QUALITY ASSURANCE PROJECT PLAN

ARKANSAS BROWNFIELD PROGRAM

Prepared by:

Arkansas Department of Energy and Environment

5301 Northshore Drive

North Little Rock, Arkansas 72118

Prepared for:

United State Environmental Protection Agency Region 6

1201 Elm Street, Suite 500

Dallas, Texas 75270

Prepared July-August 2024

Group A. Project Management and Information/Data Quality Objectives

A1. Title Page

Quality Assurance Project Plan
Arkansas Brownfield Program
Cooperative Agreement Nos. RP-01F50701, RP-02F46101, and 4W-02F47601

Prepared by:
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5301 Northshore Drive
North Little Rock, Arkansas 72118

Prepared for:
United State Environmental Protection Agency Region 6
1201 Elm Street, Suite 500
Dallas, Texas 75270

Prepared: July-August 2024
Period of Applicability: This QAPP is effective upon the approval date and will remain effective for three (3) years unless amended, replaced, or rescinded prior to expiration.

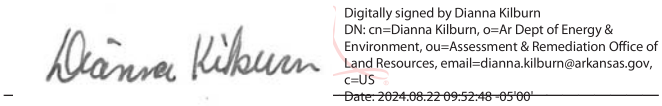
Memorandum of Agreement Date: December 21, 2000

A2. Approval Page

APPROVALS:

Operations Manager: Dianna Kilburn

Date:



08/22/2024

Quality Assurance Manager: Brie Lusk

Date:

08/22/2024

EPA Region 6 Grant Project Officer: Elizabeth Reyes

Date:

Elizabeth Reyes

09/04/2024

QAPP Revision History

Revision No.	Description	Author	Date
0	Original Version	Addie McClain	8/22/2024

A3. Table of Contents

List of Tables

List of Appendices

Abbreviations and Acronyms

AAI	All Appropriate Inquiries
ABCA	Analysis of Brownfield Cleanup Alternatives
ABS	Acrylonitrile butadiene styrene
AFIN	Arkansas Facility Identification Number
APC&EC	Arkansas Pollution Control and Ecology Commission
ASTM	American Society for Testing and Materials
bgs	below ground surface
BUILD	Brownfields Utilization, Investment, and Local Development
˚C	Degrees Celsius (or centigrade)
CA	Cooperative Agreement
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation and Liabilities Act
CFR	Code of Federal Regulations
COC	Certificate of Completion
CLP	Contract Laboratory Program
CRM	Certified Reference Material
CSA	Comprehensive Site Assessment
CWA	Clean Water Act
DEQ	Arkansas Division of Environmental Quality
DI	Deionized
DQI	Data Quality Indicator
DQO	Data Quality Objective
E&E	Arkansas Department of Energy and Environment
EPA	United States Environmental Protection Agency
ESA	Environmental Site Assessment
FID	Flame ionization detector
HASP	Health and Safety Plan

HAZWOPER	Hazardous Waste Operations and Emergency Response
HCl	Hydrochloric Acid
HNO_3	Nitric Acid
H_2SO_4	Sulfuric Acid
IA	Implementing Agreement
IDW	Investigation-derived waste
ITS	Information Technology Systems
LCS	Laboratory Control Sample
MB	Method blank
MCL	Maximum contaminant level
MDL	Method detection limit
ml	Milliliter
MOA	Memorandum of Agreement
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NGS	National Geochemical Survey
NELAP	National Environmental Laboratory Accreditation Program
OAQ	Office of Air Quality
OLR	Office of Land Resources
OSHA	Occupation Safety and Health Administration
Oz	Ounce
PED	Property Eligibility Determination
PAH	Polycyclic Aromatic Hydrocarbons
PDDD	Property Development Decision Document
PDP	Property Development Plan
PID	Photoionization detector
PCB	Polychlorinated Biphenyls
PGSSL	Protection of Groundwater Soil Screening Level
PO	Project Officer

PPE	Personal protective equipment
PG	Professional Geologist
PVC	Polyvinyl chloride
QA	Quality Assurance
QAC	Quality Assurance Coordinator
QAM	Quality Assurance Manager
QAPP	Quality Assurance Project Plan
QC	Quality Control
QL	Quantitation Limit
QMP	Quality Management Plan
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Differences
RSL	Risk-based Screening Level
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SOP	Standard Operating Procedures
SOW	Scope of Work
SRM	Standard Reference Materials
SVOC	Semi-volatile Organic Compound
TAL	Target Analyte List
TBA	Targeted Brownfield Assessment
UCSC	Unified Soil Classification System
USGS	United States Geological Survey
VOC	Volatile Organic Compound
XRF	X-ray Fluorescence

A4. Project Purpose, Problem Definition, and Background

A4.1 Introduction

The Arkansas Department of Energy and Environment's (E&E) Quality Management Plan (QMP) requires that all environmental data collection efforts mandated or supported by the United States Environmental Protection Agency (EPA) have in place a Quality Assurance Project Plan (QAPP). E&E's QMP is implemented to satisfy the policy and program requirements of the EPA Directive CIO 2105.4 and EPA Directive CIO 2105-S-02.1 as a non-EPA organization performing work on behalf of EPA through extramural agreements.

The E&E Division of Environmental Quality (DEQ) has developed this QAPP as guidance on how quality assurance (QA) and quality control (QC) procedures are applied to produce data that are scientifically valid, of documentable quality, and legally defensible.

This QAPP describes the data quality process for the Arkansas Brownfield Program (ABP) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Sections 104(k) and 128(a). It is intended to be an umbrella document covering the general procedures used to ensure high quality, usable data are produced by contractors working on brownfield projects. Approval of this QAPP authorizes DEQ to oversee sampling activities at sites enrolled in the ABP.

In addition to this Programmatic QAPP, all sampling events at brownfield sites will be conducted according to supplemental, site-specific Sampling and Analysis Plans (SAPs) or similarly named documents developed by contractors. Site-specific SAPs will be submitted to the appropriate EPA Project Officer (PO) for approval prior to the initiation of any sampling.

Throughout this QAPP and in supplemental site-specific SAPs, the following terms will be used consistently to describe whether a QA/QC activity is required or recommended by DEQ:

- *Shall*, *must*, and *will* denote DEQ's requirements to meet quality objectives;
- *Should*, *may*, and *can* denote DEQ's recommendations to meet quality objectives.

A4.2 Project Purpose

The primary goal of the ABP is to protect human health and the environment while assisting in the assessment, cleanup, and reuse of sites that meet the Federal definition of a brownfield.

The ABP provides environmental assessment and cleanup funding to eligible applicants involved in real estate transactions or property reuse planning. The ABP also provides oversight of voluntary assessments and cleanups conducted by private individuals at sites that meet the Federal definition of a brownfield. The purpose of the ABP is to facilitate the reuse of brownfield properties that will provide either economic or quality of life benefits to the surrounding community.

Environmental data collected from brownfield sites are used to identify the location, nature, and extent of contamination at brownfield sites; to evaluate the risks associated with contamination;

and to determine the remedial actions necessary to ensure safe redevelopment. These data help DEQ staff, contractors, and ABP participants determine whether further assessment and/or cleanup actions are necessary and what reuse options are available for brownfield sites.

A4.3 Problem Definition

Brownfields are properties with known or potential environmental contamination that complicates real estate transactions or site redevelopment. Prospective purchasers of such properties need to protect their interests and limit potential losses by defining environmental liability and responsibility for cleanup before taking ownership. Those involved in site reuse planning must also consider the additional costs of cleanup, and therefore have an interest in identifying environmental issues before investing in site redevelopment.

For varying reasons, prospective purchasers and property owners may not have the resources or the ability to perform environmental assessments necessary to complete a property transaction or to begin redeveloping a site. The ABP aims to provide environmental information of sufficient quality to allow prospective purchasers and property owners to complete property transfers, get sites cleaned up, and put brownfield sites back into a productive use.

A4.4 Background

The ABP operates under the authority of the following Federal and State laws and regulations:

- The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended by Superfund Amendments and Reauthorization Act (SARA) of 1986;
- The Small Business Liability Relief and Brownfields Revitalization Act of 2001;
- The Brownfields Utilization, Investment, and Local Development (BUILD) Act of 2018;
- The Arkansas Voluntary Cleanup Act of 2003; and
- The Arkansas Pollution Control and Ecology Commission (APC&EC) Rule 29, Brownfield Redevelopment.

DEQ and EPA signed a Memorandum of Agreement (MOA) dated December 21, 2000 to define the roles and responsibilities in administering and supporting the Arkansas Brownfield Program.

This QAPP describes the QA/QC procedures to be used to produce data for the ABP. Relevant planning documents pertinent to this QAPP are summarized in **Table 1** below.

Table 1. QA Planning Documents

Title of Document	Date of Document	Pertinence to this QAPP
E&E Quality Management Plan	12/14/2023 *QTRACK: 24-069*	This QAPP was developed in accordance with the organization's QMP.

Title of Document	Date of Document	Pertinence to this QAPP
Arkansas Brownfield Program 128(a) Work Plan for FFY24	Submitted to EPA 5/3/23; effective 10/1/23 to 9/30/24	Describes the activities and tasks to be completed under the Arkansas Brownfield Program using CERCLA Section 128(a) funding in FFY24.
Arkansas Brownfield Program 128(a) Work Plan for FFY25	Submitted to EPA 5/24/24; effective 10/1/24 to 9/30/25	Describes the activities and tasks to be completed under the Arkansas Brownfield Program using CERCLA Section 128(a) funding in FFY25.
Arkansas Brownfield Program Assessment Grant Work Plan for FFY25-FFY29	Submitted to EPA 6/19/24; effective 10/1/24 to 9/30/29	Describes the activities and tasks to be conducted under the Arkansas Brownfield Program using Community-wide Assessment Grant (CWAG) funding.

