QUALITY ASSURANCE PROJECT PLAN
FOR REVISED FEASIBILITY STUDY
FOR SOIL, GROUND WATER, SURFACE WATER, AND SEDIMENT
OKLAHOMA REFINING COMPANY
CYRIL, CADDO COUNTY, OKLAHOMA
CA #V-97617101

STATE OF OKLAHOMA
DEPARTMENT OF ENVIRONMENTAL QUALITY
LAND PROTECTION DIVISION
SITE REMEDIATION SECTION

Quality Management Plan EPA QTRAK# 07-166

February 19, 2008

A1. APPROVAL SHEET

Department of Environmental Quality
Land Protection Division
Site Remediation Section

QUALITY ASSURANCE PROJECT PLAN
REVISED FEASIBILITY STUDY
SAMPLING AND ANALYSIS PROJECT PLAN
FOR GROUND WATER, SURFACE WATER, AND SEDIMENT
Oklahoma Refining Company
Cyril, Caddo County, Oklahoma
CA#V-97617101

This document has been prepared in accordance with the *EPA Guidance for Quality Assurance Project Plans EPA QA/G-5* (December 2002).

Approval:

DEQ Site Remediation Section ORC Project Manager	_____ Meghan Lloyd	Date
DEQ Superfund QA Coordinator	_____ Subi John	Date
DEQ Quality Assurance Officer	_____ Karen Khalafian	Date
DEQ Program Manager Site Remediation Section	_____ Amy Brittain	Date
DEQ Program Manager Remediation Unit	_____ Kelly Dixon	Date
EPA Project Manager Superfund Division (6SF-RL)	_____ Mike Hebert	Date

A2. TABLE OF CONTENTS

Item		Page	Revision
GROUP A--PROJECT MANAGEMENT			
A1.	Title Page.....	1	0
	Approval Sheet.....	2	0
A2.	Table of Contents.....	3	0
A3.	Distribution List.....	5	0
A4.	Project/Task Organization.....	5	0
A5.	Problem Definition/Background.....	11	0
A6.	Project/Task Description.....	13	0
A7.	Data Quality Objectives for Measurement Data.....	14	0
A8.	Special Training Requirements/Certification.....	21	0
A9.	Documentation and Records.....	21	0
GROUP B--MEASUREMENT/DATA ACQUISITION			
B1.	Sampling Process Design.....	1	0
B2.	Sampling Methods Requirements.....	2	0
B3.	Sample Handling and Custody Requirements.....	4	0
B4.	Analytical Methods Requirements.....	5	0
B5.	Quality Control Requirements.....	7	0
B6.	Instrument/Equipment Testing, Inspection, and Maintenance Requirements.....	17	0
B7.	Instrument Calibration and Frequency.....	17	0

B8. Inspection/Acceptance Requirements for Supplies and Consumables…..…. 18 0

B9. Data Acquisition Requirements (Non-direct Measurements)……. 19 0

B10. Data Management….....…. 19 0

GROUP C—ASSESSMENT AND OVERSIGHT

C1. Assessments and Response Actions…..... 1 0

C2. Reports to Management…..... 2 0

GROUP D—DATA VALIDATION AND USABILITY

D1. Data Review, Validation and Verification Requirements…… 1 0

D2. Validation and Verification Methods…..... 2 0

D3. Reconciliation with Data Quality Objectives…..... 5 0

FIGURES

Figure 1: Project Organization Chart…..... A-10 0
Figure 2: Site Location Map…..... A-11 0

TABLES

Table 1: Minimum Level of Data Quality for the RFS Project 2 0
Table 2: Remedial Action Objectives for Sediments and Soils 3 0
Table 3: Remedial Action Objectives for Subsurface Soils 4 0
Table 4: Remedial Action Objectives for Ground water and Surface Water 5 0
Table 5: Laboratory Methods 6 0

LIST OF REFERENCES 1 0

GROUP A – PROJECT MANAGEMENT

A3. DISTRIBUTION LIST

The following individuals will receive copies of the approved Quality Assurance Project Plan (QAPP):

DEQ Project Personnel

Located at: State of Oklahoma
Department of Environmental Quality
707 N. Robinson
Oklahoma City, Oklahoma 73102

Meghan Lloyd, Environmental Programs Specialist, ORC Project Manager until February 29, 2008 (405) 702-5135

Jeannine Bennett, Engineer Intern, ORC Project Manager as of March 1, 2008 (405) 702-5127

Subi John, Environmental Programs Specialist, Superfund QA Coordinator (405) 702-5131

EPA Region 6 Personnel

Located at: U.S. Environmental Protection Agency
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Mike Hebert, Project Manager (6SF-RL)	(214) 665- 8315
Christy Warren, Region 6 Laboratory	(281) 983-2137
Myra Perez, Region 6 CLP Coordinator	(281) 983-2130
Walt Helmick, Region 6 QA Coordinator	(281) 665-8373

A4. Project/Task Organization

The purpose of the quality assurance project plan (QAPP) is to establish the policies, organization, objectives, functional activities, and specific quality assurance (QA) and quality control (QC) activities for sampling to be performed at the Oklahoma Refining Company (ORC) Superfund Site located in Cyril, Caddo County, Oklahoma, as part of a remedial action and replaces the existing ORC QAPP, QA/QC Limited Sampling Program.

Oklahoma Department of Environmental Quality

The Oklahoma Department of Environmental Quality (DEQ) will conduct the planning, field investigation, and reporting. The DEQ is the lead agency for the ORC Superfund Site Revised Feasibility Study (RFS). Key project personnel and other parties involved with this project are outlined in this section. Figure 1 presents an organizational chart for the project. The DEQ has entered into a Cooperative Agreement with the USEPA to provide these services for the RFS. The primary responsibilities for the DEQ Project Manager are as follows:

- Overall responsibility for project coordination
- Review and approve the project documents and subsequent revisions
- Ensure implementation of project documents
- Coordinate sample analysis with the Oklahoma State Environmental Laboratory (SEL)
- Coordinate involvement of USEPA Region 6

DEQ Primary Point of Contact
Meghan Lloyd, ORC Project Manager
Oklahoma Department of Environmental Quality
Land Protection Division
707 N. Robinson
Oklahoma City, OK 73102
Phone: (405) 702-5135
Email: Meghan.Lloyd@deq.state.ok.us

or

Jeannine Bennett, ORC Project Manager
Oklahoma Department of Environmental Quality
Land Protection Division
707 N. Robinson
Oklahoma City, OK 73102
Phone: (405) 702-5127
Email: Jeannine.Bennett@deq.state.ok.us

Oklahoma State Environmental Laboratory

It is possible that certain analytical services for the RFS will be provided by the SEL. The SEL is charged with analyzing samples that are collected to aid in evaluation of project data. Dawn

April Hurst Beltz serves as the SEL QA Officer. The primary responsibilities for the SEL QA Officer are as follows:

- Actively support the implementation of the SEL QAP
- Maintain accurate standard operating procedures and enforce their use in the laboratory
- Maintain a work environment that emphasizes the importance of data quality
- Provide appropriate management support

SEL Primary Point of Contact
Dawn April Hurst Beltz
Oklahoma Department of Environmental Quality
State Environmental Laboratory
707 N. Robinson
Oklahoma City, OK 73102
Phone: (405) 702-1038
Email: Dawn.Beltz@deq.state.ok.us

U.S. Environmental Protection Agency

The DEQ has entered into a Cooperative Agreement with the USEPA to provide for the conduct of the RFS of the ORC Superfund Site in Cyril, Oklahoma. USEPA is providing regulatory oversight of the RFS. USEPA has review responsibilities for the project plans and reports that are developed for this project. Mike Hebert will serve as the USEPA Region 6 Remedial Project Manager (RPM). The primary responsibilities for the RPM are as follows:

- Review and approve the project documents and subsequent revisions
- Coordinate involvement of the USEPA Region 6 Environmental Services Branch and Contract Laboratory Program (CLP) laboratories

Contact information for the RPM is as follows:

USEPA Region 6
Mike Hebert
US Environmental Protection Agency
Superfund – Louisiana/Oklahoma
1445 Ross Avenue
Dallas, Texas 75202
Phone (214) 665-8315
Email: Hebert.Michael@epa.gov

USEPA Region 6 Environmental Services Branch Laboratory

Certain analytical services for the RFS will be provided by the USEPA Region 6 Environmental Services Branch (ESB), also known as the Houston Laboratory. The ESB is charged with analyzing samples that are collected to aid in evaluation of project data. Christy Warren serves as the Sample Control Manager for the Sample Management Team. The primary responsibilities for the Sample Control Manager are as follows:

- Management of the Region 6 Regional Sample Control Center (RSCC)
- Coordination of transfer of samples to the CLP laboratories
- Scheduling, receiving, and tracking all samples delivered at the Houston Laboratory

Contact information for USEPA's Region 6 Sample Control Manager is as follows:

USEPA Region 6 Environmental Services Branch Laboratory
Christy Warren
US Environmental Protection Agency
Region 6 Laboratory
10625 Fallstone Road
Houston, Texas 77099
Phone: (281) 983-2137
Email: Warren.Christy@epa.gov

Due to the sample load, certain samples may also be transferred to a CLP laboratory for analysis. Myra Perez serves as the Region 6 CLP RSCC Coordinator. The primary responsibilities of the CLP RSCC Coordinator are as follows:

- Technical oversight of the CLP contracts
- Perform CLP sample scheduling through management of the RSCC
- Oversight of contractor data verification and validation activities determining contractor generated data usability for client programs

Contact information for USEPA's Region 6 CLP RSCC Coordinator is as follows:

USEPA Region 6 Laboratory
Myra Perez
US Environmental Protection Agency
Region 6 Laboratory
10625 Fallstone Road

Houston, Texas 77099
Phone: (281) 983-2130
Email: Perez.Myra@epa.gov

Ana-Lab Corporation

It is possible that certain analytical services for the remedial action will be provided by the Ana-Lab Corporation. The Ana-Lab is charged with analyzing samples that are collected for methane to aid in evaluation of project data. Koorosh Rasolkhani serves as the Oklahoma Regional Manager. The primary responsibilities for the Oklahoma Regional Manager are as follows:

- Receive samples from clients and ship to the permanent laboratory facility
- Collect samples and perform on-site analyses
- Maintain a work environment that emphasizes the importance of data quality
- Provide appropriate management support

Ana-Lab Primary Point of Contact
Koorosh Rasolkhani
Oklahoma Regional Manager
Ana-Lab Corporation
2600 Van Buren Street, Suite #2600
Norman, OK 73072
Phone: (405) 292-6630
Email: oklahoma@ana-lab.com

DEQ Project Team

The DEQ Project Team will be experienced in site investigations and will have shown technical proficiency in their respective professional areas of expertise. Members of the DEQ Project Team are responsible for conducting project work in the field or in the office. Their responsibilities include:

- Prepare planning documents and reports
- Conduct field work
- Report progress and problems to the EPA RPM
- Implement and/or recommend actions regarding project activities to the EPA RPM

Analytical Laboratories

As previously presented, the majority of the analytical data for the Site will be generated using the following laboratories: the SEL, USEPA Region 6 Laboratory, CLP laboratories, and/or Ana-Lab. Contracting and certification of these laboratories is handled by the appropriate DEQ or USEPA contact.

