 4 °C (+/- 2°C)	7 days	40 days

Table 2: Analytical Parameters, Methods, Containers, Preservation, and Holding Times						
Analytical Parameter	**Method** (SW-846 unless otherwise noted)	**Matrix**	**Container**	**Preservation**	**Extraction Holding Time**	**Analytical Holding Time**
Herbicides	8151A	Solid	4 oz wide-mouth glass container with PTFE-lined lid	Cool to 4 °C (+/- 2°C)	14 days	40 days
TEH	Iowa Method OA-2	Aqueous	Amber quart glass container with PTFE-lined lid.	Cool to 4 °C (+/- 2°C)	NA	14 days
TEH	Iowa Method OA-2	Solid	4 oz wide-mouth glass container with PTFE-lined lid	Cool to 4 °C (+/- 2°C)	NA	14 days
Metals (excluding mercury) or :Lead only	6010D	Aqueous	600 ml PTFE, plastic, or glass	HNO_3 to pH<2	NA	6 months
Metals (excluding mercury) or :Lead only	6010D	Solid	4 oz wide-mouth glass container with PTFE-lined lid	None	NA	6 months
Mercury	7470A	Aqueous	400 ml PTFE, plastic, or glass	HNO_3 to pH<2	NA	28 days
Mercury	7471B	Solid	4 oz wide-mouth glass container with PTFE-lined lid	Cool to 4 °C (+/- 2°C)	NA	28 days
Narcotics	HPLC-MS-MS	Aqueous	250 mL plastic	Cool to 4 °C (+/- 2°C)	NA	28 days

Table 2: Analytical Parameters, Methods, Containers, Preservation, and Holding Times						
Analytical Parameter	**Method** (SW-846 unless otherwise noted)	**Matrix**	**Container**	**Preservation**	**Extraction Holding Time**	**Analytical Holding Time**
Narcotics	HPLC-MS-MS	Solid	4 oz wide-mouth glass container with PTFE-lined lid	Cool to 4 °C (+/- 2°C)	NA	28 days
Asbestos	PLM EPA 600/R-93/116	Building Material	6.5” x 5.78” (or larger) zipper-top plastic bag	None	NA	60 days
Mold	SA SOP 104	Building Material	6.5” x 5.78” (or larger) zipper-top plastic bag	None	NA	7 days

°C = degrees Celsius
CH3OH = methanol
HCl = hydrochloric acid
HNO_3 = nitric acid
HPLC-MS-MS = high performance liquid chromatography-mass spectrometry -mass spectrometry
L = Liter
ml = milliliter
$NaHSO_4$ = Sodium Bisulfate
oz = ounce
PLM = Polarized Light Microscopy
PTFE = polytetrafluoroethylene
SA = SanAir Technologies Laboratories, Inc.
SOP = Standard Operating Procedure