A4.5 Project Administration

DEQ staff serve in an administrative and technical oversight capacity for sites enrolled in the ABP. The ABP staff, Groundwater staff (Geologists), and Technical staff (Engineers and Risk Assessors) will conduct all of their QA/QC activities according to this QAPP.

All data generation under the ABP is accomplished through professional services contractors (environmental consulting firms). DEQ contractors are selected through a formal Request for Qualifications (RFQ) bidding process and are retained to perform environmental assessment, cleanup, and monitoring activities throughout the state. Because DEQ relies on contractors for sampling activities and for subcontracting analytical laboratories, these firms are an integral part of the ABP and must meet all data quality requirements established in this QAPP. The selected firms may also operate according to their own QA plans or Standard Operating Procedures (SOPs), which may be referenced in plans produced for the ABP. However, DEQ consultants must ensure that all activities conducted in support of the ABP adhere to this QAPP.

Project organization and roles are further defined in **Section A8** of this QAPP.

A5. Project Task Description

The brownfield assessment process typically involves review of historical records, coordination with environmental agencies, field investigations including sampling and laboratory analyses, evaluation of data usability, and evaluation of cleanup options and costs. The remediation process involves implementation of a DEQ-approved cleanup plan with sampling and analyses to verify that site-specific cleanup goals have been met.

ABP tasks are summarized in **Table 2** on the following page.

Table 2. Tasks, Schedules, and Products

Task	Schedule for Accomplishment	Description of Work	Products Produced
Planning and Management	Ongoing	Daily management of the ABP including program management and supervision, CA administration, legal assistance, and fiscal/contract management.	Progress reports to EPA
Program Enhancement/ Community Outreach	Ongoing	Efforts to enhance the ABP, including improvements to the process, training, reviewing assessment and remediation reports, documenting progress at sites, expanding the public record, and conducting community outreach.	Progress reports to EPA, review letters for assessments and remediation reports, Implementing Agreements (IAs), Property Development Decision Documents (PDDDs), Public Notice documents; Certificates of Completions (COCs)
Site-Specific Assessments and Cleanups	Ongoing	Targeted Brownfield Assessments (TBAs) and direct cleanups conducted by professional services contactors for sites enrolled in the ABP	Phase I Environmental Site Assessments (ESAs), Phase II ESAs and Comprehensive Site Assessments (CSAs), Asbestos Inspections, Lead-Based Paint Inspections, Remediation Reports, Quality Assurance Project Plans (QAPPs), Analyses of Brownfield Cleanup Alternatives (ABCAs); and other types of reports as needed.

QA/QC activities related to each task are described below.

A5.1 Planning and Management

Task 1 includes all program planning and management activities, including preparing and maintaining the ABP QAPP. The Brownfield Program Coordinator is responsible for conducting annual reviews and updating the QAPP as needed.

A5.2 Program Enhancement and Community Outreach

Task 2 activities include all reviews and technical oversight performed by DEQ staff. The Brownfield Program Coordinator will assign a Brownfield Project Manager to each site enrolled in the ABP. Project Managers will coordinate with contractors, provide updates to program participants, and review all work products produced by contractors. Project Managers' contact information will be included in site-specific QA documents throughout the brownfield assessment and remediation process.

Branch Managers and/or Supervisors will assign a technical team consisting of a Geologist, Engineer, and Epidemiologist (Risk Assessor) for each site that will be sampled for hazardous substances. The technical team will assist with reviews of work products produced by contractors and with producing and reviewing DEQ work products.

The Brownfield Program Coordinator and the Project Manager will both serve as points of contact between DEQ and the EPA PO(s).

A5.3 Site-Specific Assessments and Cleanups

Task 3 activities consist of Targeted Brownfield Assessments (TBAs) and remedial work performed by contractors at sites enrolled in the ABP, including all field sampling events and laboratory analyses. Sampling may be performing in one or more sampling event, depending on site needs and funding availability.

Media to be sampled under this QAPP include:

- Soil;
- Soil gas;
- Groundwater;
- Surface water;
- Sediment;
- Air; and
- Man-made/building materials (e.g. for asbestos and/or lead-based paint).

Classes of contaminants to be analyzed under this QAPP include:

- Petroleum hydrocarbons;
- Volatile organic compounds (VOCs);
- Semi-volatile organic compounds (SVOCs);
- Pesticides and herbicides;
- Polychlorinated biphenyls (PCBs);
- Metals;
- Asbestos; and
- Dioxins/furans.

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

The overall QA objective for the ABP is to develop and implement standard procedures for collection of environmental data that will provide scientifically valid results at levels sufficient to meet the data quality objectives (DQOs).

A6.1 Data Quality Objectives

DQOs are qualitative and quantitative statements that clarify project objectives, define the types of data needed, and describe the tolerable levels of potential decision errors for the project. This

QAPP outlines the broad DQOs for the ABP. DQOs for each stage of the brownfield assessment and remediation process will be further defined in site-specific SAPs produced by contractors.

In general, environmental data collected from brownfield sites will be used to:

- Identify the location, nature, and extent of contamination at brownfield sites;
- Evaluate potential threats to public health and/or the environment;
- Determine if additional investigation is needed;
- Develop remediation plans and estimate costs; and
- Verify attainment of cleanup goals and/or determine if additional remediation is needed.

DEQ will require contactors to submit a site-specific SAP prior to conducting any field sampling activities. Site-specific SAPs must describe field activities, including the following components:

- A description of the brownfield project with relevant background information;
- A list of project members, their roles and responsibilities, and their contact information;
- A distribution list identifying all individuals who will receive a copy of approved the site-specific SAP and any subsequent revisions;
- Specific DQOs for the sampling event;
- A sampling plan, including the location, number, and media of the samples to be collected;
- Sampling procedures, including equipment needed for sampling;
- Field equipment calibration and decontamination procedures;
- Field documentation procedures, including sample handling and custody;
- The number and type of field Quality Control (QC) samples to be collected and submitted for analysis (trip blanks, rinsate blanks, duplicate samples, etc.). The collection rate for QC samples shall follow the guidance in **Table 3** at a minimum;
- The analytical methods and the minimum detection limits and reporting limits that the selected laboratory must achieve;
- The analytical and QC elements (blanks, replicates, fortified samples, etc.) and assessment criteria that laboratories must meet, if these differ from the laboratory's Quality Assurance Manual. Default laboratory QC requirements for analyses of samples from brownfield sites are provided in **Table 3**;
- Reporting requirements and formats for laboratory data (reporting limits, data flagging, etc.). All laboratory data shall include supporting QC data;
- Any additional sampling, analytical, or QA/QC requirements that differ from those established in this Programmatic QAPP;
- The screening levels that will be used to evaluate risk associated with the analytical results;
- A site-specific Health and Safety Plan (HASP) detailing the potential hazards associated with the site and how the contractor will ensure the safety of personnel during field activities.

If the general procedures described in this QAPP sufficiently describe planned field activities, then the site-specific SAP may simply reference this QAPP and outline any additions or deviations.

Contractors will ensure that pertinent documentation is maintained by field personnel during all site-related activities. Any deviations from pre-approved plans will be documented in a bound logbook. Throughout all site sampling events, personnel will maintain chain-of-custody forms. Copies of logbook records and chain-of-custody forms will be included in final work products. Field documentation requirements are described in greater detail in **Section A12.4**.

A6.2 Data Quality Indicators

Environmental data from brownfield sites must meet specific acceptance criteria related to sensitivity, precision, accuracy, representativeness, comparability, and completeness. These data quality indicators (DQIs) are discussed in greater detail in **Section D1** in the context of environmental information reviews.

DEQ contractors will be responsible for selecting and coordinating with an analytical laboratory that is accredited for all applicable parameters by DEQ. Further discussion of laboratory QC requirements is included in **Section B4.2.**

Table 3 below lists general field and laboratory QC requirements and associated acceptance criteria.