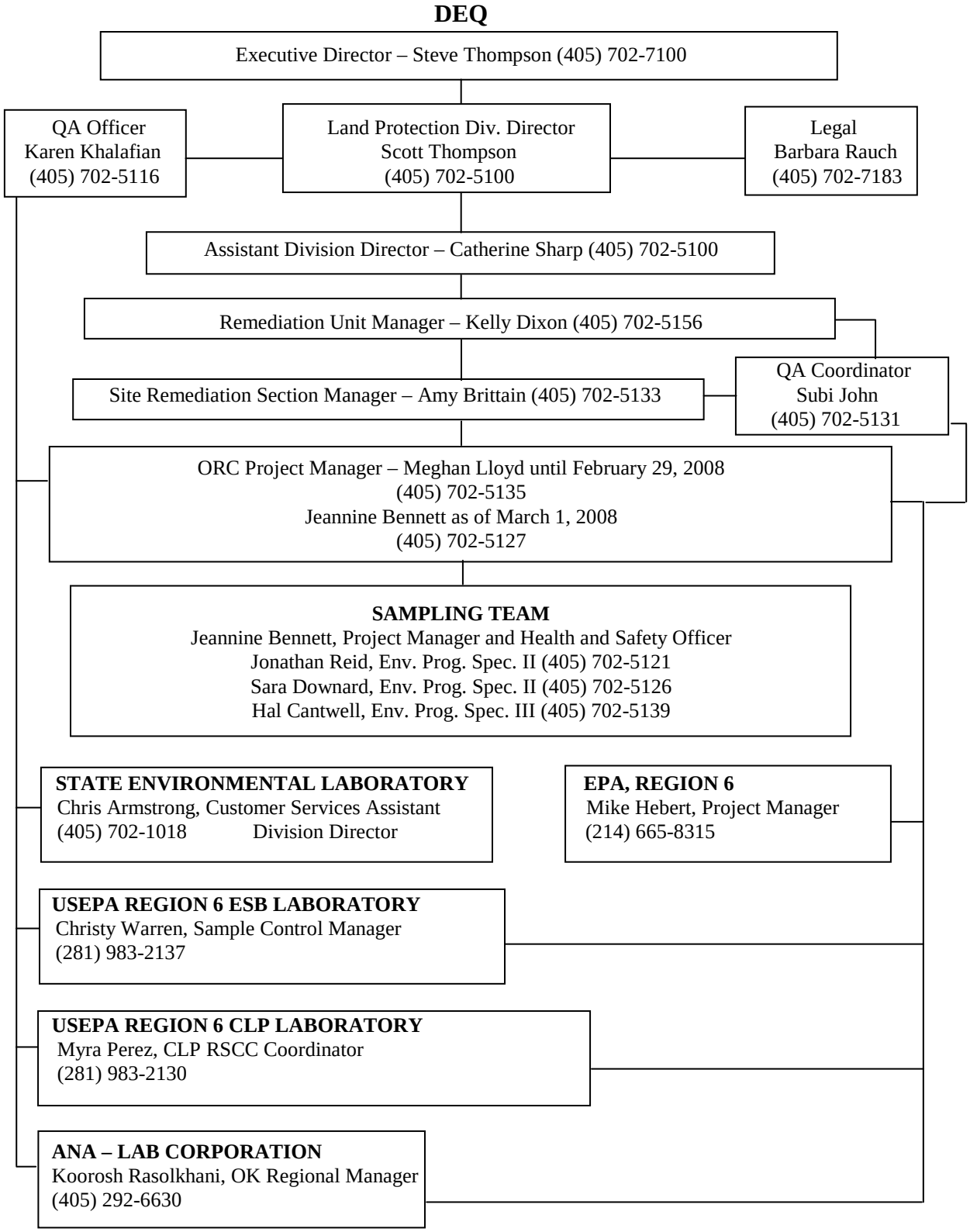


Figure 1. Organizational Chart for the Oklahoma Refining Company Site, Cyril, Oklahoma, 2008-2009

A5. PROBLEM DEFINITION/BACKGROUND

The ORC Superfund Site is located in southwest Oklahoma in extreme southeast Caddo County. The Site is bordered by Gladys Creek on the east, U.S. Highway 277 on the north, Cyril on the west and a tributary of Gladys Creek on the south (Figure 2).

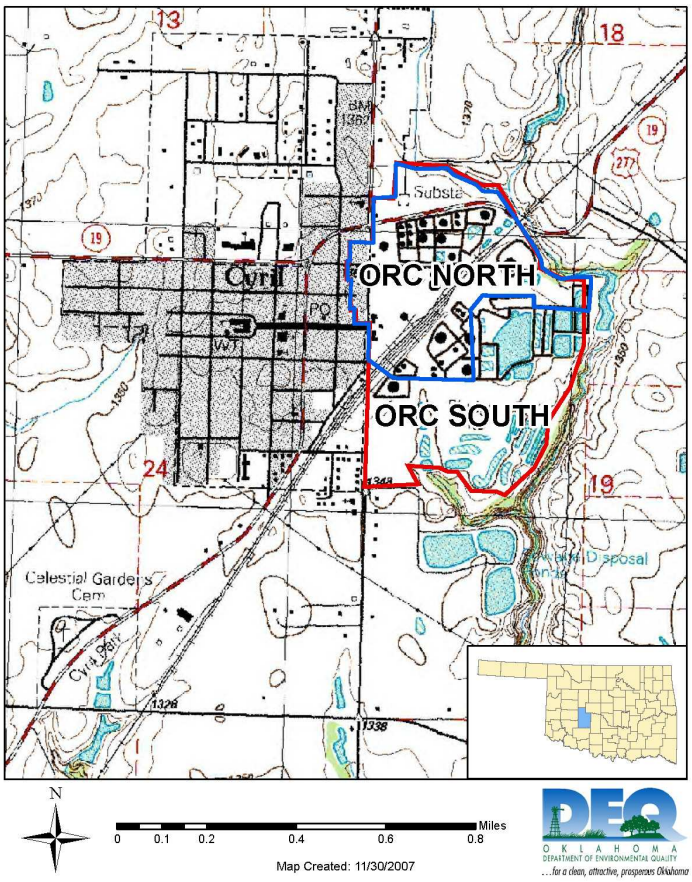


Figure 2. Location map of the Oklahoma Refining Company Superfund Site, Cyril, Caddo County, Oklahoma

The Site history, background, and scope of work for this project are presented in the DEQ Site RFS Field Sampling Plan (FSP), February 2008. The DEQ will perform sampling of north property soil, site-wide ground water, surface water, and sediment to assess Site conditions and to document Site condition changes. The analysis of the samples will be performed by either the SEL, ESB/CLP(s), or Ana-Lab. These sampling activities are authorized by the Comprehensive

Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA).

The objectives of the sampling by the DEQ are to:

- Determine the nature and extent of contamination in the north property soils;
- Establish the efficacy of monitored natural attenuation as a potential component of the eventual remedy for the ground water phase;
- Monitor containment of chemicals of concern;
- Monitor the mobility of the light non-aqueous phase liquid (LNAPL) plume; monitor the impact of ground water discharge to Gladys Creek;
- Determine the extent and degree of contamination and associated risk to human health and/or the environment from the ground water, surface water, and sediment of Gladys Creek.

The ORC Site covers approximately 220 acres. The Site encompasses an area that was used for petroleum refining purposes for about 80 years. Approximately one-half of the Site consisted of a refinery process area and a tank farm area. The other half consisted of grasslands and approximately 40 randomly sized pits, wastewater ponds and impoundments.

During the period of active refining at this Site, various refining processes were utilized. These processes included crude distillation, vacuum distillation, fluid catalyst cracking, alkylation, bi-metallic reforming and downstream processing. Wastewater generated at the refinery was sent through an American Petroleum Institute (API) separator to recover free-floating hydrocarbons. The water was then treated in a series of surface impoundments. Effluent from the surface impoundments was then discharged into Gladys Creek. Other refinery wastes including asphaltic, acidic, and caustic wastes were disposed of on Site in various impoundments.

Contaminants present at the Site included volatile organic compounds, such as benzene, toluene and xylenes, semi-volatile organic compounds, and a number of heavy metals including arsenic, cadmium and lead. Waste at the Site was present in the surface soils, subsurface soils,

sediments, surface water and ground water. Waste on the south portion and limited areas of the north portion of the Site were addressed during the 1997-2003 Remedial Action. The ground water contamination includes a free-floating LNAPL hydrocarbon plume and dissolved phase contaminants.

The ORC Site was added to the National Priorities List (NPL) of hazardous waste sites in June 1988, making the Site eligible for cleanup under the federal Superfund program. On December 5, 1995, the EPA and DEQ agreed to implement the ground water portion of the remedy in a second construction phase after the completion of the source remedy. The North portion of the Site was regulated under the Resource Conservation and Recovery Act (RCRA) until August 2002 when it was deferred to Superfund authority. The source removal phase of RA for the South portion of the Site reached final completion in January 2002. The EPA Emergency Response Branch began a removal action on the North portion of the site in August 2003 that included demolition of process equipment and tanks. This removal action was completed in February 2006. Remaining soil contamination on the north side of the site, site-wide ground water, and the seeps into Gladys Creek has yet to be addressed.

Currently, DEQ will collect data to develop and evaluate remedial alternatives for the remedial action at the Site. To do this EPA and DEQ will perform soil, ground water, surface water and sediment sampling.

A6. Project/Task Description

To accomplish the objectives of the FSP, sampling of north side soil, Gladys Creek surface water and sediment, monitored natural attenuation (MNA) ground water sampling, containment ground water well sampling, LNAPL delineation and characterization, and a resistivity survey will be conducted. This will yield the best data available to assess the current site conditions and outline future investigation and planning activities necessary to assess and address potential threats to human health and the environment associated with the Site. The data from this effort will be used to:

- Quantify the nature and extent of north side soil contamination;

- Quantify the nature and extent of surface water and sediment contamination in Gladys Creek;
- Characterize the physical nature of the LNAPL plume;
- Determine the potential for MNA as a remedial alternative for site ground water;
- Evaluate if off-site migration of contamination is occurring in the ground water; and
- Obtain information necessary to evaluate remedial alternatives in the RFS.

The DEQ will sample 66 locations for surface soil samples and 15 locations for sub-surface soil samples across the north property of the site. Six wells will be sampled semi-annually to verify onsite containment of contaminated ground water. Twenty-four wells not sampled since the Remedial Design or Remedial Action will be sampled during the RFS to establish a site-wide baseline for ground water contamination. An additional 13 wells will be sampled on a semi-annual basis to monitor and evaluate MNA. Also included is quarterly monitoring of 42 LNAPL wells. Approximately ten surface water and ten sediment samples will be collected from Gladys Creek. DEQ personnel will conduct all sampling procedures and all samples will be analyzed by the SEL, ESB/CLP, or Ana-Lab. The media to be sampled at the Site includes soil, ground water, surface water, and sediment. Refer to the FSP for additional details.

All samples can be considered critical data points for achievement of project objectives. Sampling activities will be conducted in accordance with the procedures outlined in the FSP. No special personnel or nonstandard equipment are required for the sampling.

Samples will be analyzed for the list of constituents with reporting requirements indicated on Tables 1, 2, and 3, which is based on the Remedial Action Objectives (RAOs) set forth in the 1992 Record of Decision (ROD). Matrix interference and/or elevated concentrations of target and non-target constituents could necessitate sample dilution to mitigate these effects and minimize damage to laboratory instruments. This dilution could result in elevated reporting limits that are largely outside of the control of the analytical laboratory.

A7. Data Quality Objectives for Measurement Data

Data quality objectives (DQOs) are qualitative and quantitative statements that clarify study objectives, define the type of data needed, and establish error limits for the quality and quantity of data needed to support decisions (Reference 2). DQOs are used to establish performance criteria, or measurement quality objectives, that take into account the purpose of data collection, the types of data needed, and tolerable limits for decision error. DQOs are developed through a six-step process.

- Step 1: State the Problem
- Step 2: Identify the Decision
- Step 3: Identify Inputs to the Decision
- Step 4: Define the Study Boundaries
- Step 5: Develop a Decision Rule
- Step 6: Specify Limits on Decision Errors

DQOs are revised and/or expanded, as needed, based on review of each data collection and analysis activity. The following sections present a discussion of DQO development as applied to the Site. Table 1 shows the minimum data quality for the RFS project at the site.

DQO Step 1: State the Problem

Details regarding the project organization and decision-makers were presented in Section A4 of this QAPP. Primary data users include DEQ and USEPA. Background regarding the Site and the RFS objectives were presented in Section A5. A summary of the project and relevant deadlines was presented in Section A6.

DQO Step 2: Identify the Decision

The purpose of this step is to identify the decisions that require the collection of new information. The primary goals are to identify the key questions of the study; define alternative actions that could result from resolution of the study questions; and combine the study questions and alternative actions into decision statement (USEPA, 2000c). The primary decisions to be addressed during the RFS include:

- Determine the nature and extent of north side soil contamination;
- Determine the nature and extent of surface water and sediment contamination in Gladys Creek;
- Determine the characteristics of the physical nature of the LNAPL plume;
- Determine the potential for MNA as a remedial alternative for site ground water;
- Determine if off-site migration of contamination is occurring in the ground water; and
- Determine the necessary information needed to evaluate remedial alternatives in the RFS.

DQO Step 3: Identify Inputs into the Decision

Step 3 identifies information that is needed to support the decision statements made above and identifies areas that will require environmental data collection. To adequately address the decision statements, the following types of inputs are needed:

- Screen data to evaluate the migration and/or attenuation of the free phase and dissolved phase plume;
- Analytical laboratory data, primarily for VOCs, SVOCs, and metals to evaluate the soil, ground water, surface water, and sediment; and
- Physical and chemical properties of wastes and contaminated media.

DQO Step 4: Define the Study Boundaries

Step 4 clarifies the characteristics that the collected environmental data are intended to represent. The following activities are performed to define the study boundaries: define the population of interest; define the geographic area; determine the time frame to which the decision applies; determine the data collection time frame; define the scale of decision making; and identify any constraints on the data collection. The following paragraphs address each of these items:

Population of Interest

Soil, ground water, surface water, and sediment are all media of interest for the Site. The primary potential contaminates of interest in these media include VOCs, SVOCs, and metals.

Parameters will be reported as indicated in Tables 1, 2, and 3. The parameter list is based on the Remedial Action Objectives set forth in the ROD.

Geographic area

The geographic area under consideration is the ORC Superfund Site, which is located in Cyril, Caddo County, Oklahoma. Figure 2 of the QAPP provides the delineation of the property boundary.

Time Frame

The data collection will occur over the next two years, beginning in April 2008.

Scale of Decision Making

- Soil – Soil within the north property boundary will be addressed during the RFS. Soils within the south property boundary were previously addressed during the Remedial Action completed in 2002.
- Ground water – Ground water will be considered on a site-wide basis.
- Surface water and Sediment – Surface water and sediment locations will be determined at the time of the sampling event and will be considered on a site-wide basis.

Constraints on Data Collection

Sampling could be delayed by excessive periods of rain that would limit accessibility to certain locations on the Site. Damage to monitor wells could limit accessibility to ground water.

DQO Step 5: Develop a Decision Rule

In Step 5, a decision rule is developed that defines the conditions that would cause the decision-maker to choose among alternative actions. Activities involved in Step 5 include: specify the statistical parameter that characterizes the population; specify an action level for the decision; confirm that detection limits will allow reliable comparison with the action level, and state the decision rule.

Statistical Parameters

Different data uses will result in the potential need to examine multiple statistical parameters for a given media and/or location. Depending on the end use of the data (i.e. source identification, determination of extent of contamination, risk assessment, etc.), any one of several statistical parameters could prove useful. For example, the use of the maximum concentration of a constituent in a given population is useful for identification of source areas. The difference between the maximum concentration of a constituent at an area boundary versus background can be used for definition of the extent of contamination.

Action Level

Given the multiple uses of the data, any one of several numerical values may prove useful to answer questions regarding the Site. The ROD established action levels, or Remedial Action Objectives (RAOs), and applicable or relevant and appropriate requirements (ARARs) that the sampling data will be screened against. RAOs are presented in Tables 1 through 3.

Confirm Detection Limits

To the extent that is technically feasible using routine analytical techniques, the reporting limits for critical parameters should meet the RAOs established for the Site. Typical reporting limits for the parameters are indicated in Tables 1, 2, and 3 of this QAPP. Matrix interference and/or elevated concentrations of target and non-target constituents could necessitate sample dilution to mitigate these effects and minimize damage to laboratory instruments. This dilution could result in elevated reporting limits that are largely outside of the control of the analytical laboratory. Therefore, automatic data rejection will not occur should a parameter's reporting limit exceed an RAO. Instead, the magnitude of the exceedence will be considered in conjunction with the intended use of the data to determine its overall impact upon decision-making.

Decision Rule

Given the many objectives of the RFS, the following decision rules are appropriate for the project, they include:

- If the concentrations for a parameter are above background concentrations at the periphery of a given area, the extent of contamination may require further evaluation. Ground water, surface water, and sediment background concentrations will be determined using background sample locations during the RFS. Soil background concentrations were determined during the 1991 RI/FS.
- If the concentration of a parameter exceeds a RAO for a given population, further evaluation may be required.
- If the concentrations for a parameter are above background concentrations, but below RAOs, further evaluation will not be required.

DQO Step 6: Specify Limits on Decision Error

Step 6 quantifies performance criteria for decision rules by expressing the probability limits on potential errors in decision-making. The probability limits on decision errors specify the level of confidence desired in making conclusions regarding the Site data. The possibility of a decision study error exists due to the inherent variability in the sample collection and analysis process. The two main components of the "total study error" include the following:

- Sampling Design Error – Sampling design error is influenced by the sampling design, the number of samples collected, and the inherent variability of the media to be sampled. Sampling design error occurs when the collection program is not established such that the variability within the media is accounted for.
- Measurement Error – Measurement error is influenced by the sampling and analysis system. Errors are introduced into the system during sample collection, handling, preparation, analysis, and data reduction.

Two types of decision errors are common in environmental measurements. The first type of error is known as a false acceptance error. False acceptance errors occur when the data leads the end user to conclude that the baseline condition (for example, the Site is contaminated) is true when it is really false. In contrast, false rejection errors occur when the data leads the end user to conclude that the baseline condition is false when it is really true. For purposes of the RFS a

decision error of 5 percent (or a confidence level of 95%) for both false acceptance and false rejection errors has been established.

Additionally, to limit impractical or infeasible sample sizes, a gray region of possible values near the action level where the true value is "too close to call" is selected. It is an area where it is not feasible to control the false acceptance decision error to low levels since the costs of sampling and analysis outweigh the potential consequences of choosing the wrong course of action. For the purposes of this study, the lower boundary of the gray area was selected at 80 percent of the action level, or RAO, and the upper boundary of the gray area was selected as the RAO.

To minimize the possibility of decision errors, the components of the total study error are examined. Sampling design error can be minimized by collecting a larger number of samples, or in the case of resource limitations, using screening technologies to focus sampling on areas of potential concern. Measurement errors can be minimized by replicate analysis of the same sample or by selecting cleanup preparation, and analysis methods that are best suited to the Site matrix. Measurement errors will be assessed by reviewing several data quality indicators (DQIs) including precision, accuracy, representativeness, completeness, and comparability.

Measurement Quality Objectives

The overall objective of the QAPP is to establish QA criteria for project activities so that the data generated are scientifically valid and usable for the project objectives. To support this overall objective, the following management objectives have been established for the investigation:

- Sample analysis will be completed in accordance with the methods, or equivalent procedures, listed in Table 5 to provide supportable results.
- Parameters will be reported as indicated on Tables 1, 2, and 3. The parameter list is based upon the RAOs set forth in the ROD.
- Data will be evaluated for achievement of method-specific QA/QC criteria. Data qualifiers, when appropriate, will be added to the data in accordance with the *Contract Laboratory Program National Functional Guidelines for Organic Data Review (NFGO)* USEPA, 1996b. Data that is rejected during validation due to problems with analytical

quality or significant matrix-related interference will not be usable for purposes of the RFS.

- Data will be reported in units consistent with environmental engineering, geologic, hydrogeologic, and analytical laboratory standards applicable for the data being collected.

A8. Special Training Requirements/Certification

All sampling team members will meet the requirements set forth in the DEQ Quality Management Plan for employment in their various positions. Sampling team membership will be limited to the following positions: Environmental Programs Specialist (all levels); Environmental Engineer (all levels). All DEQ sampling team members will have the OSHA CFR 1910.120, 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training and will receive the HAZWOPER 8-hour refresher training as needed. Additionally, the ORC project manager and sampling team leader will be required to have attended the EPA Sampling for Hazardous Materials or RCRA Sampling Procedures training course.

A9. Documentation and Records

The DQO planning process will be utilized throughout the project. A field logbook will be maintained for all procedures conducted onsite. The following information will be recorded in the field logbook: weather conditions; sample identification number; date and time of sample collection; sample description (e.g., color, turbidity, composition etc.); location of sample; physical and chemical properties of the sample as appropriate (e.g., field pH, conductivity, temperature readings etc.); sampler's initials; number and description of any photographs taken; and any changes made in the field which differ from the approved FSP. The field logbook will be kept in the Site's permanent DEQ file.

The most current version of this QAPP will be maintained by DEQ and distributed to parties on the distribution list if there are revisions. The revision number and date appearing in the header of the document may readily identify revisions to the QAPP.

Information pertaining to the analytical laboratory documentation, record keeping, and narratives will be provided in the laboratory Quality Assurance Plans (QAPs) or is outlined in the Statements of Work for the CLP laboratories. QAPs for the ESB/CLP and SEL (Reference 3) are maintained at those facilities. The minimum data anticipated for the laboratory data package are the sample and QC results associated with the analysis.

When all sample analyses have been received from the SEL, ESB/CLP, or Ana-Lab and the data have been validated, verified and interpreted, a memorandum on the sampling event will be written by the sampling team leader under the supervision of the ORC project manager. This memorandum will include: a detailed discussion of the results of the analytical data; a Site map indicating the areas of contamination as determined analytically; tables displaying the analytical results matched to their sample points; copies of any photographs taken during that sampling event; any changes from the FSP that were made in the field; a summary of what the data collected indicates; all references cited in the report; the laboratory data; and any recommendations. Logbook data that provides additional clarification will be tabulated and included with the memorandum. These memoranda will be submitted to EPA for review and discussion. Copies of all Site documents will be kept in the Site's permanent DEQ file. All DEQ files are open for public inspection during regular office hours.

GROUP B. – MEASUREMENT/DATA ACQUISITION

If possible, all samples will be collected during five weeks depending on the availability of personnel or unforeseen circumstances such as adverse weather conditions. The media to be sampled are soil, ground water, surface water, and sediment. The SEL, ESB/CLP, or Ana-Lab will be utilized for the analyses of all samples collected by the sampling team.

B1. Sampling Process Design

The purpose of the sampling is to ensure that the analytical data is legally defensible and that it can be used confidently in the decision making process. The objectives of the project are to: quantify the nature and extent of north side soil contamination; quantify the nature and extent of surface water and sediment contamination in Gladys Creek; characterize the physical nature of the LNAPL plume; determine the potential for MNA as a remedial alternative for site ground water; evaluate if off-site migration of contamination is occurring in the ground water; obtain information necessary to evaluate remedial alternatives in the RFS; develop and evaluate cleanup alternatives; and develop cost estimates for the remedial action. Specific activities comprising the sampling will consist of soil, ground water, surface water, and sediment sampling. Specific sampling areas were selected using judgmental sampling based on knowledge of past Site operations and historical data to correlate with known areas of contamination.

The DEQ will sample:

- Sixty-six locations on the north property for surface soil
- Fifteen locations on the north property for subsurface soil
- Twenty-four wells to establish a site-wide baseline for ground water contamination
- Six wells semi-annually for containment monitoring
- Thirteen wells on a semi-annual basis for MNA monitoring
- Quarterly monitoring of forty-two LNAPL wells

- Gladys Creek surface water and sediment will be sampled (Site sample locations will be determined at the time of sampling)
- Creek sampling will consist of about ten surface water samples and ten sediment samples.

MNA monitoring parameters include:

Field Parameters	**Laboratory Parameters**
PH	VOC, SVOC
Conductivity	Iron (total)
Temperature	Nitrate
Dissolved Oxygen	Nitrite
Oxidation-Reduction Potential	Sulfate
Ferrous Iron (individual test kit)	Manganese
Hydrogen Sulfide (individual test kit)	Alkalinity
Turbidity	Dissolved Methane
	Metals

B2. Sampling Methods Requirements

All sampling procedures will follow the LPD Site Assessment Unit QAPP (Reference 4) or EPA compendia and similar publications including: Sampling for Hazardous Materials Procedures (Reference 5); CLP Guidance for Field Samplers; Compendium of ERT Sampling Equipment Decontamination SOP #2006; DEQ Field Logbooks SOP-1; and DEQ Field Instruments SOP-2. Surface soil sampling will be consistent with the following procedures: Compendium of ERT Soil Sampling SOP #2012 and DEQ Subsurface Soil and Bedrock Sampling SOP-4. Surface water sampling will be consistent with the following procedures: Compendium of ERT Surface Water Sampling SOP #2013 and DEQ Surface Water Sampling SOP-5. Sediment sampling will follow the Compendium of ERT Sediment Sampling SOP #2016. Ground water well

installation will be consistent with the following procedures: Compendium of ERT Well Development SOP #2044 and Compendium of ERT Monitoring Well Installation SOP #2048. Ground water sampling will be consistent with the following procedures: Compendium of ERT Ground Water Sampling SOP #2007; Compendium of ERT Water Level Measurement SOP #2043; and DEQ Monitoring Well Sampling with a Low-Flow Peristaltic Pump SOP-7. All SOPs are included in Appendix B in the RFS Field Sampling Plan (Reference 6).