Table 3. Field and Laboratory QC Elements and Acceptance Criteria

	QC Sample Type	Frequency	Media*	Analyte Type**	Acceptance Criteria
Field QC	Trip Blank	1 per cooler	All	Organic	Only required when collecting VOCs
	Rinsate Blank	1 per 20 field samples (or at least 1 per day if less than 20 samples)	All	All	< method reporting limit, **or** <10% of the lowest concentration identified in any sample
	Field Duplicate	1 per 20 field samples (or at least 1 per day if less than 20 samples)	Air, water	Inorganic	RPD +/- 20% for concentrations >5X the QL, **or** absolute difference ≤ QL for average concentrations ≤ QL
				Organic	RPD +/- 30% for concentrations >5X the QL, **or** absolute difference ≤ QL for average concentrations ≤ QL
			Solids, non-aqueous liquids	Inorganic	RPD +/- 30% for concentrations >5X the QL, **or** absolute difference ≤ QL for average concentrations ≤ QL
				Organic	RPD +/- 35% for concentrations >5X the QL, **or** absolute difference ≤ QL for average concentrations ≤ QL
Laboratory QC	Method Blank (MB)	5% for each preparation	All	All	<1/2 QL or <10% of the lowest concentration identified in the sample
	Laboratory Duplicates or Matrix Spike Duplicate (MSD)	5% for each media sampled	Air, water	Inorganic	RPD +/- 20% for concentrations >5X the QL, **or** absolute difference ≤ QL for average concentrations ≤ QL
				Organic	RPD +/- 30% for concentrations >5X the QL, **or** absolute difference ≤ QL for average concentrations ≤ QL

	QC Sample Type	Frequency	Media*	Analyte Type**	Acceptance Criteria
			Solids, non-aqueous liquids	Inorganic	RPD +/- 30% for concentrations >5X the QL, **or** absolute difference ≤ QL for average concentrations ≤ QL
				Organic	RPD +/- 35% for concentrations >5X the QL, **or** absolute difference ≤ QL for average concentrations ≤ QL
	Laboratory Fortified Sample (Matrix Spike/MS)	5% for each preparation	Air, water	Inorganic	Recovery: 80-120%
				Organic	Recovery: 60-140%
			Solids, non-aqueous liquids	Inorganic	Recovery: 70-130% for at least 80% of analytes
				Organic	Recovery: 50-120% for at least 80% of analytes
	Surrogate	Each sample	All	Organic	Recovery: 50-150%
	Laboratory Control Sample (LCS)	1 per batch	All	Inorganic	Recovery: 85-115%
				Organic	Recovery: 75-130%***

Notes:

* Water refers to all aqueous media containing less than 15% settleable solids (drinking water, groundwater, surface water, waste effluent, etc.). Solids refers to all aqueous media containing greater than 15% settleable solids (soils, sediments, sludges). Non-aqueous liquids refers to any non-water substance containing less than 15% settleable solids (fuels, oils, solvents, etc.). Air refers to all media in a gaseous state at ambient conditions at the time of sampling.

** Inorganic analyses include all metals, nutrients, and anions. Organic analyses include petroleum hydrocarbons, volatile and semi-volatile organic compounds, pesticides, herbicides, PCBs, and dioxins/furans.

*** May not apply to compounds that are known to be problematic.

The ABP uses risk-based screening levels to evaluate risk during the assessment stage and to determine whether additional assessment activities are needed. The following screening levels will be used to evaluate risk at brownfield sites:

- **EPA Regional Screening Levels (RSLs)** will be used to evaluate risk to human receptors. Residential soil screening levels will be used in the brownfield assessment stage. DEQ will use Maximum Contaminant Levels (MCLs), when available, to evaluate groundwater risk to human receptors. When an MCL is not available, DEQ will use Tapwater RSLs to evaluate groundwater risk to human receptors.
- **EPA Vapor Intrusion Screening Levels (VISLs)** will be used to evaluate risk to human health from soil gas.
- **Protection of Groundwater Soil Screening Levels (PGSSLs)** will be used to evaluate the risk of soil contamination migrating to groundwater.
- **EPA Region 4 Ecological Screening Levels** will be used to evaluate the risk to ecological receptors surrounding the brownfield site.

Samples collected from the site will be compared to site-specific background samples collected during each sampling event. Background samples aid in determining whether contaminants found

at a site are from a site source, if their presence could be attributed to an up-gradient source, or if the contaminants could be naturally occurring in the environment.

The locations of background samples shall be identified in site-specific SAPs. Whenever possible, background samples will be collected from the brownfield site to eliminate the need for additional access agreements from surrounding property owners. Soil background samples will be collected from locations that are topographically up-gradient from suspected areas of contamination at the site. Background surface water samples will be collected upstream from the site. Background groundwater samples will be collected from the up-gradient portion of the site in terms of groundwater flow direction. Background air samples of outdoor air will be collected from the up-wind portion of the site. If collecting background samples from the brownfield site is not possible, the contractor will discuss collection of off-site background samples with the Project Manager to ensure that property access can be secured.

When collecting background samples is not feasible, DEQ may use the United States Geological Survey (USGS) National Geochemical Survey (NGS) database to compare site sample results to established "background" concentrations for metals. DEQ typically does not require sites to be cleaned up to below naturally occurring concentrations of metals.

During the remediation stage, DEQ will define site-specific, risk-based cleanup levels in the site's cleanup plan.

A7. Distribution List

Table 4 includes DEQ staff responsible for implementing independent internal quality management steps, DEQ staff serving in oversight roles, and points of contact for the contactors that will perform field sampling activities for the ABP.

This QAPP will be distributed to all staff and contractors presented in **Table 4**. Additionally, the QAPP will be provided to any unlisted staff and any unlisted contractors or subcontractors who are subsequently assigned to perform work for the ABP.

Table 4. QAPP Distribution List

Name	Organization	Role
Christy Warren	EPA Region 6	Quality Assurance Manager
Elizabeth Reyes	EPA Region 6	EPA Brownfields Section 128(a) Grant Project Officer
James Waldo	EPA Region 6	EPA Brownfields Assessment Grant Project Officer
Alan York	E&E	Director of Operations (Senior Manager)
Bryan Leamons	E&E	Associate Director
Nick Jones, PE	E&E	Senior Operations Manager

Name	Organization	Role
Dianna Kilburn, PG	E&E	Assessment & Remediation Operations Manager (Program Manager)
Addie McClain	E&E	Brownfield Program Coordinator
Jonathan Burns	E&E	Brownfield Project Manager
Brock Huerkamp	E&E	Brownfield Project Manager
Blake Whittle, PG	E&E	Groundwater Branch Manager
Matthew Carey, PG	E&E	Geology Supervisor
Candice Cone	E&E	Geologist
Anna Griffiths	E&E	Geologist
Jordan Anderson	E&E	Geologist
Doug Ritchie	E&E	Risk Assessment/Epidemiology Supervisor
Tyler Wright	E&E	Epidemiologist
Megan Ruffin	E&E	Epidemiologist
Mark Moix, PE	E&E	Corrective Action Engineer Supervisor
Clay McDaniel	E&E	Engineer
Giovanni Cruz	E&E	Engineer
Christy Coker	E&E	Engineer
Maunish Shah	E&E	Engineer
Vacant	E&E	OLR Quality Assurance Coordinator
Brie Lusk	E&E	E&E Quality Assurance Manager
Emily Brickman	EnSafe, Inc.	Professional Services Contractor
Jeffrey Mitchell	Tetra Tech	Professional Services Contractor
Mary Clerget	AECOM	Professional Services Contractor
Mark Koch	Olsson Associates	Professional Services Contractor
Bob Smith	Environmental Enterprises Group, Inc.	Professional Services Subcontractor
Rusty Rizzo	Walker-Hill Environmental	Professional Services Subcontractor
John Overby	Eurofins Arkansas	Professional Services Subcontractor
Nikolay Nedkov or Scott Anderson, PE	OWN, Inc.	Professional Services Subcontractor
Steven Head or Aaron Musick	McClelland Consulting Engineers, Inc.	Professional Services Subcontractor
Robert Roberson	Safety & Environmental Investigations, Inc.	Professional Services Subcontractor
Kerrie Diaz	Snyder Environmental & Construction, LLP	Professional Services Subcontractor
Jeremy Blaylock	Environmental Protection Associates	Professional Services Subcontractor
Mark Wilder	HEPACO	Professional Services Subcontractor
Wes Vance	Pace Analytical	Professional Services Subcontractor
Katie Bialy	Valicor Environmental Services, Inc.	Professional Services Subcontractor
Stephen Neal	Waste Services, Inc.	Professional Services Subcontractor

A8. Project Organization

The ABP is administered by the Office of Land Resources (OLR) at DEQ. This section describes the roles of key personnel involved in the implementation of this QAPP, both inside and outside E&E.

All personnel participating in or observing field activities will have stop-work authority to ensure worker safety.

A8.1 E&E and DEQ Staff Roles

E&E and DEQ staff will serve in an administrative and technical oversight capacity for sites enrolled in the ABP. Each staff member will perform the functions listed beneath their title.

Senior Operations Manager
Arkansas Department of Energy & Environment - Office of the Secretary

- Senior Manager with executive leadership authority for E&E.

Project Quality Assurance Manager (QAM)
Arkansas Department of Energy & Environment – Division of Environmental Quality - Office of Water Quality

- Provides final approval of the ABP QAPP;
- Oversees E&E's QA program;
- Prepares, updates, and revises the agency's QMP;
- Conducts internal reviews; and
- Serves as the main point of contact between E&E and EPA Region 6 Office of Quality Assurance.

OLR Quality Assurance Coordinator (QAC)
Arkansas Department of Energy & Environment - Division of Environmental Quality - Office of Land Resources

- Oversees OLR QA programs;
- Conducts or schedules audits by the QAM; and
- Reports QC failures or project-related problems to the QAM.

Assessment & Remediation Operations Manager
Arkansas Department of Energy & Environment - Division of Environmental Quality - Office of Land Resources - Operations - Assessment & Remediation

- Provides approval of the ABP QAPP; and
- Provides policy and technical oversight for the ABP.

Brownfield Program Coordinator
Arkansas Department of Energy & Environment - Division of Environmental Quality - Office of Land Resources - Operations - Assessment & Remediation - Arkansas Brownfield Program

- Project Operations Manager (Program Coordinator) for the ABP;
- Prepares the ABP QAPP and conducts annual reviews;
- Assigns a Brownfield Project Manager for each new site enrolled in the ABP;
- Provides oversight to Brownfield Project Managers;
- Reviews work products produced by Brownfield Project Managers;
- Updates ACRES and ABP Database;
- Manages Cooperative Agreements (CAs); and
- Serves as the main point of contact between DEQ and the EPA POs for CA management.

Brownfield Project Managers
Arkansas Department of Energy & Environment - Division of Environmental Quality - Office of Land Resources - Operations - Assessment & Remediation - Arkansas Brownfield Program

- Serve as site-specific Brownfield Project Managers for the duration of the brownfield assessment and remediation process;
- Produce work products described in Table 2, Task 2;
- Review contractor-produced work products described in Table 2, Task 3;
- Oversee contractor field implementation at brownfield sites; and
- Update internal databases as brownfield sites progress.

Groundwater Branch Manager
Arkansas Department of Energy & Environment - Division of Environmental Quality - Office of Land Resources - Operations - Assessment & Remediation - Arkansas Brownfield Program - Groundwater Branch

- Provides oversight for Geologists working on ABP assignments.

Geology Supervisor
Arkansas Department of Energy & Environment - Division of Environmental Quality - Office of Land Resources - Operations - Assessment & Remediation - Arkansas Brownfield Program - Groundwater Branch

- Assigns a Geologist to the technical team for the duration of the brownfield assessment and remediation process; and
- Provides oversight for Geologists working on ABP assignments.

Geologists
Arkansas Department of Energy & Environment - Division of Environmental Quality - Office of Land Resources - Operations - Assessment & Remediation - Arkansas Brownfield Program - Groundwater Branch

- Serve as members of the technical team for the duration of the brownfield assessment and remediation process.

Risk Assessment Supervisor
Arkansas Department of Energy & Environment - Division of Environmental Quality - Office of Land Resources - Operations - Assessment & Remediation - Arkansas Brownfield Program - Technical Branch

- Assigns an Epidemiologist to the technical team for the duration of the brownfield assessment and remediation process; and
- Provides oversight for Epidemiologists working on ABP assignments.

Epidemiologists
Arkansas Department of Energy & Environment - Division of Environmental Quality - Office of Land Resources - Operations - Assessment & Remediation - Arkansas Brownfield Program - Technical Branch

- Serve as members of the technical team for the duration of the brownfield assessment and remediation process.

Engineering Supervisor
Arkansas Department of Energy & Environment - Division of Environmental Quality - Office of Land Resources - Operations - Corrective Action

- Assigns an Engineer to the technical team for the duration of the brownfield assessment and remediation process; and
- Provides oversight for Engineers working on ABP assignments.

Engineers
Arkansas Department of Energy & Environment - Division of Environmental Quality - Office of Land Resources - Operations - Corrective Action

- Serve as members of the technical team for the duration of the brownfield assessment and remediation process.

A8.2 Contractor Roles

DEQ contractors will:

- Develop site-specific SAPs in accordance with this QAPP, working closely with the DEQ Brownfield Project Manager;
- Communicate DQOs to laboratories analyzing samples collected from brownfield sites;
- Assemble project teams, implement field work, and coordinate sample analyses;
- Verify proper function of all equipment before beginning field activities;
- Ensure the proper number, type, and quantity of sample containers, including preservation methods, are available for field activities;
- Follow standard sampling procedures as defined in this QAPP or in the site-specific SAP;
- Record all field data in accordance with this QAPP or the site-specific SAP;
- Follow all applicable SOPs to ensure samples are collected, preserved, labeled, packaged, and shipped to laboratories in an appropriate manner;
- Prepare reports described in Table 2, Task 3, evaluating and summarizing all brownfield site activities, sample results, and recommendations for further actions; and
- Perform data validation as required.

A8.3 Analytical Laboratory Roles

Subcontracted analytical laboratories will:

- Maintain accreditation by DEQ's Environmental Laboratory Accreditation Program;
- Understand and follow DQOs outlined in this QAPP and site-specific SAPs;
- Perform the requested analyses using appropriate test methods specified in the QAPP and site-specific SAPs;
- Satisfy laboratory QA/QC objectives and activities;
- Prepare laboratory reports for contractors, including all data and QC reports;
- Communicate any analytical issues or concerns to the contractor in a timely manner; and
- Initiate corrective action measures when deficiencies in sample collection, preservation, handling, test methods, or documentation are identified.

A9. Project Quality Assurance Manager Independence

The QAM for E&E operates independently from any DEQ staff and contractors producing data for the ABP. The QAM has the authority to access and discuss quality-related issues with E&E's senior manager outside of their direct supervisory chain as necessary. The OLR QAC reports directly to the QAM for quality-related issues.

A10. Project Organization Chart and Communications

See **Appendix A** for the Project Organization Charts.

A11. Personnel Training/Certifications

DEQ staff are not permitted on a potential or known hazardous substance site without an escort until they have completed 40 hours of Hazardous Waste Operations and Emergency Response (HAZWOPER) training as required by applicable Occupational Safety and Health Administration (OSHA) regulations (29 CFR 1910.120). DEQ also requires personnel to obtain 8-hour annual refresher courses, according to OSHA 1910.120, once during each calendar year. All employees are offered QA courses from EPA when available.

Contractors are responsible for ensuring their field personnel are trained on relevant OSHA guidelines, as well as acceptable sampling techniques, sample collection, preservation and sample handling, field instrument operation, and documentation procedures.

Contractors working on asbestos projects are required to be certified through the E&E-DEQ Office of Air Quality (OAQ) Asbestos Section and contractors working on lead-based paint projects are required to be accredited through the Arkansas Department of Health (ADH) Lead-Based Paint Program. Per Arkansas Code Annotated § 17-32-301(c)(d), any report containing geologic interpretations (i.e. sediment, soil, groundwater), must contain the stamp of an Arkansas registered Professional Geologist (PG). All certifications must be current at the time that site work is being performed.

A12. Documents and Records

A12.1 Project Files and Document Retention

Each brownfield site will be assigned a location-specific Arkansas Facility Identification Number (AFIN) for use in DEQ documents and databases. All documents and records produced for the ABP will be maintained in site-specific project folders in the department-wide computer system. Additionally, copies of work products will be archived in DEQ's digital file management system.

Document retention procedures are outlined in the E&E QMP. At present, DEQ plans to retain ABP project files indefinitely.

Contractors are responsible for developing their own document retention and archival policies and procedures.

A12.2 Work Products

Typical documents and records to be produced under the ABP include, but are not limited to, the following:

- Application forms submitted by potential ABP participants;
- Written correspondence between DEQ and ABP participants;
- Written correspondence between DEQ and contactors;
- Property Eligibility Determination (PED) forms submitted to EPA POs;
- Progress reports submitted to EPA POs;
- Scopes of Work and Cost Estimates;
- Site-specific SAPs;
- Environmental Site Assessments;
- Hazardous Materials Surveys;
- Implementing Agreements between DEQ and ABP participants;
- Property Development Plans (PDPs);
- Analysis of Brownfield Cleanup Alternatives (ABCAs) and Property Development Decision Documents (PDDDs);
- Remedial Reports;
- Field notes and records;
- Chain-of-custody forms;
- Laboratory analytical reports; and
- Photographs.

Changes to SAPs, analytical reports, and any other formal written documentation produced under the ABP will require a correction or addendum to be attached to the front of the original document. Alternatively, a revised document may be produced if the revision is clearly noted in the document's title and clearly supersedes the original document. Both original and revised versions of documents will be retained in project files.

Per Arkansas Code Annotated § 17-32-301(c)(d), any report containing geologic interpretations (i.e. sediment, soil, groundwater), must contain the stamp of an Arkansas registered Professional Geologist (PG).

A12.3 Field Documentation

Proper field documentation ensures that field activities are conducted in an accurate, methodical, and reproducible manner and that sample integrity is maintained from the time of collection through transport, storage, and chemical analysis.

Field personnel will record all field data in a bound logbook dedicated to the brownfield project. When contemporaneous activities are being conducted at a brownfield site, more than one field logbook may be required. A new page shall be used for field note entries. DEQ does not require a standard format for daily field note entries, however the following elements must be included with each day's entry:

- The date;
- The project location;
- The contractor's and any subcontractors' arrival times;
- Weather conditions and temperature;
- Names, affiliations, and roles of all personnel onsite;
- Field instruments being used and calibration records, if applicable;
- Levels of personal protective equipment (PPE) being used;
- Any deviations from planned field activities;
- References to other field forms used;
- References to any photographs taken, including the location, photographer, date and time, direction, and a description of each photograph;
- Pertinent conversations with any site visitors (DEQ staff, property owners, citizens, etc.);
- Detailed descriptions of each task undertaken for the day, including starting and ending times for each task, lunch and other break times, and any work stoppages.

If site sketches or diagrams are included in field notes, the approximate scale should be included. Alternatively, the individual taking field notes may indicate that the drawing is "not to scale."

Sampling activities may be documented in the field logbook or on separate sampling forms. Regardless of the format, the following information shall be recorded when describing sampling activities:

- Sample location descriptions;
- Unique sample IDs;
- Collection times;
- Designation of the sample as a grab or composite sample;
- Media of the sample;
- Environmental measurement data (pH, temperature, specific conductivity, turbidity, etc.);

- Field observations (odors, color, etc.);
- Type of preservative used;
- Instrument readings, if applicable.

At the end of each day of field activities, the following information shall be recorded in the field logbook:

- A description of decontamination procedures used (equipment and personnel);
- A description of any investigation-derived wastes (IDW) and how they were handled;
- A summary of which planned activities were completed and which were not;
- The contractor's and any subcontractors' departure times;
- A summary of any activities that were conducted after departure from the site (paperwork, sample packing and shipping, etc.)