If possible, all samples will be collected during a five week time period depending on the availability of personnel or unforeseen circumstances such as adverse weather conditions. In the case of adverse weather conditions, sampling will be suspended until conditions are deemed favorable. If the adverse weather conditions persist, sampling will be suspended for the day, the samples on hand will be transported or shipped to the laboratory, and sampling will resume the following day if weather conditions have improved. Samples will be shipped or delivered to the laboratory at the end of each sampling day.

The DEQ has a decontamination (decon) area that has been established at the Oklahoma City office for the decontamination of personal protective equipment (PPE) and disposable sampling equipment. Reusable sampling equipment, such as spoons, bowls, and ground water equipment, will be decontaminated in the field following the Compendium of ERT Sampling Equipment Decontamination SOP #2006 (Reference 6). While in the decon area, disposable PPE and sampling equipment will be collected, double bagged, and disposed of at DEQ Headquarters in Oklahoma City. While in the decon area, exposed skin will be washed with soap and water. In an emergency, the primary concern is to prevent the loss of life or severe injury to site personnel. If immediate medical treatment is required to save a life, decontamination will be delayed until the victim is stabilized.

Sample containers that have been cleaned and certified in accordance with SEL or ESB/CLP quality parameters will be used for each sampling event. The containers will then be transferred to the sampling vehicle where they will be secured until use.

Samples from ground water monitoring wells will be collected only after verifying that purging has been successfully completed. This will be accomplished by measuring temperature, pH, and conductivity of the water as described in the Compendium of ERT Ground Water Sampling Procedures SOP #2007 (Reference 6). Samples will be collected and analyzed for VOCs, SVOCs, metals, and appropriate MNA parameters.

If problems are encountered during sampling the project manager will be responsible for initiating corrective actions. Corrective action for field measurement may include:

- Repeat the measurement to check the error
- Check for all proper adjustments for ambient conditions such as temperature
- Check the batteries
- Check the calibration
- Replace the instrument or measurement device

Corrective action for sampling procedures may include:

- Evaluating and amending sampling procedures
- Resampling

B3. Sample Handling and Custody Requirements

A waterproof field notebook will be maintained and each sample will be entered in the notebook with waterproof ink. Specific information for each entry will include: weather conditions; sample identification number; date and time collected; location of sample; appearance of sample; field pH, conductivity and temperature; sampler's initials; number

and description of any photographs taken; and any changes made in the field that differ from the FSP.

All samples will be placed in sample containers that have been cleaned and prepared by the SEL or appropriate vendor. The sampling team leader will assign a number to each planned sample and labels with the individual numbers will be attached to each sample container prior to entering the field. As samples are taken, the labeled containers will be bagged and placed in a sample cooler and preserved with ice to 4 degrees C. Each sample will be entered on the Chain-of-Custody Record (Reference 7) and Sample Log-in form (Reference 8) as it is placed in the cooler. When needed Forms II Lite Software will be used to generate appropriate documentation (COCs, sample labels, sample tags, etc.).

A sample will be considered in an individual's custody if the sample is in an individual's possession or view, the sample was in possession and locked up or sealed, or the sample is in a secured area. Chain-of-Custody Records will be maintained at all times. The DEQ sampling personnel delivering the samples will sign and date the Chain-of-Custody Records when they relinquish the samples to SEL personnel or appropriate shipping company personnel. When not in the immediate presence of DEQ personnel, the samples will be locked inside the sampling vehicle and DEQ personnel will maintain the key. The samples will be delivered directly to the SEL by the sampling team leader or a designated sampling team member on the day of the sampling event. In the event that SEL personnel are not available to receive the samples, all containers will be stored in an SEL refrigerator designated for the Land Protection Division, DEQ. In the event that the Ana-Lab or ESB/CLP laboratory is utilized the samples will be shipped via appropriate carrier to the laboratory on the same day as the sampling event.

B4. Analytical Methods Requirements

The DEQ QA/QC samples collected during this phase will be analyzed for VOCs, SVOCs, and metals (see Tables 1, 2, and 3). Media to be sampled throughout the

sampling project include ground water, surface water, soil, and sediment. The samples will be analyzed in accordance with the SEL, ESB/CLP, and Ana-Lab QAP. Due to the use of multiple laboratories, the analytical method and/or reporting limit may not be identical for each compound class.

The laboratories QAPs contain information regarding analytical equipment, maintenance, and calibration for analyses performed using these methods. In addition, the laboratory QAPs detail corrective actions that are to be taken in the event of QC failures. If a condition in the laboratory is discovered which compromises analytical data, the laboratory will contact the appropriate party (USEPA or DEQ depending upon which party has oversight for laboratory activities) as soon as practicable. The laboratory QA officer and appropriate project managers will address the situation as soon as practicable. Any action taken will be recorded and eventually included in the data submittal.

Samples will be analyzed in accordance with the procedures in EPA's Test Methods for Evaluating Solid Waste, Physical and Chemical Methods, SW-846, Final Update III as amended (SW-846)(USEPA, 1997b) and Methods for Chemical Analysis of Water and Wastes (EPA 600 Methods) (USEPA, 1983), where applicable. ESB/CLP will utilize the Multi-Media, Multi-Concentration, Organic Analytical Service for Superfund (ILM04.3) (Reference 9) and Multi-Media, Multi-Concentration, Inorganic Analytical Service for Superfund (OLM05.3) (Reference 10) for analytical data reporting. Ana-Lab will utilize the Dissolved Methane Test Methods, RSK 175, for analytical data reporting (Reference 11). Key COCs for this project are listed in Tables 2 through 4.

To assess whether QA objectives have been achieved, the following Data Quality Indicators (DQIs) will be considered: precision, accuracy, representativeness, comparability, and completeness. To monitor the quality of field sampling techniques and potential sample transport anomalies, QC samples (including trip blanks, equipment rinsate blanks, field blanks, matrix spike/matrix spike duplicates and field duplicate

samples) will be submitted with the samples collected in the field. Discussion of laboratory QC samples and procedures are presented in the laboratory QAPs.

B5. Quality Control Requirements

To assess whether QA objectives for this project have been achieved, the following data quality indicators will be considered: precision, accuracy, representativeness, comparability, and completeness. To monitor the quality of field sampling techniques and potential sample transport anomalies, QC samples (including trip blanks, field blanks, matrix spike/matrix spike duplicates [MS/MSD], and field duplicate samples) will be submitted with the samples collected in the field. The combined laboratory and field QC procedures will provide an adequate database for evaluation of analytical data. Discussion of laboratory QC samples (blanks, surrogates, and laboratory control samples [LCS]) and procedures are presented in the laboratory QAPs. Data will be evaluated for achievement of any method-specific QA/QC criteria. Data qualifiers, when appropriate, will be added to the data in accordance with USEPA's NFGO and NFGI.

Precision is the level of agreement among individual measurements of the same chemical or physical property. During the data validation process, precision is expressed in terms of relative percent difference (RPD). Chemical concentration data obtained from the analysis of field duplicate, laboratory duplicate, MSD, and/or laboratory control sample duplicate (LCSD) samples will be compared to evaluate analytical precision. A measurement of precision will be conducted.

Perfect precision would be indicated by a RPD of zero percent. In general, RPD values less than 20 percent for water and 35 percent for soil indicate adequate precision for a given analysis. However, the CLP Statements of Work have RPD limits established in each method. For analysis other than CLP, most laboratories establish QC limits at the approximate 99 percent confidence interval using historical data sets. For samples having low chemical concentrations (less than five times the requested reporting limit), a

sensitivity test is conducted. If the difference in duplicate sample analytical results is less than one times the reporting limit for water or two times the reporting limit for soil, the sensitivity test is passed, and analytical data for samples having low chemical concentrations are considered acceptable.

Laboratory Control Sample/Laboratory Control Sample Duplicate

Certain USEPA methods require the analysis of a LCS in each analytical batch, up to a maximum of 20 samples. For the LCS, an interference-free matrix is spiked with known concentrations of target constituents and analyzed. In addition, while not required by the methodology, some laboratories analyze a duplicate preparation of the LCS (called the LCSD). The intent is to measure analytical accuracy and precision of the method in the absence of sample matrix effects. When provided, the results of the LCS/LCSD will be utilized to assess the precision of the preparation and analysis methods.

MS/MSD Samples

MS and MSD analytical results will be utilized to assess the accuracy and precision of the laboratory analytical results in the presence of any potential sample matrix interference. The laboratory will spike the MS and MSD samples with known concentrations of target analytes prior to analysis. As a measure of precision, results of the MS and MSD are compared to each other to determine the RPD. The project goal is to collect a minimum of five percent MS and MSD samples during the sampling event with emphasis on collecting MS/MSDs for each unique matrix. The laboratory will spike the MS and MSD samples with known concentrations of target analytes prior to analysis. As a measure of precision, results of the MS and MSD are compared to each other to determine the RPD. Laboratory methodology generally requires the analysis of a MS/MSD pair in each analytical batch, up to a maximum of 20 samples. The maximum RPD between the MS and MSD is typically 20 percent for aqueous samples and 35 percent for soil samples. However, USEPA methodology allows for statistical determination of the control limits on a parameter-specific basis.

Any RPD outside of control limits for the MS/MSD requires evaluation by the lab. At a minimum, calculations should be checked for errors and corrected when necessary. If no calculation errors occurred, instrument performance should be verified. If an instrument problem is found, it should be corrected and the samples reanalyzed. If no instrument problem is found, then the magnitude of the result from control limits should be evaluated. Significant deviance from control limits (i.e. RPDs that exceed control limits by more than 25 percent) may necessitate reanalysis. However, if the corresponding RPD for the LCS/LCSD sample is within control limits, such reanalysis is not necessary and the exceedence may be attributable to sample inhomogeneity and/or matrix interference. In some instances, the corrective action will involve flagging the data during data validation.

Laboratory Duplicate Samples

For samples analyzed using the CLP Inorganic Statement of Work, the methodology calls for analysis of an MS and laboratory duplicate. In these instances, samples are collected in triplicate volume and designated as field sample, MS, and laboratory duplicate samples. The laboratory will analyze the field sample and duplicate sample using the same preparation and analytical techniques. To assess precision, the results of the field sample and duplicate are compared. The project goal is to collect a minimum of five percent laboratory duplicate samples during the sampling event with emphasis on collecting laboratory duplicates for each unique matrix. When required by the methodology, laboratory duplicates are generally analyzed in each analytical batch, up to a maximum of 20 samples. The maximum RPD between the sample and duplicate is typically 20 percent for aqueous samples and 35 percent for soil samples. However, USEPA methodology allows for statistical determination of the control limits on a parameter-specific basis.

Any RPD outside of control limits for the laboratory duplicate requires evaluation by the laboratory. At a minimum, calculations should be checked for errors and corrected when

necessary. If no calculation errors occurred, instrument performance should be verified. If an instrument problem is found, it should be corrected and the samples reanalyzed. If no instrument problem is found, then the magnitude of the result from control limits should be evaluated. Significant deviance from control limits (i.e. RPDs that exceed control limits by more than 25 percent) may necessitate reanalysis. However, if the corresponding RPD for the LCS/LCSD and/or MS/MSD sample is within control limits, such reanalysis is not necessary and the exceedence may be attributable to sample inhomogeneity and/or matrix interference. In some instances, the corrective action will involve flagging the data during data validation.

Field Duplicate Samples

Field duplicate sample results will indicate the precision and reproducibility of sample collection and analytical results. A field duplicate sample is obtained from a single sample that is split into two similar portions to produce two samples. The project goal is to collect a minimum of 10 percent duplicate samples during the sampling event. The field duplicate samples will be collected in the same manner and analyzed for the same parameters as field samples from the same location. For purpose of review, the maximum allowable RPD for field duplicate samples is set at 20 percent for aqueous samples and 35 percent for soil samples. Results less than five times the reporting limit will be compared using a sensitivity test.

It should be noted that field duplicate samples are expected to have greater variability than laboratory duplicates. Any RPD outside of control limits for the field duplicate requires evaluation. The sample collection method should be verified to determine likely sources of sample inhomogeneity. Additionally, the RPD calculations should be checked for errors and corrected when necessary. If no calculation errors occurred, then the laboratory should be contacted and requested to verify their results. Additionally, any information the laboratory can give regarding apparent homogeneity of the sample within the sample container should be obtained. If analytical holding times have not been

exceeded and sufficient sample volume remains, it may be beneficial to have the laboratory repeat the sample analysis in instances where the field duplicate RPD is significantly outside of control limits (i.e. RPDs that exceed control limits by more than 50 percent). If the corresponding RPD for the LCS/LCSD and/or MS/MSD samples are within control limits, the field duplicate failure may be attributable to sample inhomogeneity. In some instances, the corrective action will involve flagging the data during data validation or rejection of the results for the original and duplicate sample.

Accuracy

Accuracy measures the bias of a measurement system and may be defined as the degree of agreement between a measurement and its accepted or true value. The accuracy of chemical results is assessed by examining the results of spike recovery and blank samples.

Blank Samples

Blank (laboratory, field, equipment rinsate, and trip) results are used to evaluate whether field or laboratory handling may have contaminated samples and adversely impacted analytical accuracy. The results of these analyses allow an evaluation of whether detections may represent chemicals introduced into the samples during handling, sample shipment, or analytical preparation and analysis.

Blanks are expected to have no detections of target constituents. Any blank detection that exceeds the constituent's reporting limit requires corrective action to determine the apparent source of contamination and/or reanalysis of the blank to confirm the detection. Detections between the method detection limit (MDL) and reporting limit do not require corrective action. Results in field samples that are less than five times the corresponding contaminated blank value are generally considered false positive and flagged accordingly during data validation. Instances of gross contamination (i.e. blank detections exceed

applicable screening levels) may require reanalysis and/or resampling if the corresponding field samples have similar detections.

Method Blanks: USEPA methodology generally requires the analysis of a method blank sample in each analytical batch, up to 20 samples. For the method blank, a clean matrix is prepared and analyzed in the same manner as the field samples. Any detection in the method blank indicates potential laboratory contamination of the associated field samples in the analytical batch.

Trip Blanks: Trip blanks are utilized for samples planned for VOC analysis. The laboratory prepares trip blanks and sends them to the field along with the containers for sample collection. They are utilized to determine if any VOCs diffused through the sample container septum due to site, shipping, or laboratory conditions; thereby, causing cross-contamination of samples. One trip blank will be included in each cooler that contains samples for VOC analysis.

Rinsate Blanks: Equipment rinsate blanks are collected to determine if any cross-contamination between samples occurred due to insufficient decontamination of sampling equipment. If disposable sampling equipment is not used, then an equipment rinsate will be obtained by rinsing decontaminated sampling equipment with deionized water and collecting the resulting rinsate for analysis of the same analytical parameters as the previous samples. One soil equipment rinsate blank, if necessary, will be collected per day or every twenty samples, whichever is more frequent during sampling.

Field Blanks: Field blanks for VOC samples will be prepared in the field on a daily basis by sampling personnel to assess the ambient conditions under which the samples were collected. Field blanks will be prepared by pouring deionized water directly into the VOC sample containers. The field blanks will be submitted to the laboratory for VOC analysis.

Spike Recovery Studies: Spike recovery studies (surrogates, LCS/LCSD, and MS/MSD) results are used to evaluate the ability of the laboratory to recover constituents that are intentionally spiked into the samples. Accuracy of spiked (LCS/LCSD, surrogates, and MS/MSD) samples is expressed as the percent recovery (REC). Perfect accuracy is defined as 100 percent recovery. In general, REC values from 70 to 130 percent indicate adequate accuracy for a given analysis. However, the CLP Statements of Work have REC limits established in each method. For analysis other than CLP, most laboratories establish QC limits at the approximate 99 percent confidence interval using historical data sets. It should also be recognized that not all constituents are capable or recovering within this range. An elevated REC indicates high sensitivity or high bias in detecting a compound; therefore, non-detect results would be considered reliable. A low REC indicates a low sensitivity or low bias in detecting a compound, which leaves the possibility of false negative results.

Surrogates: Surrogates are added to each sample that undergoes organic analyses. Surrogates are compounds that are not normally found in environmental samples that are added (spiked) into field and QC samples and analyzed for REC. Surrogates are utilized to give an indication of the analytical accuracy of the preparation and analysis method on a per sample basis. In general, REC values from 70 to 130 percent indicate adequate accuracy for a given analysis. However, USEPA methodology allows for statistical determination of the control limits on a parameter-specific basis.

Any surrogate REC outside of control limits requires evaluation by the laboratory. At a minimum, calculations should be checked for errors and corrected when necessary. If no calculation errors occurred, instrument performance should be verified. If an instrument problem is found, it should be corrected and the samples reanalyzed. If no instrument problem is found, then the sample should be re-extracted and reanalyzed, as applicable, according to method requirements. If the REC is still outside of control limits upon reanalysis, the data should be considered estimated. In some instances, the corrective action will involve flagging the data during data validation.

LCS/LCSD: As a measure of accuracy, the results of these two portions are compared against the known analyte concentrations in the spike to determine REC. The purpose of the LCS/LCSD is to determine the performance of the laboratory with respect to analyte recovery, independent of field sample matrix interference. In general, REC values from 70 to 130 percent for organic analyses and 80 to 120 percent for inorganic analyses indicate adequate accuracy for a given analysis. However, USEPA methodology allows for statistical determination of the control limits on a parameter-specific basis.

Any LCS and LCSD REC outside of control limits require evaluation by the laboratory. At a minimum, calculations should be checked for errors and corrected when necessary. If no calculation errors occurred, instrument performance should be verified. If an instrument problem is found, it should be corrected and the samples reanalyzed. If no instrument problem is found, then the corresponding REC for the MS/MSD should be examined. If the problem is limited to the LCS or LCSD and MS/MSD results are acceptable, then the problem is likely limited to only that sample and further corrective action would not be required. In some instances, the corrective action will involve flagging the data during data validation.

MS/MSD: As a measure of accuracy, the results of the MS and MSD are compared against the known analyte concentrations to determine REC. The purpose of the

MS/MSD is to determine analytical performance in the presence of any sample matrix interference. In general, REC values from 70 to 130 percent for organic analyses and 80 to 120 percent for inorganic analyses indicate adequate accuracy for a given analysis. However, USEPA methodology allows for statistical determination of the control limits on a parameter-specific basis.

Any MS or MSD REC outside of control limits requires evaluation by the laboratory. At a minimum, the data should be compared to the corresponding LCS/LCSD. If the problem is limited to the MS/MSD, the problem is likely attributable to sample matrix interference that is largely outside of the control of the laboratory. Additionally, calculations should be checked for errors and corrected when necessary. If no calculation errors occurred, instrument performance should be verified. If an instrument problem is found, it should be corrected and the samples reanalyzed. Depending upon the number and magnitude of compounds with MS and/or MSD REC failures, corrective action may include reanalysis of the MS and/or MSD or re-extraction and reanalysis of all samples within the batch. In some instances, the corrective action will involve flagging the data during data validation.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition.

The representativeness of the data will be determined by:

- Qualitative comparison of actual sampling procedures to those presented in the Site Field Sampling Plan (FSP).
- Quantitative comparison of analytical results for field duplicates and/or field splits to determine parameter variation at a sampling point.

- Invalidating nonrepresentative data or identifying data to be classified as questionable through qualitative or quantitative data validation procedures.

Nonrepresentative or questionable data is data that does not accurately reflect site conditions. If data is determined to be nonrepresentative, it will not be used in subsequent data reduction, validation, and site characterization. If a critical data point or parameter is determined to be nonrepresentative, the project manager will carefully assess the need for additional data collection.

Completeness

Completeness defines the percentage of measurements judged to be valid measurements. Completeness is assessed for both field and laboratory activities.

Field Completeness

Field completeness is assessed by comparing the number of samples collected to the number of samples planned for collection, as follows:

$$\text{Field Completeness} = \frac{\text{Number of samples collected}}{\text{Number of samples planned}} \times 100$$

The field completeness goal for this project is 90 percent. If field completeness falls below 90 percent, the need for additional data collection to meet project objectives will be carefully assessed by the project manager.

Laboratory Completeness

Laboratory completeness is assessed by comparing the number of valid sample results to the total number of sample results, as follows:

$$\text{\% Laboratory Completeness} = \frac{\text{Number of valid results}}{\text{Total number of results}} \times 100$$

The laboratory completeness goal for this project is 95 percent. If laboratory completeness falls below 95 percent for a critical parameter or sampling location, the need for additional data collection will be carefully assessed by the project manager.

Comparability

Comparability is a qualitative parameter used to express the confidence with which one data set may be compared to another. To produce comparable data, the units specified for analytical results obtained during the field investigations will be consistent throughout this project and standardized analytical methods will be utilized for each parameter.

B6. Instrument/Equipment Testing, Inspection, and Maintenance Requirements

The pH meter, temperature/conductivity meter, Oxygen Reduction Potential (ORP) meter, Dissolved Oxygen (DO), turbidity meter, Photo-Ionization Detector (PID), water level indicator and oil/water interface probe will be inspected and tested three to five days prior to field use to verify instrument accuracy and reliability. Malfunctioning equipment will be replaced or repaired and recalibrated as necessary preceding field use.

B7. Instrument Calibration and Frequency

The sampling team leader will be responsible for ensuring that the sampling equipment, sample containers, and pH, temperature/conductivity/ORP/DO monitoring equipment calibrations meet the requirements for the project. Prior to each sampling event, the field pH, temperature/conductivity, turbidity meter, and ORP/DO monitoring equipment will be maintained and recalibrated in accordance with the manufacturers' instructions. This task will be performed by the sampling team leader. All field calibrations will be recorded in the field logbook. The monitoring equipment will be decontaminated after each use. No equipment rinsate samples will be submitted for laboratory analyses.

B8. Inspection/Acceptance Requirements for Supplies and Consumables

As part of the field mobilization, the following sampling equipment items may be obtained, inspected, and located in the sampling team vehicle by the sampling team leader or designated sampling team members:

Sampling Equipment	
Logbook and Waterproof Marker	Nitrile Gloves
Disposable/Dedicated Bailers	Deionized Water
Sample Containers	Alconox Detergent
Plastic Zip Lock Bags	Plastic Sheeting
Sample Coolers	Fishing Line and Hook
pH Meter	Chain-of-Custody Forms
Temperature/Conductivity Meter	Paper Towels
DO Meter	Nylon Rope
Oil/Water Interface Probe	5-gallon Buckets
Shovel	Sampling Beakers
Stainless Steel Scoops/Trowels	Stainless Steel Bowls
ORP Meter	Low-flow Pump
Turbidity Meter	Disposable/Dedicated Tubing
Hydrogen Sulfide Test Kit	Ferrous Iron Test Kit
Digital Camera	Photo-ionization Detector (PID)

All supplies and consumables will be inspected for usability prior to the field work.

B9. Data Acquisition Requirements (Non-direct Measurements)

Data from the sampling will be compared to RAOs, current MCLs, and/or previous data collected during the RA. This will allow consistency in decision making for the Site.

B10. Data Management

The project manager has the overall responsibility for data management. These data management activities include record keeping/tracking, document control systems, and data handling to process, compile, analyze and transmit data. Day-to-day oversight of sampling activities, laboratory activities, and data tracking and receipt will be the responsibility of the project manager. All project team members are responsible for handling data in a manner consistent with standard procedures which includes information pertaining to field logbooks, photographs, sample numbering, sample documentation, laboratory assignments, documentation (cooler/shipping documentation and filing system), and corrections to documentation.

After each sampling event, reports in the form of memoranda will be organized and prepared in a comprehensive format by the sampling team leader or his designated representative under the supervision of the ORC project manager. The memoranda will be shared with the EPA for review. Master copies of all printed documents, memoranda, laboratory analysis data, and correspondence will be maintained in the ORC RFS subfile of the ORC Superfund Site Project master file system. Filing may be further subdivided for convenient retrieval and storage. All master computer disks containing DEQ QA/QC sampling and analysis information will be stored in a designated computer disk subfile of the ORC Superfund Site Project master computer disk file. All files relating to the DEQ RFS Field Sampling Plan for soil, ground water, surface water, and sediment sampling will be maintained at the DEQ central office located at 707 North Robinson Street, Oklahoma City, Oklahoma.

Analytical data reduction, review, reporting, and storage requirements are outlined in the contract laboratory QAPs. Checklists and standard forms are provided in the laboratory QAP and/or standard operating procedures for laboratory activities. The laboratory will provide an electronic deliverable of the data in an Excel spreadsheet or Access database format. In general, this electronic deliverable should contain the following information:

Electronic Deliverable Contents	
Laboratory Identification Number	Sample Analysis Date
Sample Delivery Group Number	Analytical Result
Sample Name	Units of Measure
Sample Collection Date	Method Detection Limit
Sample Matrix	Reporting Limit
Sample Collection Depths, if applicable	Laboratory Qualifier(s)
Analytical Method Code	Dilution Factor
Analysis Type	Moisture Content
Parameter Name	QC Batch Number
Sample Preparation or Extraction Date, if applicable	

GROUP C – ASSESSMENT AND OVERSIGHT

Under the supervision of the ORC project manager, the sampling team leader will oversee all aspects of the DEQ QA/QC planning, sampling, reporting, and, as necessary, corrective action.