All original data recorded in field logbooks, chain-of-custody forms, and other forms or labels shall be written in waterproof ink. These documents shall not be discarded, regardless of legibility or inaccuracies that require a replacement document. If an error is made on a document assigned to an individual, that individual shall make necessary corrections by crossing through the error in a single line, entering the correct information, and initialing the correction.

Group B. Implementing Environmental Information Operations

DEQ contractors are responsible for implementing environmental data collection at brownfield sites. DEQ staff will serve in an administrative and technical oversight capacity.

B1. Identification of Project Environmental Information Operations

Environmental information operations to be conducted under this QAPP include:

- Use of existing information;
- Field activities/sampling events; and
- Laboratory analyses.

Data collected from brownfield sites will allow DEQ to make recommendations on the feasibility of cleanup and redevelopment options consistent with the protection of human health and the environment.

B2. Methods for Environmental Information Acquisition

The following subsections describe the standard methods used to acquire data for the ABP.

B2.1 Existing Information

DEQ staff will use existing information to evaluate potential brownfield sites to ensure they meet criteria for enrollment in the ABP. This data will be obtained from property owners and prospective purchasers, county records, DEQ records, or Federal information databases and tools. All existing data collected for the purpose of determining site eligibility will be submitted to the appropriate EPA PO in a PED form prior to any site assessment.

Contractors will use existing information to complete Phase I ESAs, including review of historical records and review of local, State, or Federal environmental records. All Phase I ESAs completed for the ABP are performed in accordance with the latest American Society for Testing and Materials (ASTM) International standard practice (currently ASTM E 1527-21) and comply with the All Appropriate Inquiries (AAI) Final Rule at 40 Code of Federal Regulations (CFR) Part 312.

B2.2 Field Activities/Sampling Events

Brownfield projects typically involve sampling of soil and groundwater; however, other medias such as soil gas, surface water, sediment, air, and man-made building materials may also require sampling.

B2.2.1 Sampling Design

Sampling plans for brownfield sites will consider site conditions as they relate to known or suspected releases of hazardous substances. Plans will be developed according to the specific needs and phase of each brownfield site. Typical plans may focus on establishing a baseline for existing contamination at a site, filling data gaps from previous investigations, or documenting that a remedial action has been completed according to site-specific cleanup goals.

Contractors will be responsible for coordinating with the appropriate analytical laboratory for proper sampling containers, forms, and equipment at least two weeks prior to conducting field activities. Any field activities involving sampling will require a site-specific SAP to be submitted by the contractor for DEQ and EPA approval prior to initiating field activities. These plans must include the information listed in **Section A6** of this QAPP.

Sampling equipment will be assembled based on the type of samples to be collected from the site. All sampling equipment will be checked for proper calibration, assembly, and operation prior to use. Sampling equipment will be transported in a manner that will preserve its cleanliness.

B2.2.2 Field Equipment Decontamination

Disposable and/or dedicated sampling equipment should be used whenever possible to avoid cross-contamination and to protect field personnel from exposure to contaminated equipment. All non-disposable sampling equipment must be decontaminated between sampling locations and between sampling intervals. Any equipment that has encountered potentially contaminated media shall not be used again without undergoing proper decontamination.

Decontamination shall be conducted in a centralized location, upwind and away from any suspected contaminant sources. Sampling personnel must wear clean, disposable latex or nitrile gloves during decontamination of equipment. All decontamination procedures performed during sampling events shall be documented in the field logbook, and any deviations from the standard procedures described in this QAPP shall be noted.

General decontamination procedures are listed below. Solvent rinses are not necessary when the analysis does not include organics and may be eliminated from the steps below when not required. Similarly, an acid rinse is not necessary when the analysis does not include inorganics and may be eliminated from the steps below when not required.

1. Wash with tap water and soap, using a brush to remove any excess material. Stainless steel and carbon steel equipment may be steam cleaned instead of brushing; other materials should not be steam cleaned. Any sampling equipment that is steam cleaned should be placed on racks at least two feet higher than the decontamination pad floor.
2. Rinse thoroughly with tap water;
3. Rinse thoroughly with DI water;
4. Rinse with 10% nitric acid *if the sample will be analyzed for trace inorganics*;
5. Rinse thoroughly with DI water;
6. Rinse thoroughly with pesticide-grade isopropanol solvent *if the sample will be analyzed for organics*.

7. Rinse thoroughly with DI water again, then allow equipment to air dry;
8. Wrap equipment in an appropriate equipment storage material, if not using immediately. At the end of the sampling event, write the date of decontamination on the wrapping material.

These procedures can be used on equipment made of stainless steel, carbon steel, Teflon, polyvinyl chloride (PVC), acrylonitrile butadiene styrene (ABS), or other plastics. Equipment shall be disassembled, as appropriate, so field personnel can access and clean all surfaces that may have encountered contaminated media.

B2.2.3 Personal Decontamination

Disposable personal protective equipment (PPE) should be worn whenever possible to avoid cross-contamination and to protect field personnel. Formal personal decontamination procedures shall be addressed in the HASP included with each site-specific SAP. If conditions encountered at the site warrant a PPE upgrade, these procedures will be implemented in accordance with the HASP.

B2.2.4 Investigation-Derived Waste

Investigation-derived waste (IDW), if generated, shall be stored in 55-gallon drums prior to disposal. IDW from brownfield sites may include soil from drilling operations, purge water from groundwater sampling, or sampling equipment decontamination water. A sample of each media of IDW will be collected for waste characterization purposes prior to disposal.

B2.2.5 Sampling Procedures

The order of sample collection at brownfield sites shall be as follows:

1. VOCs;
2. Petroleum hydrocarbons;
3. SVOCs;
4. Chlorinated Phenols;
5. Pesticides and PCBs;
6. Total Recoverable Metals (RCRA 8 metals or EPA Contract Laboratory Program (CLP) Target Analyte List (TAL) 23 metals)

Background samples shall be collected prior to collecting samples from the site and shall be collected in the order listed above.

Asbestos sampling must be conducted by a DEQ-certified asbestos inspector, and lead-based paint sampling must be conducted by an ADH-accredited lead inspector. These samples may be collected before, during, or after sampling of other medias is completed, if the building material sample collection does not impact the collection of other samples.
All samples shall be collected in a manner consistent with the media being sampled and the analytes of interest. In general, sampling at brownfield sites shall use the methods listed in EPA

SW-846, Chapter 10. Additional or alternate methods may be used with the approval of the Project Manager. If additional or alternative methods of sample collection are used, they must be detailed in the site-specific SAP.

Proper sample containers and appropriate preservation techniques must be used when collecting samples. Samples shall only be collected in containers supplied by the laboratory. This ensures that the container is clean, and that the laboratory will have a sufficient volume of the sample to perform the required analyses. Samples submitted to the laboratory in any container other than those provided by the laboratory may be rejected. Samples must also be properly preserved, or they may be rejected.

Table 5 includes the required sample containers, preservation techniques, and holding times for the most commonly requested analytes at brownfield sites. For any analytes not listed in the table, the laboratory should be contacted for further information.

Table 5. Sample Containers, Preservation, and Holding Times

Parameter	Container	Preservative	Holding Times
Volatile Organic Compounds			
Liquids	2 or 3 x 40-ml vials with Teflon-lined septum caps	4 drops conc. HCL Cool, ≤ 6˚C No headspace	14 days
	2 or 3 x 40-ml vials with Teflon-lined septum caps	Cool, ≤ 6˚C No headspace	7 days
Solids	2 x 40-ml pre-tared VOA vials with Teflon-lined septum caps containing: Low level—10 ml DI water or empty, High level—10 ml Methanol	Cool, ≤ 6˚C	48 hours
		Cool, ≤ -7˚C	14 days
Pure Product	1 x 40-ml vial with Teflon-lined septum caps	Cool, ≤ 6˚C	14 days
Air	Summa Canister	None	30 days
	Tedlar bags	None	3 days
Semi-Volatile Organic Compounds			
Liquids	1-quart brown/amber glass jar with Teflon liner	Cool, ≤ 6˚C	7 days extract analysis within 40 days of collection
Solids	4-oz. brown/amber glass jar with Teflon liner	Cool, ≤ 6˚C	14 days extract analysis within 40 days of collection
Air	consult specific analytical method		
Metals (Except Hexavalent Chromium and Mercury)			
Liquids	250-ml polyethylene	Total aqueous – unfiltered; Dissolved aqueous – filtered on-site; HNO_3, pH<2	6 months

Parameter	Container	Preservative	Holding Times
Solids	Polyethylene or glass jar	None	6 months
Air	consult specific analytical method		
Hexavalent Chromium			
Liquids	250-ml polyethylene	Cool, ≤ 6˚C	24 hours
Solids	Polyethylene, glass, or zip-lock baggies	Cool, ≤ 6˚C	1 month to extraction; 4 days after extraction
Air	consult specific analytical method		
Mercury			
Liquids	250-ml polyethylene	Total aqueous – unfiltered; Dissolved aqueous – filtered on-site; HNO3, pH<2	28 days
Solids	Polyethylene or glass jar	Cool, ≤ 6˚C	28 days
Air	consult specific analytical method		
PCBs, Chlorinated Pesticides, and Dioxins/Furans			
Liquids	1-quart brown/amber glass jar with Teflon liner	Cool, ≤ 6˚C	7 days extract analysis within 40 days of extraction (pesticides) 1 year (PCBs, Dioxins/Furans)
Solids	4-oz. brown/amber glass jar with Teflon liner	Cool, ≤ 6˚C	14 days extract analysis within 40 days of extraction (pesticides) 1 year (PCBs, Dioxins/Furans)
Air	consult specific analytical method		
Organo-phosphate Pesticides			
Liquids	1-quart brown/amber glass jar with Teflon liner	Adjust pH to 5-8 with NaOH or H_2SO_4 Cool, ≤ 6˚C	7 days extract analysis within 40 days of extraction
Solids	4-oz. brown/amber glass jar with Teflon liner	Cool, ≤ 6˚C	7 days extract analysis within 40 days of extraction
Air	consult specific analytical method		
Asbestos			
Solids	Polypropylene or glass jar, or zip-lock bag	N/A	1 year
Air	Filter stored in zip-lock bag	N/A	1 year

B2.2.5.1 Soil Sampling

Surface soil samples shall be collected using a stainless steel spoon, trowel, or pre-sterilized polyethylene scoop. The top layer of soil shall be carefully removed and transferred to the appropriate sample container.