C1. Assessments and Response Actions

All planning documents, reports, and memoranda summarizing sampling and analytical results and interpretations will be reviewed and assessed by the sampling team leader and ORC project manager who will make any necessary changes. Analytical results returned by the laboratory after a sampling event will also be reviewed by the sampling team leader and ORC project manager for the purpose of identifying and reporting significant issues. If issues arise, the sampling team leader will notify the ORC project manager and the laboratory project manager to begin resolving the issues through the validation process. Data will be shared through verbal, written and electronic means. The sampling team leader will submit all documents to the ORC project manager for approval prior to distribution.

The sampling team leader has the authority to assess the abilities and schedules of the sampling team and replace and/or rotate members as needed. The sampling team leader has the authority to make changes from the FSP if field conditions warrant change. The sampling team leader has the responsibility to note in the field logbook any changes made in the written plans and ensure that the information is included in the subsequent report. The sampling team leader has the authority to delegate responsibility to the sampling team. The sampling team leader is supervised by the ORC project manager.

Laboratory Performance and System Audits

Audits/reviews of laboratory activities may be performed to evaluate the execution of sample identification, sample control, COC procedures, sample tracking, sample storage, and sample analysis procedures. The evaluation is based on the extent to which the

applicable procedures defined in this QAPP and the laboratory QAPs are followed. The person conducting the audit/review will be a senior technical reviewer familiar with technical, procedural, and QC requirements governing laboratory activities.

At this time it is not planned to submit blind performance evaluation (PE) samples to the analytical laboratory for analysis. Each laboratory conducts PE sample analysis as part of its program certification requirements. Therefore, an independent PE effort was not deemed necessary at this time.

C2. Reports to Management

The sampling team leader will make verbal reports on the status of each sampling event to the ORC project manager as sampling progresses. Verbal and written communication between the sampling team leader and the ORC project manager will be on a continuing basis throughout the project. Verbal, written, and electronic communication and reporting between the DEQ and EPA project managers will also be conducted as necessary on a continuing basis. Appropriate planning documents will be submitted to the EPA for approval prior to the commencement of sampling. Memoranda on analytical results and interpretation will be submitted to the ORC project leader and to EPA project manager by the sampling team leader.

Laboratory Reports

At a minimum, laboratories are expected to provide a data package that includes the following information:

- Field sample name and associated laboratory number
- Results for each target analyte with appropriate units
- Reporting limits for each compound
- Results of QC sample analysis
- Association of samples with field samples

GROUP D—DATA VALIDATION AND USABILITY

D1. DATA REVIEW, VALIDATION, AND VERIFICATION REQUIREMENTS

Section B provided a discussion of the data quality indicators (precision, accuracy, representativeness, comparability, and completeness) that will be evaluated as part of the data review. The quality of the laboratory results will be assessed through evaluation of the results of the submitted QA/QC samples (trip blanks, field duplicates, MS/MSDs, etc.) and laboratory internal QA/QC samples (blanks, surrogates, duplicates, laboratory control samples, etc.). Data validation will include a review of any method-specific QA/QC criteria. Data qualifiers, when appropriate, will be added to the data in accordance with USEPA's NFGO and NFGI. A brief summary is presented in the following paragraphs.

Analytical Precision

Precision will be evaluated by calculating the RPD for field duplicates and MS/MSD samples. RPD criteria outside of QC limits may result in qualification of data as estimated (J). Data will not be qualified solely based on RPD criteria not being met. Rather, outlying RPD data will be reviewed with other QC data to assess the overall impact to data quality.

Analytical Accuracy

Accuracy will be assessed by evaluating the results of spiked samples for recovery and blank samples for potential contamination of samples. Recovery results for spike samples (surrogates, laboratory control samples, and MS) will be used to assign qualifiers to analytical data. A recovery above QC limits suggests the possibility of high bias in the analytical results, and detections will be qualified as estimated (J) when this occurs. A recovery below QC limits suggests the possibility of low bias in the analytical results, and data will be qualified as estimated (J) or unusable (R) based upon the magnitude of the deviance from QC limits.

Blank samples will be used to evaluate whether field samples have been cross-contaminated during shipping or handling. Detections in blank samples will be used to qualify similar detections in associated field samples. If a field sample has a detection of a compound that is less than five times (10 times for common laboratory contaminants) the blank concentration, then the field sample result will be qualified as undetected (U).

Representativeness

Representativeness will be assessed by examining sample preservation, results of the precision and accuracy evaluation, and adherence to method holding time. Failure of field or laboratory personnel to properly handle samples may result in qualification of the data as estimated or unusable. The representativeness review will qualitatively consider whether precision and/or accuracy are sufficient to characterize the samples. Analytical data for samples that are not analyzed within holding times will be qualified as estimated (J) or unusable (R) based upon the magnitude of the holding time exceedence.

Completeness

Completeness will be assessed by calculation of field completeness and laboratory completeness.

Comparability

Comparability will be assessed by evaluating whether samples were collected in a manner similar to previous sampling events and analyzed using the similar analytical methodology as previous events.

D2. Validation and Verification Methods

The following discussion focuses on the validation of data generated by laboratories other than the CLP. For analyses performed by the CLP labs, the Environmental Services Assistance Team (ESAT) at the USEPA Houston Laboratory provides validation

according to their own in-house procedures and protocols and is beyond the scope of the QAPP.

Data validation evaluates the quality of field and laboratory activities and documents the quality of data generated. The goals of data validation are to evaluate achievement of DQOs for the project, to ensure achievement of all project contractual requirements, to determine the impact of DQOs that were not met, and to document the results of data validation. The intent is to evaluate the data against project DQOs and planning documents to ensure that goals are met. Ideally, the end result of validation is a technically sound, statistically valid, legally defensible, and properly documented data set for decision-making purposes.

Data validation requires knowledge of the type of information that is validated. Therefore, a person familiar with field activities, such as the project manager is typically assigned to the validation of field activities, documents, and records. Likewise, a person familiar with analytical methodology, such as a chemist, is typically assigned to the validation of laboratory documents and records.

DEQ evaluates data quality through the evaluation of both field and laboratory QC data. Validation is initiated at the time of first sample collection. Field documents are reviewed by the project manager or designee to determine that all samples were appropriately collected, containerized, labeled, and submitted to the laboratory. These items will be verified daily during sampling activities. Additionally, the project manager or designee will be in communication with the non-CLP laboratories during sample collection and analysis to verify condition of sample receipt, appropriate sample login, etc. If problems are noted at this point, they can easily be corrected or locations resampled, if needed, while the field crews are still mobilized.

Following analysis, the laboratory data submittal is verified by the chemist for conformance with method, procedural, and contractual requirements. The contracted laboratory will be responsible for accurately performing the prescribed methods per USEPA protocols. This includes all procedures, QC checks, corrective actions, and data storage. In general, chemical data is validated by evaluation of the laboratory submittal against any requirements established in the analytical method and QAPP.

Data validation extends beyond method, procedural, and contractual compliance to determine the quality of the data set and the types of uncertainty introduced by a failure to meet requirement. It includes a determination, where possible, of the reasons for any failure to meet requirements, and an evaluation of the impact of the failure upon the overall data set. In this manner, the effect of any data rejection is presented in terms of its impacts on the overall uncertainty and usability of the data set.

Following verification and validation the project manager working with the appropriate data validator will perform a global review of the findings to determine overall usability of the data set for its intended purpose. It is at this point that a final analysis of the data is made, taking into consideration the following:

- Sample collection – Were problems encountered during sample collection that suggest samples were potentially compromised? If so, what is the impact?
- Suitability of methodology – Based upon the chemical data validation, was significant precision or bias problems noted with the data? Were significant matrix interference problems noted?
- Adequacy of reporting limits – Was excessive sample dilution required due to interference or presence of elevated concentrations of target or nontarget compounds? If so, does this adversely impact the ability to draw conclusions regarding any undetected constituents?

- Reasonableness of QC limits – Do the initially established control limits for DQIs still seem appropriate for the data set? If not, is the data exhibiting higher variability than assumed during project planning?
- Patterns in qualified data – Are patterns evident in the type of samples or analyses that required qualification during validation? Do these patterns suggest overall problems in one area or for a particular type of analysis?

Completed Chain-of-Custody and sample login forms will be delivered to the laboratory with the sample containers from each sampling event.

Data validation, including data comparison of duplicates and blanks with sample analysis data, will be conducted by the SEL, ESB/CLP, and Ana-Lab in accordance with their approved QA Plan. For analyses performed by the CLP laboratories, the Environmental Services Assistance Team (ESAT) at the EPA Houston Laboratory provides validation according to their own in-house procedures and protocols. Analytical results will be delivered to the sampling team leader. The sampling team leader will confirm that the laboratory project manager has reviewed each analytical data package for such factors as transmittal errors, field and laboratory QC data, detection limits, instrument calibration, special sampling and analysis conditions, performance evaluations and technical audits. The sampling team leader will then validate that the data to ensure the data represents the site and sampling and project goals. The sampling team leader or his designee will review and tabulate the analytical results from each sampling event. A memorandum summarizing the sampling event, analytical results, and resolution of discrepancies will be prepared by the sampling team leader for distribution to the project file and EPA.

D3. Reconciliation with Data Quality Objectives

The reconciliation of the analytical data obtained during each sampling event to the DQOs will occur when:

- The media sampled, sampling protocols, and analytical tests and methods are those required by the approved remedial planning documents;
- The data has been validated and verified, issues resolved, and analytical data placed in the hands of the data users and decision makers;
- Comparison of the analytical data with past data shows agreement within the ranges specified for each media sampled; and
- Any data limitations revealed by comparison of DEQ's analytical data has been summarized and distributed to the decision makers. Decreasing concentrations of the contaminant(s) affecting the various media will demonstrate continuing remedial effectiveness in the respective areas sampled.

Successful remediation of a given area will be recognized when the DEQ analytical data verify that all contaminants slated for remediation are equal to or below the approved RAOs or performance criteria.

TABLES

Table 1
Minimum Level of Data Quality for the RFS Project
Oklahoma Refining Company Superfund Site
Cyril, Oklahoma

Chemical of Concern	Method		Lab Detection Limit		RAOs	
	Soil/Sediment	Water	Soil/Sediment (ug/kg)	Groundwater/ Surface Water (ug/l)	Soil/Sediment (ug/kg)	Groundwater/ Surface Water (ug/l)
Metals						
Arsenic	SW-846 6000 or 7000 series Or EPA 200 series Or ILM05.3	SW-846 6000 or 7000 series Or EPA 200 series Or ILM05.3	1,000	1	25,000	10
Barium			20,000	10	13,500,000	1,000
Beryllium			500	1	2,000	4
Cadmium			500	1	13,5000	5
Chromium			1,000	2	770,000	100
Copper			2,500	2	351,000,000	1,300
Lead			1,000	1	600,000	15
Mercury			100	-	81,000	-
Nickel			4,000	1	5,400,000	100
Zinc			6,000	2	54,000,000	5,000
VOCs						
Benzene	SW-846 5035A/8260B or OLM04.3	SW-846 5030B/8260 B	10	10	200	5
1,2-Dichloroethane			10	10	-	5
Ethylbenzene			10	10	191,000	700
Toluene			10	10	104,000	1,000
Xylenes			10	10	2,828,000	10,000
SVOCs						
Acenaphthene	SW-846 8260B or OLM04.3	SW-846 8270C or OLM04.3	330	10	4,424,000	-
Anthracene			330	10	55,752,000	-
Benzo(a)anthracene			330	10	4,100	-
Benzo(a)pyrene			330	10	330	-
Benzo(b)fluoranthene			330	10	690	-
Benzo(g,h,i)perylene			330	10	1,080,000	-
Benzo(k)fluoranthene			330	10	13,000	-
Chrysene			330	10	46,000	-
Dibenzo(a,h)anthracene			330	10	330	-
Floranthene			330	10	10,800,000	-
Fluorene			330	10	8,888,000	-
Indeno(1,2,3/c,d)pyrene			330	10	3,200	-
Naphthalene			330	10	79,000	150
Phenanthrene			330	10	1,080,000	-
Pyrene			330	10	8,100,000	-
2,4-Dimethylphenol			330	10	66,000	730
2-Methylnaphthalene			330	10	510,000	150
2-Methylphenol			330	10	12,000	1,800
4-Methylphenol			330	10	14,000	1,800
Phenol			330	10	125,000	22,000