Subsurface soil samples may be collected during advancement of a soil boring, during UST removals, or during excavation of test pits. Samples may be collected using a variety of equipment such as direct push technology, hollow stem, air rotary, or sonic drilling technology, excavation

equipment, or by hand auger. Collection procedures must be documented in the field notebook. Samples shall be collected according to the specific EPA guidance in *A Compendium of Superfund Field Operations* (EPA/540/P-87/001).

All soil samples will be discrete samples, unless otherwise stipulated in the site-specific SAP. If composite or incremental samples are to be collected, the site-specific SAP must include the specific purpose for using this sampling method. Soil samples shall contain as little gravel, stones, or cobble as possible, unless the Project Manager specifically requests for them to be included in the analysis.

General procedures for collection of subsurface soil samples are described below.

1) Hand Augers

Hand augers can be used to collect soil samples to depths of approximately 10 feet below ground surface (bgs). The sample shall be extruded into a stainless steel or aluminum pan, followed by immediately placing it into the appropriate sample container. Samples may be obtained from discrete depths by forcing the soil core from the auger and collecting soil from the depth of interest.

2) Test Pits, Excavations, and Underground Storage Tank Removals

Excavation activities at brownfield sites may include test pits, large excavations to remove contamination, and underground storage tank (UST) system removals. Excavation may be by hand but will more commonly be performed using heavy equipment such as a backhoe or excavator.

If the excavation can be safely entered by field personnel, subsurface soil samples may be collected from the sidewall and/or bottom of the excavation area after removing 1 inch of the exposed surface layer. Samples shall be placed directly into appropriate sample containers. If the excavation cannot be safely entered by field personnel, samples shall be collected from an undisturbed volume of soil in a backhoe or excavator bucket.

3) Boreholes

Subsurface soil samples can be collected from boreholes using sampling equipment specific to the drilling technology (liners, split-spoon samplers, etc.) and transferred to the appropriate container. During drilling, cuttings will be placed in a sealed plastic bag and field-screened using a photoionization detector (PID) or a flame ionization detector (FID) to determine the depth from which samples will be collected. Soil classification during drilling activities will be noted on soil boring logs and will be based on the Unified Soil Classification System (USCS). Where appropriate, ASTM procedures D2487 “Classification of Soils for Engineering Purposes” and D2488 “Description and Identification of Soils (Visual-Manual Procedure)” should be performed.

B2.2.5.2 Sediment Sampling

Sediment samples can be collected using either piston samples or grab/dredge samplers, depending on factors such as site access, sample volume requirements, sediment texture, and target sample depth. Generally, piston samplers are best for soft, fine-grained sediments at greater depths. Grab/dredge samplers are best for shallow, coarse sediments and when larger volumes of the sample are required. When sediment sampling is requested by the Project Manager, the site-specific SAP shall specify the sampling equipment to be used and the rationale.

B2.2.5.3 Water Sampling

Surface water samples are typically collected from streams, drainage ways, and wetlands downstream from a suspected contamination source, or upstream from a suspected contamination source to establish site-specific background concentrations. Groundwater samples are typically collected from wells screened within the uppermost aquifer.

General procedures for collection of water samples are described below.

1) Surface Water

Surface water samples will be collected using a stainless steel collection container such as a bucket. Downstream samples should be collected before upstream samples. Before collecting the sample, the collection container will be rinsed with water from the area to be sampled, then a fresh sample should be collected. Sample bottles shall not be dipped into the collection container to avoid contamination from the outside of the sample bottle or from the sampler's hands. Instead, water from the collection container will be poured into the sample bottle. If a stainless steel collection container is not available, the sample bottle will be dipped directly into the water with the opening facing upstream, the lid will be closed, and any excess water will be wiped off the outside of the bottle using a paper towel.

2) Groundwater

All monitoring wells must be properly installed and developed in accordance with Arkansas Water Well Commission rules and regulations and DEQ's *Monitoring Well Construction, Geotechnical Boreholes, and Plug & Abandonment Policy* (Interim Policy PRCR 96-4/Policy # HWD-002). Nonstandard wells or problems encountered during sampling should be noted in the field log and in final work products.

Prior to sampling, each groundwater monitoring well should be measured with an electronic water meter. Measurements should be recorded to the nearest 0.01-foot. Groundwater depths should be compared to the relative top of casing elevations in each monitoring well to determine groundwater flow direction. When sampling groundwater from monitoring wells, the sampler should utilize low flow sampling methods (EPA 540/s-95/504, April 1996) whenever possible. If low flow sampling is not appropriate, monitoring wells should be purged until stabilization of field parameters occurs or a minimum of three well volumes are removed

before sampling. Teflon® or PVC bailers or tubing will be used to collect groundwater samples. Groundwater will be poured directly into sample containers.

If collecting split samples, the sampler must ensure they are homogeneous by filling a large, clean container and gently swirling the contents before pouring into appropriate sample bottles. For VOC analytes, the sample containers will be filled directly from the sample source in the following manner: one from the primary sample bottle set, then one from the split-sample bottle set, and so forth. Samples used to measure field parameters (temperature, pH, dissolved oxygen, etc.), or samples collected in purge vials for VOC analyses, cannot be split in this manner. They must be filled individually, directly from the tap or the bailer.

Groundwater samples from soil borings may be collected as grab samples or by temporary well points using a stainless steel or PVC screen. Groundwater samples can be obtained using a small bladder pump, peristaltic pump, stainless steel or Teflon bailers, or polyethylene or Teflon tubing and foot valve.

Once assessment and/or cleanup activities are completed, temporary monitoring wells must be closed in accordance with the DEQ's *Monitoring Well Construction, Geotechnical Boreholes, and Plug & Abandonment Policy*.

B2.2.5.4 Air Sampling

Air sampling may consist of sampling indoor or outdoor ambient air, sub-slab air, crawlspace air, or soil gas.

Air sampling equipment will depend on sampling objectives, the nature of the site, contaminants of concern, and analytical methods. Typical sampling containers include Tedlar bags, stainless steel Summa canisters, and glass sorbent traps used with sampling pumps. Indoor, outdoor, and crawlspace air samples are collected directly into sampling containers. Soil gas and sub-slab vapor samples are collected into sampling containers from subsurface soil gas sampling probes which may be installed permanently or temporarily.

B2.2.5.5 Asbestos Surveys

Asbestos samples are collected directly from building materials. One sample will be collected per homogeneous building material and will be placed in a polypropylene or glass jar, or a zip-lock bag for shipment to the analytical laboratory. All asbestos surveys must be performed by an asbestos inspector certified by the DEQ Asbestos Section.
Samples are typically collected via cutting or by using a sampling device appropriate for the material. Destructive sampling and repairs associated with sample locations should be discussed in the site-specific SAP. Whenever possible, samples should be collected from an inconspicuous area of the building. When this is not possible, the sampled area should be patched or repaired to prevent further damage to those materials.

B2.2.5.6 Lead-Based Paint Surveys

Lead-based paint surveys may be accomplished using X-ray Fluorescence (XRF) to screen for lead or may consist of collecting paint chip samples for laboratory analysis. The site-specific SAP shall identity and discuss which screening method will be used. Regardless of the method, all lead-based paint surveys must be conducted by an ADH-accredited lead inspector.

When an XRF is used to screen for lead, painted surfaces will be screened using an XRF spectrometer and any results greater than 1 mg/cm^3 will be considered positive for lead-based paint. When laboratory analysis will be used, the inspector will collect one paint chip sample from each painted surface and place the sample in a zip-lock bag, glass jar, or another hard-shelled container for shipment to the analytical laboratory.

B2.3 Sample Handling and Custody Procedures

Sample handling includes sample labeling and identification, packaging, transportation to the analytical laboratory, and storage. Sample custody procedures document the traceability of samples from the time they are collected to their final disposition. It is vital to maintain proper custody records to ensure sample integrity.

Each sample container will include a sample label either completed with waterproof ink and covered with clear tape, as necessary, to prevent smearing. Sample labels will clearly identify the unique sample ID, sampler's initials, sampling location, depth, date and time of collection, preservation method, and analyses requested.

Once collected and labeled, samples will be handled as infrequently as possible to prevent cross-contamination. Samples will be immediately cooled to 6˚C or below, depending on the preservation method. Samples will be packed in a cooler with sufficient bubble wrap or similar protective material to prevent breakage. Samples may be shipped or hand-delivered to the analytical laboratory.

A sample is considered to be in custody when it is in the physical possession of authorized individual and when it is secured in a location where unauthorized individual cannot access it. Chain-of-custody forms will be used to document the custody of samples in chronological order of when the sample is collected, transferred, received, analyzed, stored, and disposed of. These forms must be signed with the date and time by both the individual handing off the samples and the individual receiving the samples each time samples change hands. Additionally, the analytical laboratory must sign the chain-of-custody form indicating the date and time the samples were received at the laboratory, and the individual who received the samples.