Table 2
Remedial Action Objectives for Sediments and Surface Soils
Oklahoma Refining Company Superfund Site
Cyril, Oklahoma

Chemical of Concern	RAOs, mg/kg	Basis
1. Arsenic	305 or 25	Groundwater protection or HBR
2. Barium	13,500	HBR
3. Beryllium	2*	Detection Limit
4. Cadmium	135	HBR
5. Chromium	1350 or 770	HBR or Groundwater protection
6. Copper	351,000	HBR
7. Lead	600 or 865	HBR or Groundwater protection
8. Mercury	81	HBR
9. Nickel	5400	HBR
10. Zinc	54,000	HBR
11. Benzene	22 or 0.20	HBR or Groundwater protection
12. Ethyl benzene	27,000 or 191	HBR or Groundwater protection
13. Toluene	54,000 or 104	HBR or Groundwater protection
14. Xylenes	540,000 or 2,828	HBR or Groundwater protection
15. Acenaphthene	16,000 or 4,424	HBR or Groundwater protection
16. Anthracene	81,000 or 55,752	HBR or Groundwater protection
17. Benzo (a) anthracene	4.1	HBR
18. Benzo (a) pyrene	0.33	Detection Limit
19. Benzo (b) fluoranthene	0.69	HBR
20. Benzo (g,h,i) perylene	1,080	HBR
21. Benzo (k) fluoranthene	13	HBR
22. Chrysene	46	HBR
23. Dibenzo (a,b) anthracene	0.33	Detection Limit
24. Fluoranthene	10,800	HBR
25. Fluorene	10,800 or 8,888	HBR or Groundwater protection
26. Indeno (1,2,3,cd) pyrene	3.2	HBR
27. Naphthalene	79	HBR or Groundwater protection
28. Phenanthrene	1,080	HBR
29. Pyrene	8,100	HBR
30. 2,4 Dimethyl phenol	5,400 or 66	HBR or Groundwater protection
31. 2-Methyl naphthalene	1,080 or 510	HBR or Groundwater protection
32. 2-Methyl phenol	13,500 or 12	HBR or Groundwater protection
33. 4-Methyl phenol	13,500 or 14	HBR or Groundwater protection
34. Phenol	162,000 or 125	HBR or Groundwater protection

*The RAO for beryllium was changed to 2.0 mg/kg during the RA in order to eliminate false positives and uncertain quantifications.

Table 3
Remedial Action Objectives for Subsurface Soils
Oklahoma Refining Company Superfund Site
Cyril, Oklahoma

Chemical of Concern	RAOs, mg/kg	Basis
1. Arsenic	305	Groundwater Protection
2. Chromium	770	Groundwater Protection
3. Lead	865	Groundwater Protection
4. Benzene	0.20	Groundwater Protection
5. Naphthalene	79	Groundwater Protection
6. Phenol	125	Groundwater Protection
7. 2-Methylphenol	12	Groundwater Protection
8. 4-Methylphenol	14	Groundwater Protection
9. 2,4-Dimethylphenol	66	Groundwater Protection
10. 2-Methylnaphthalene	510	Groundwater Protection

Table 4
Remedial Action Objectives for Ground water and Surface Water
Oklahoma Refining Company Superfund Site
Cyril, Oklahoma

Chemical of Concern	RAOs, (µg/l)	Basis
1. Arsenic	50 (10)*	MCL
2. Barium	1000	MCL
3. Beryllium	1 (4)*	MCL
4. Cadmium	5	MCL
5. Chromium	100	MCL
6. Copper	1000 (1300)*	MCL
7. Lead	15	EPA Memorandum, 1990
8. Nickel	100	MCL
9. Zinc	5000	MCL
10. Benzene	5	MCL
11. 1,2 – Dichloroethane	5	MCL
12. Ethyl benzene	700	MCL
13. Toluene	1000	MCL
14. Xylenes	10000	MCL
15. Naphthalene	150	HBR
16. 2-Methyl naphthalene	150	HBR
17. Phenol	22000	HBR
18. 2-Methyl phenol	1800	HBR
19. 4-Methyl phenol	1800	HBR
20. 2,4 Dimethyl phenol	730	HBR

*****The MCL for arsenic, beryllium, and copper have been updated since the ORC ROD was released in 1992. The current MCL for each COC is in parenthesis.

Table 5
Analytical Methods, Containers, Preservatives, and Hold Times
Oklahoma Refining Company Superfund Site
Cyril, Oklahoma

Analysis	Matrix	Method	Container Type	Number of Containers Needed for Samples Only	Number of Additional Containers Needed for Samples with MS/MSD	Volume/Mass	Preservative	Holding Time
VOCs	Water	SW-846 5030B / 8260B	40 mL amber glass vial, 24 mm neck finish	3	6	Fill to capacity w/ no headspace or air bubbles	Preserve to a pH of 2 with HCL and cool to 4°C immediately after collection.	14 days
	Soil/ Sediment (Houston Lab)	SW-846 8260B or OLM04.3	4 oz (120 mL) tall, wide mouth, straight-sided, glass jar, 48 mm neck finish	2	0	Fill to capacity	Cool to 4°C immediately after collection.	14 days
	Soil/ Sediment (CLP)	SW-846 5035A/ 8260B or OLM04.3	Coring tool used as a transport device (e.g., 5 g Sampler) and 40 mL amber glass vial, 24 mm neck finish	3 samplers and 1 vial	9 samplers and 1 vial	Fill with soil, no headspace	Frozen (-7°C to -15°C) or iced to 4°C	48 hours
		SW-846 5035A/ 8260B or OLM04.3	40 mL amber glass vial, 24 mm neck finish, pre-weighed, stir bar and 4 oz wide mouth glass jar	3 vials and 1 – 4oz jar	8 vials	5 g, place samples on side prior to being frozen	Frozen (-7°C to -15°C) or iced to 4°C	14 days
	LNAPL	SW-846 5030B/8260B	40 mL amber glass vial, 24 mm neck finish	3	6	Fill to capacity w/ no headspace or air bubbles	Frozen (-7°C to -15°C) or iced to 4°C	14 days
SVOCs	Water	SW-846 8270C or OLM04.3	1 L amber round glass bottle, 33 mm pour-out neck finish	2	4	2 Liter	Cool to 4°C immediately after collection.	7 days
	Soil/ Sediment	SW-846 8260B or OLM04.3	8 oz short, wide mouth, straight-sided, glass jar, 70 mm neck finish	1	0	Fill to capacity	Cool to 4°C immediately after collection.	14 days
	LNAPL	SW-846 8270C or OLM04.3	1 L amber round glass bottle, 33 mm pour-out neck finish	2	4	2 Liter	Cool to 4°C immediately after collection.	7 days
Metals	Water	SW-846 6000 or 7000 series Or EPA 200 series or ILM05.3	1 L high density polyethylene, cylinder-round bottle, 28 mm neck finish	1	1	1 Liter	Acidify to pH < 2 with HNO3 and cool to 4°C immediately after collection.	6 months
	Soil/ Sediment	SW-846 6000 or 7000 series Or EPA 200 series or ILM05.3	8 oz short, wide mouth, straight-sided, glass jar, 70 mm neck finish	1	1	Fill to capacity	Cool to 4°C immediately after collection.	6 months
	LNAPL	SW-846 6000 or 7000 series Or EPA 200 series or ILM05.3	1 L high density polyethylene, cylinder-round bottle, 28 mm neck finish	1	1	1 Liter	Cool to 4°C immediately after collection.	6 months
Methane	Water	SW-846 3810M of RSK 175	40 mL glass vial (provided by Ana Lab)	2	0	Fill to capacity	Cool to 4°C immediately after collection.	7 days
Alkalinity	Water	EPA 310 Series or SM 2320B	100 mL high density polyethylene bottle (provided by SEL Lab)	1	0	Fill to capacity	Cool to 4°C immediately after collection.	14 days
Nitrite	Water	SW-846 9000 Series or EPA 325 Series or EPA 300.0						48 hours
Nitrate	Water	SW-846 9000 Series or EPA 325 Series or EPA 300.0						48 hours
Sulfate	Water	SW-846 9000 Series or EPA 325 Series or EPA 300.0						28 days

LIST OF REFERENCES

1. Johnson, Donald. *Letter to Gayle Bartholomew, Environmental Grants Administrator, Office of the Secretary of Environment. Re: Quality Management Plan for the Oklahoma Department of Environmental Quality*. February 21, 2007.

2. U.S. Environmental Protection Agency. *Data Quality Objectives Process for Superfund, Interim Final Guidance-Manual*. September 1993.

3. Oklahoma Department of Environmental Quality, State Environmental Laboratory. *Federal FY 2006. Quality Assurance Plan*. August 14, 2006.

4. Oklahoma Department of Environmental Quality, Site Assessment Unit. *Quality Assurance Project Plan*. August 29, 2006.

5. U.S. Environmental Protection Agency, Office of Emergency and Environmental Response. *Sampling for Hazardous Materials, Environmental Response Training Program- Manual*. Undated.

6. Oklahoma Department of Environmental Quality. *Revised Feasibility Study Field Sampling Plan Oklahoma Refining Company Superfund Site Cyril, Oklahoma*. November 2007.

7. Oklahoma Department of Environmental Quality. *Chain of custody form*. Undated.

8. Oklahoma Department of Environmental Quality. *Sample log-in form*. Undated

9. U. S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. *Multi-Media, Multi-Concentration, Organic Analytical Service for Superfund (OLM04.2 and OLM04.3)*. May 1999 and March 2003.

10. U. S. Environmental Protection Agency, Office of Solid Waster and Emergency Response. *Multi-Media, Multi-Concentration, Inorganic Analytical Service for Superfund (ILM05.3 and ILM05.4)*. February 2004 and March 2007.

11. Ana-Lab Corporation. *Quality Manual, Revision 13*. June 2006.

12. Oklahoma Refining Company Superfund Site Record of Decision. *Table 1 Remedial Action Objectives for Ground water and Surface Water at the ORC Superfund Site*. June 1992.

13. Oklahoma Refining Company Superfund Site Record of Decision. *Table 2 Remedial Action Objectives for Sediments and Surface Soils at the ORC Superfund Site*. June 1992.

14. Oklahoma Refining Company Superfund Site Record of Decision. *Table 3 Remedial Action Objectives for Sediments and Surface Soils at the ORC Superfund Site*. June 1992.

Reference 1

MILES TOLBERT
SECRETARY OF THE ENVIRONMENT

BRAD HENRY
GOVERNOR

STATE OF OKLAHOMA

OFFICE OF THE
SECRETARY OF THE ENVIRONMENT

Memorandum

February 27, 2007

To: Karen Khalafian, Oklahoma Department of Environmental Quality

From: Gayle Bartholomew

re: Quality Management Plan (QMP) – QTRAK #07-166

The attached letter from U.S. EPA approves DEQ's revised Quality Management Plan. Also enclosed are fully executed signature pages. The plan will remain in effect for one year from the date of Mr. Johnson's signature. If you have any questions or need additional information, please do not hesitate to contact me by phone at (405) 530-8996 or email at gnbartholomew@owrb.state.ok.us.

3800 North Classen Boulevard • Oklahoma City, Oklahoma 73118
(405) 530-8995 • fax (405) 530-8999

Recycled Paper

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

February 21, 2007

Ms Gayle Bartholomew
Environmental Grants Administrator
Office of the Secretary of Environment
3800 N. Classen Road
Oklahoma City, Oklahoma 73118

Dear Ms Bartholomew:

The Quality Management Plan for the Oklahoma Department of Environmental Quality (ODEQ) has been reviewed and is approved. This plan will expire one year from the date of my signature, which was February 21, 2007. Enclosed are six original signature pages for your use. This plan has been assigned the QTRAK number 07-166 for reference. The review was been accomplished by Walt Helmick, the Quality Assurance Officer of the Superfund Division.

If you have any questions or concerns please contact Mr. Helmick at (214) 665-8373, or I can be reached at (214) 665-8343.