B2.4 Laboratory Analyses

All laboratory analyses for the ABP will be performed by a DEQ-accredited laboratory. DEQ's Environmental Laboratory Accreditation Program ensures that all analytical data will meet quality standards.

All methods used to analyze samples collected from brownfield sites must be in compliance with applicable Federal and State requirements for which they are collected (Comprehensive Environmental Response, Compensation and Liabilities Act [CERCLA], Clean Water Act [CWA], Safe Drinking Water Act [SDWA], Resource Conservation and Recovery Act [RCRA], Clean Air Act [CAA], etc., or alternate EPA-approved methods.

The current approved list of methods approved under the CWA and SDWA are promulgated in the Code of Federal Regulations (CFR Part 136, 40 CFR Part 141) and can be found at the following link: https://www.ecfr.gov/current/title-40. The CFR is reviewed annually and updated by EPA as needed.

Current, approved methods under RCRA SW-846 can be found at the following link: https://www.epa.gov/hw-sw846/sw-846-compendium. Because SW-846 method updates occur on a periodic basis and there are no implementation dates assigned, it is satisfactory for a lab to be behind by one version.

B3. Integrity of Environmental Information

DEQ and its contractors will ensure the integrity of environmental information collected for the ABP by adhering to the practices described in this Programmatic QAPP and in site-specific SAPs. Field sampling procedures are discussed in Section B2.2 of the Programmatic QAPP; sample handling and custody procedures are discussed in Section B2.3; and laboratory accreditation requirements are discussed in Section B2.4.

B4. Quality Control

E&E's agency-wide quality management system is outlined in the E&E QMP. This QAPP defines and describes the general quality objectives of the ABP. Site-specific quality objectives are further defined in SAPs. This graded approach to quality system management ensures that quality-related activities are conducted throughout the project, while allowing for the flexibility to tailor quality-related activities to individual projects.

B4.1 Field QC Requirements

Field QC samples will be used to ensure the analytical data produced under the ABP are of sufficient quality to meet Program goals.

Trip blanks will be submitted for any brownfield site sampled for VOCs, at a frequency of one trip blank per cooler. Trip blanks are samples of an analyte-free media that are prepared by the analyzing laboratory and transported to field along with other sampling containers. Trip blanks are kept with the environmental samples collected from the site and are be sent back to the laboratory for the same analysis as the site samples. The purpose of a trip blank is to ensure that contamination detected in site samples is not the result of contamination during sampling, handling, and transportation of the samples prior to analysis.

Depending on site-specific circumstances, other blanks may be used:

- Transfer Blanks are sample containers filled at the site with purified water. They are used to assess the potential for airborne contamination at a site and are most useful when sampling for VOCs, or when there are particulates in the air when sampling for metals.
- Rinsate Blanks are water samples generated by pouring analyte free (i.e., deionized) water over decontaminated sampling equipment. They are used to assess the potential for cross-contamination from improperly decontaminated equipment. Rinsate blanks are not necessary for brownfield sites where dedicated, disposable, sampling equipment is used.

Field duplicate samples will be collected to assess the precision of the sample collection process and the representativeness of the sample. Field duplicates will be collected at a frequency of one per 20 site samples of each media, with a minimum of one duplicate sample per media per sampling event, regardless of the total number of site samples collected. Field duplicate samples shall be collected within five minutes of collecting the original site samples and shall be shipped to the laboratory with other samples for analysis.

B4.2 Laboratory QC Requirements

All laboratory analyses will be performed by a DEQ-accredited laboratory. DEQ's Environmental Laboratory Accreditation Program requires submittal of the laboratory's Quality Assurance Manual (or a similarly named QA document) outlining routine laboratory QA activities. The Quality Assurance Manual must, at a minimum, adhere to the consensus standards adopted by the National Environmental Laboratory Accreditation Program (NELAP). These standards include the following elements:

1. Daily instrument calibration, or calibration verification prior to analyzing samples.
2. Calibrations must be verified according to the analytical methods using a standard source other than the source used for instrument calibration.
3. Method blank analysis daily, or at a frequency of 1 in 20 samples (whichever is greater).
4. Analysis of a laboratory control sample (LCS) or a certified reference material (CRM) at a frequency of 1 per batch of 20 or fewer samples. This sample is also referred to as a blank spike.
5. Analysis of a matrix spike at a frequency of 1 in 20 samples, or as the matrix changes, to assess accuracy and to identify possible matrix interferences.
6. Analysis of laboratory sample duplicates or matrix spike/matrix spike duplicates (MS/MSD) at a frequency of 1 in 20 samples to assess the precision of the analysis;
7. Determination of the minimum reporting limit based on detection limit studies and the concentration of the lowest calibration standards.

Analytical precision and accuracy must fall within the overall expectations for precision and accuracy as described in **Table 3**, or as otherwise described in the site-specific SAP. Precision and accuracy will vary based on the analytical method and the laboratory procedures. The laboratory will qualify any analytical results that do not meet acceptance criteria and will make precision and accuracy statements available upon request.

In addition to sample results, the laboratory will provide sample receipt conditions and sample-related QC results, which may include method blanks, LCS, matrix spikes, and laboratory duplicates. If additional validation is required beyond the level of validation described in **Section D1** of this QAPP, it must be defined in the site-specific SAP.

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

All field and laboratory instruments and equipment used for measurement data will be operated and maintained in accordance with the manufacturer's guidelines.

Field instruments and equipment used by contractors will be inspected, tested for usability, and calibrated prior to use in the field to ensure performance accuracy. Calibration and testing instructions provided by the manufacturer shall accompany all instruments and equipment to the field. Calibration records for field instruments and equipment will be included in final work products.

Each laboratory will be responsible for calibrating analytical instruments according to their Quality Assurance Manual. In accordance with consensus standards adopted by the NELAP, analytical instruments should be calibrated daily, or calibration should be verified prior to analyzing samples. Calibrations should be verified according to the analytical methods using a standard source other than the source used for instrument calculation.

B6. Inspection/Acceptance of Supplies and Services

All supplies and consumables shall be examined for damage or other issues that would compromise data quality. Contractors and laboratories shall have written procedures for inspecting and accepting supplies and consumables in their quality management plans.

B7. Environmental Information Management

All field data from brownfield sites shall be recorded in bound logbooks. Copies of field data and field notes will be included with final work products produced by contractors. Laboratory analytical data will be submitted to the professional services contractor and will be included with final work products.

Final work products from contractors are required to be submitted as digital files only; however, hard copies of work products may also be submitted. E&E Information Technology Systems (ITS) is responsible for ensuring that DEQ digital records are secured and backed up according to the agency QMP.

Group C. Assessment, Response Actions, and Oversight

C1. Assessments and Response Actions

Contract laboratories are required to be recertified by DEQ's Environmental Laboratory Accreditation Program on an annual basis.

For short-term sampling events, DEQ contractors will be responsible for reviewing data, evaluating sampling procedures, and arranging any re-sampling events necessary due to QA/QC failures. Personnel responsible for data assessment will check the results of every sampling event for precision and completeness.

Technical and/or quality system audits of professional services contractors or laboratories may be initiated on a prescribed schedule or on an as-needed basis in response to identified or suspected problems. Assessment and response actions will be documented and submitted to the Project Manager by the contractor. Identified deficiencies will be followed up by written corrective action plans.

The Brownfield Program Manager will conduct annual reviews of this QAPP and will update the QAPP at the time of the scheduled review, or sooner if current situations necessitate an immediate update.

C2. Oversight and Reports to Management

The Brownfield Program Manager is responsible for reporting all brownfield activities to their EPA Region 6 Brownfield PO(s). These reports will be submitted on a quarterly or bi-annual basis depending on specific grant terms.

Group D. Environmental Information Review and Usability Determination

D1. Environmental Information Review

Data assessment, verification, and validation are the quality management methods used to determine if sampling data from brownfield sites meet the planned DQOs and other requirements outlined in this Programmatic QAPP and in site-specific SAPs. During data assessment and validation, data shall be evaluated for completeness, correctness, and compliance against the analytical method, procedural, or contractual requirements of the project. If any data is determined to be compromised in some way, qualifying data flags must be used to explain the variance.

D1.1 Data Validation Flags

Laboratories will qualify any results that are affected by QC exceptions or other events that affect the interpretation of analytical results. The standard EPA validation flags listed below can be used for brownfield projects; however, because analytical laboratories may use different data flags, the laboratory must define each flag used in the analytical report. Data flags will also be included in data tables in final work products.

Table 7. Standard EPA Data Validation Flags

Flag	Definition
J	The analytical result is an estimate because the measured sample concentration is less than the laboratory's reported quantitation limit (QL) but greater than the method detection limit (MDL), or laboratory QC criteria were not met.
J+	The result is an estimate (see "J" flag definition) and may be biased high
J-	the result is an estimate (see "J" flag definition) and may be biased low
B	The blank was contaminated with the analyte being reported
U	The measured sample concentration is less than the laboratory's reported QL
N	The analysis indicated the presence of an analyte for which there is sufficient evidence to make a "tentative identification."
R	The data are unusable due to significant QC failures. The present of an analyte in a sample cannot be verified. Resampling or reanalysis is required for verification.
UJ	The analyte was analyzed for but was not detected at the reported QL. The result is also estimated due to QC failures.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated value represents its estimated concentration.
Q	Not all quality control criteria were met

D1.2 Data Quality Indicators

Data assessment and validation is performed by evaluating the analytical data against the following data quality indicators (DQIs): sensitivity, precision, accuracy, representativeness, comparability, and completeness. Each of these indicators is discussed in greater detail below.

D1.2.1 Sensitivity

Sensitivity is defined as the ability of a method or an instrument to measure the smallest concentration of a substance of interest in a sample.

The QLs developed for site-specific SAPs should be 5 to 10 times below any action level whenever possible. For some risk-based screening levels, this may not be possible. For very low risk-based screening levels, it may be necessary to report data below the laboratory's QL for those parameters (i.e., to report data to their MDL). Values less than the laboratory's QL shall be reported as an estimate.

Blanks shall be less than half the QL for each analyte listed in the site-specific SAP. Laboratory method blanks (MB) shall be prepared along with each LCS. The MB will be used to assess the sensitivity of the method. If corrective action measures fail to resolve MB errors, then analytical results batched with the MB will be flagged with the appropriate data qualifier.

D1.2.2 Precision

Precision is a measure of statistical variability—the degree to which repeated measurements under the same conditions show the same results.

Field duplicate samples are collected to assess precision in sampling activities. MS/MSD analyses are performed to assess precision in the laboratory. Precision is expressed as relative percent difference (RPD). Acceptable RPDs are included in **Table 3**. Site-specific SAPs may further define acceptable RPDs for data.

D1.2.3 Accuracy

Accuracy measures the difference between the observed concentrations in a sample and the true sample concentrations. Because true concentrations are not known, accuracy must be inferred from recovery data determined from standard reference materials (SRM) or LCS, and from matrix spikes.

SRM and/or LCS are used to assess the laboratory's performance in using a particular analytical method. An SRM is a sample of known composition in a relatively clean matrix similar to that being tested; an LCS is a known concentration of a standard spiked to a clean matrix. Accuracy is expressed as the percent recovery of a known concentration. Some analytical methods specify control limits. For methods that do not, the laboratory will determine its own control limits. These control limits will generally be within those included in **Table 3**.

MS/MSD are used to evaluate the performance of the analytical method on a specific sample matrix. Laboratories spike one sample from each preparation batch. Unless specified in the site-specific SAP, samples collected for the ABP may not be spiked. Some organic methods require surrogate spikes on each sample, which are used to assess accuracy. The analyzing laboratory must determine its own control limit, which shall be similar to those listed in **Table 3**. Until the

analyzing laboratory has collected sufficient data, it is acceptable to set the control limit to that presented in the cited method or in **Table 6**.

D1.2.4 Representativeness

Representativeness is a measure of how closely the observed analytical result for a given sample matrix reflects actual conditions.

Sampling design and sampling procedures shall be developed so that results represent the matrix being measured. The site-specific SAP shall include a rationale for each sampling location.

Sample handling protocols related to storage, preservation, and transportation have been established in this Programmatic QAPP to preserve the representativeness of field samples. Proper documentation will be used to show that these protocols have been followed and to ensure sample identification and integrity.

Trip blanks, rinsate blanks, and field duplicates will be used to assess field and transportation contamination, as well as analytical method variation. Laboratory method blanks will be run on a regular basis. If it is determined that a sample's integrity has been compromised, the data will be flagged with the appropriate data qualifier.

Evaluating field duplicate results, laboratory duplicate results, and accuracy data will determine if the sample is representative. If field duplicate data exceeds precision limits but laboratory duplicate and accuracy data is acceptable, the sampling design may be in error and the data may not represent the environmental conditions for which it was collected. If field duplicate data indicates representativeness is acceptable, data users can assume that other project data also meet representativeness objectives.

D1.2.5 Comparability

The objective of this QC element is to assure that data obtained from field sampling events can be compared to literature data and/or other applicable criteria. EPA-approved analytical methods will be used to maintain comparability. Contract laboratories list analytical methods used in the documentation submitted to DEQ's Environmental Laboratory Accreditation Program. If a different method is required, the site-specific SAP shall identify the new method and indicate how it compares to other methods. The laboratory will measure comparability of any methods not approved by EPA by evaluating inter-laboratory splits or alternate test procedures.

D1.2.6 Completeness

Completeness is a measure of the amount of valid data obtained from the analytical measurement system compared to the amount expected to be obtained under normal conditions. It is defined as the total number of samples for which valid analytical results are obtained, divided by the total number of samples collected, and multiplied by 100. For each analyte, at least 90% of all samples tested must yield valid data.

D2. Usability Determination

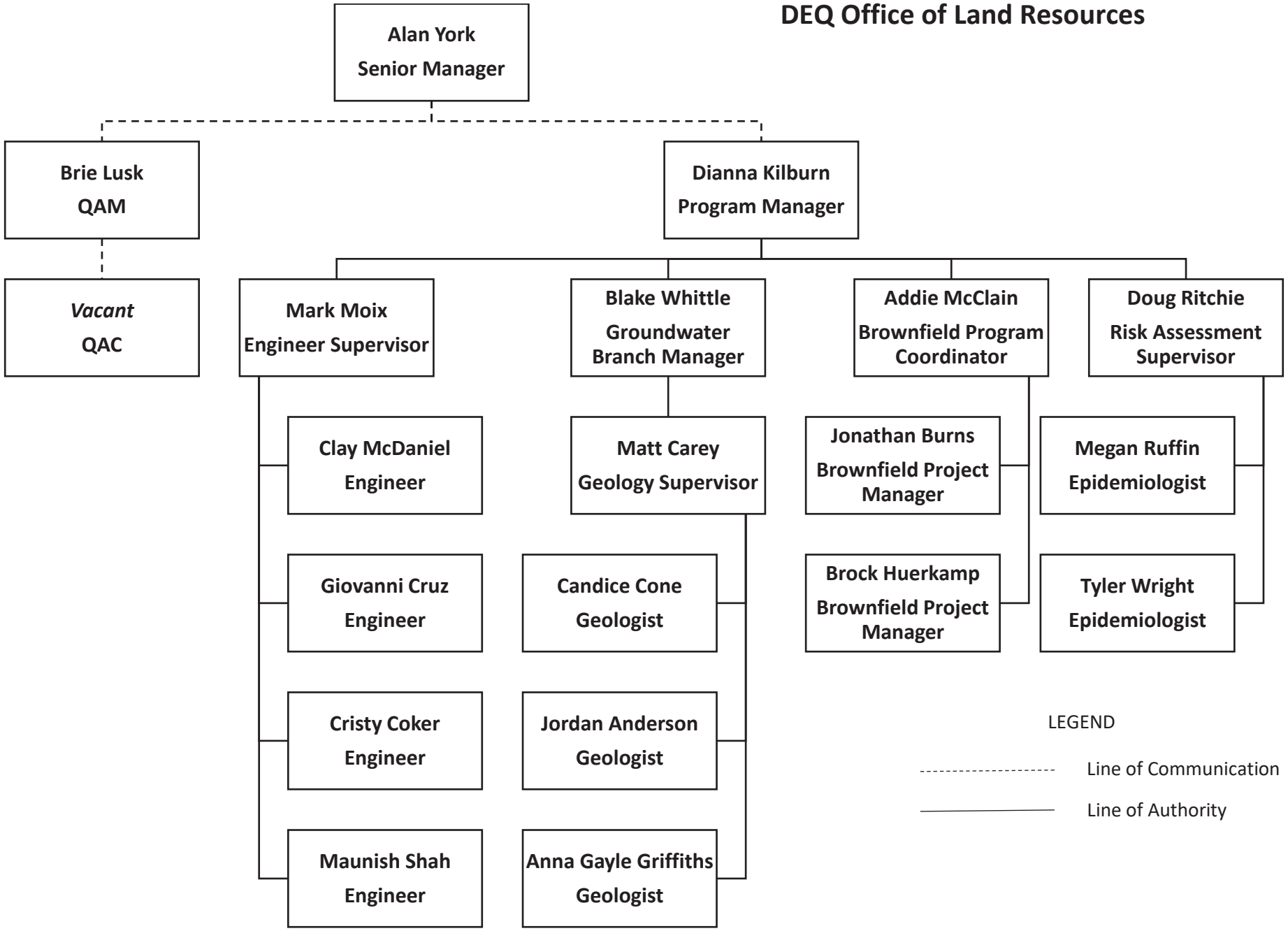
Analytical data usability will be determined by the laboratory's use of data qualifiers described in **Section D1** of this QAPP, or other qualifiers used by the laboratory and defined in the analytical report. If other sources of data validation criteria are to be used, they must be outlined in the site-specific SAP. When qualified data are used in work products, the qualifiers must be included in data tables and discussed in the narrative, results, and/or conclusions sections of the report.

Any data flagged as "unusable" by the laboratory due to quality issues will not be used to make decisions for the site. If any data from the sampling event are determined to be unusable, the contractor shall contact the laboratory as soon as possible to determine if the sample(s) can be reanalyzed, or if a resampling will be required. Final work products will include a discussion of any flagged or unusable data and an explanation for the quality issues.

Upon receipt of a work product from a contractor, the DEQ Project Manager will review the report to ensure that the data collected meet DEQ's needs for evaluating the site. Additionally, the Project Manager will ensure that contractors have satisfied the requirements of this QAPP, the site-specific SAP, and any contractual agreements between the contractor and DEQ.

APPENDIX A
Project Organization Charts

Arkansas Brownfield Program Organizational Chart
DEQ Office of Land Resources



Arkansas Brownfield Program
Organizational Chart
Contractors and Subcontractors