Sincerely yours,

Donald L. Johnson
Region 6 Quality Assurance Manager

cc: Karen Khalafian, ODEQ
Teresita Mendiola, 6WQ-AT
Walt Helmick, 6SF-D
Kathy Gibson, 6SF-LT
Dick Thomas. 6PD-S

Recycled/Recyclable • Printed with Vegetable Oil Based Inks on 100% Recycled Paper (40% Postconsumer)

APPROVALS

Name	Title	Division	Signature	Date
Steven A. Thompson	Executive Director			2/1/07
Eddie Terrell	Division Director	Air Quality		1-31-07
Scott Thompson	Division Director	Land Protection		2-1-07
Gary Collins	Division Director	Environmental Complaints & Local Services		1/31/07
David Dyke	Division Director	Administrative Services		1-31-07
Jon Craig	Division Director	Water Quality		1/31/07
Judith A. Duncan	Division Director	Customer Services		2/5/07
Keith Duncan	QA Coordinator	Air Quality		1/31/07
Jerry Matthews	QA Coordinator	Land Protection		1/31/07
Karen Khalafian	QA Officer	Land Protection		1/31/07
Subi John	QA Coordinator	Land Protection		1/31/07
Hillary Young	QA Coordinator	Land Protection		1-31-07
Amber Brawdy	QA Coordinator	Land Protection		1/31/07
Roy Walker	QA Coordinator	Administrative Services		1/31/7
Karen Miles	QA Coordinator	Water Quality		1/31/07
Susan Mensik	SEL QA Officer	Customer Services		1/31/07

Jennifer Lee Myers Wasinger
Environmental Programs Manager/QA Officer
Office of the Secretary of Environment

Signature *Date* 2/6/07

Donald L. Johnson
Region 6 Quality Assurance Manager
U. S. Environmental Protection Agency

Signature *Date* 2/21/07

Reference 2

United States
Environmental Protection
Agency

Office of
Solid Waste and
Emergency Response

Publication 9355.9-01
EPA540-R-93-071
PB94-963203
September 1993

Superfund

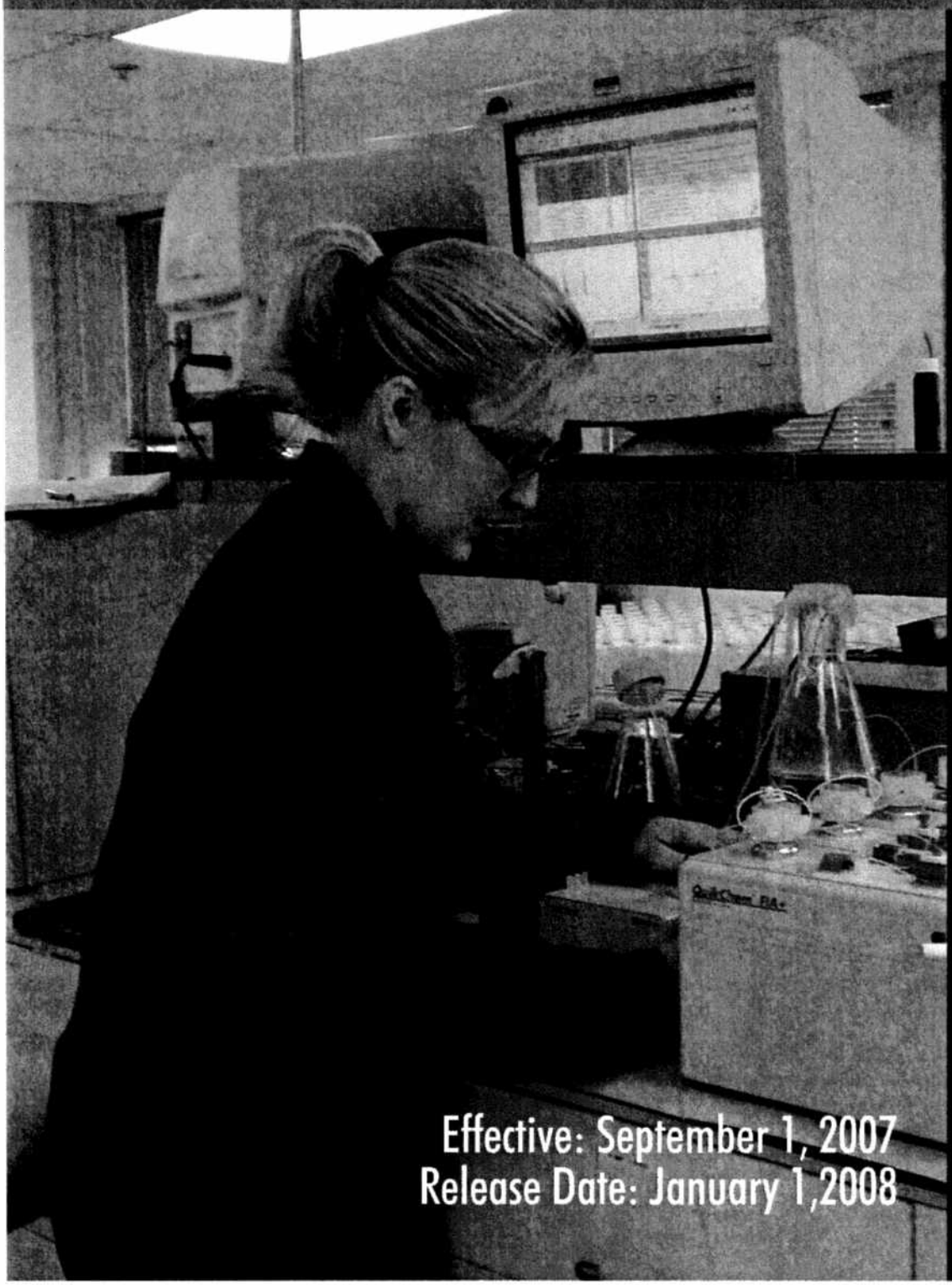
EPA

DATA QUALITY OBJECTIVES PROCESS FOR SUPERFUND

Interim Final Guidance

Reference 3

QUALITY ASSURANCE PLAN



STATE ENVIRONMENTAL LABORATORY
DEPARTMENT OF ENVIRONMENTAL QUALITY

Effective: September 1, 2007
Release Date: January 1,2008

707 N. ROBINSON, P.O. BOX 1677
OKLAHOMA CITY, OK 73101-1677
(405) 702-1000

OKLAHOMA
DEPARTMENT OF ENVIRONMENTAL QUALITY
...for a clean, attractive, prosperous Oklahoma

Reference 4

QUALITY ASSURANCE PROJECT PLAN
for
Site Assessment Unit
Scope of Work
FFY 2008

STATE OF OKLAHOMA
DEPARTMENT OF ENVIRONMENTAL QUALITY
LAND PROTECTION DIVISION
SITE REMEDIATION SECTION
SITE ASSESSMENT UNIT

Quality Management Plan EPA QTRAK # 07-166

Title and Approval Sheet

DEQ Site Assessment Unit Leader	Hal Cantwell	29/08/07 Date
DEQ Remediation Unit QA Coordinator	Subi John	8/29/07 Date
DEQ Quality Assurance Officer	Karen Khalafian	8/29/07 Date
DEQ Site Remediation Section Manager	Ray Roberts	8/29/07 Date
EPA-Region 6 Site Assessment Manager	Philip Ofosu	9/5/07 Date

August 29, 2007

Reference 5

United States
Environmental Protection
Agency

Office of Solid Waste and
Emergency Response
(5201G)

EPA-540-B-00-012
OSWER 9285.9-47
August 2000
www.epa.gov/superfund

Superfund

EPA

Sampling for Hazardous Materials (165.9)

Student Manual

Recycled/Recyclable
Printed with Soy/Canola Ink on paper that
contains at least 50% recycled fiber

Reference 6

Revised Feasibility Study
Field Sampling Plan
Oklahoma Refining Company Superfund Site
Cyril, Oklahoma

November 2007

Prepared by
Oklahoma Department of Environmental Quality

Reference 7

SUPERFUND
DEPARTMENT OF ENVIRONMENTAL QUALITY

Chain of Custody Record

Site Name:	Site Location:	Code:

Sample Location	Date	Time	*GCMS Extractables	GCMS Purgeables	Metals	General Chemistry				S.E.L. Numbers

Sampler's Signature (Relinquished by):			Received by:
Relinquished by:			Received by:
Relinquished by:			Received by:

Remarks:

*Indicate the number of containers for each analysis in the proper column.

Reference 8

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY
STATE ENVIRONMENTAL LABORATORY
LAND PROTECTION DIVISION
SAMPLE LOG-IN FORM

FOR LAB USE ONLY

Sample No. _____

Project Code: _____

This box must be completed in full or samples may be rejected.

Collector's Name: _____ HW_____ or SW_____ or SF_____

Facility Name: _____

Check type of sample: LIQUID_____ or SEDIMENT_____ or DRINKING WATER_____
Chlorinated? _____Yes _____ No

Date Collected: _____/_____/_____ Time Collected: _____:_____

City: _____ County: _____ Program Code: _____

Sample Identification or Sampler's Comments: _____

_____

GC/MS LAB	METALS LAB	
*SCAN (Both Vol's/S-Vol's) _____	Priority Pollutants ____ (6010)	Drinking Water _____ **(PDES 200.7 or DW 200.8)
*Purgeables (Vol's 8260) _____	Arsenic _____	Silver _____ Conductivity_____
*Extractables (S-Vol's 8270) _____	Barium _____	Sodium _____
VOC's (Drinking Water 524.2) _____	Beryllium _____	Arsenic _____ Turbidity_____
	Cadmium _____	Barium _____
	Chromium _____	Beryllium _____
	Copper _____	Cadmium _____
	Lead _____	Chromium _____
	Thallium _____	Copper _____
If there are two phases in one bottle; pick one.	Nickel _____	Iron _____
If you want both phases; we need two sets of sample to analyze each phase.	Silver _____	Lead _____
	Zinc _____	Manganese _____
	Antimony _____	Thallium _____
	Selenium _____	Nickel _____
Aqueous Phase _____	Mercury _____	Zinc _____
		Antimony _____
Organic Phase _____	TCLP Metals _____	Selenium _____
		Mercury _____

GENERAL CHEMISTRY LAB	ORGANICS LAB	OTHER
_____	Pesticides_____	_____
_____	Herbicides_____	_____
_____	PCB's _____	_____
_____	DRO _____	_____
	GRO _____	
	Flashpoint _____	

***CONTACT THE PROJECT MANAGER, _____, Ext. _____,**
IF DILUTION FACTOR IS ABOVE 5.00 FOR PURGEABLES AND ABOVE 2.00 FOR EXTRACTABLES.

****METHOD SELECTION IS DETERMINED BY CONDUCTIVITY AND TURBIDITY.**

Return to: _____
Land Protection Division

copy to: File

Reference 9

USEPA CONTRACT LABORATORY PROGRAM

STATEMENT OF WORK

FOR

ORGANICS ANALYSIS

Multi-Media, Multi-Concentration

OLM04.2
May 1999

OLM04.3
Corrections/Modifications/Clarifications

In 1999, EPA procured commercial laboratory services under OLM04.2 contracts. The scope of service consisted of the OLM04.2 Statement of Work (SOW) for the analysis of organic compounds found at Superfund sites. In early 2000, the CLP issued a modification (including technical changes) to the OLM04.2 SOW. This was outlined in the OLM04.2A Contract Modifications document. Specifically, a new SOW was not developed, but rather the scope of service became a combination of the OLM04.2 SOW and the OLM04.2A Contract Modifications document.

In March of 2003, EPA procured new commercial laboratory services under OLM04.3 contracts. Again, a new SOW was not specifically developed for this contract. The scope of service for the OLM04.3 contracts consists of the full length OLM04.2 SOW, the OLM04.2A Contract Modifications, and additional OLM04.3 modifications to both documents. Both OLM04.2A and OLM04.3 modifications can be found in this document.

Exhibit C, Section 1.0 Volatiles Target Compound and Contract Required Quantitation Limits

OLM04.2A Modification Changes:
All values under the column "Med. Soil ug/Kg" should be changed from 1200 to 1300. The reason for this change lies in the fact that the CLP rounding rule has been changed from that used in previous Statement of Work. The numbers in the "Med. Soil" column are derived from calculations based on the sample preparation protocol of the SOW. The calculated "nonrounded" value under this column is 1250 ug/Kg. Based upon the previous SOW rounding rule (if number to be retained is an even number preceding a 5, then number is to be unchanged), 1250 ug/Kg would be rounded to 1200 ug/Kg. The new rounding rule (as outlined in Exhibit B, Section 3.3.9, page B-33) stipulates that if the number to be dropped is 5 or greater, then the number retained should be increased by 1. Based upon this requirement, 1250 ug/Kg becomes 1300 ug/Kg.

OLM04.3 Modification Changes: No changes are to be made to the above language.

Exhibit D - Volatiles Appendix B
Modified SW-846 Method 5035 for Volatiles in Low Level Soils

OLM04.2A Modification Changes:
Section 1.1 - The following statement should be added to the end of the paragraph.
(It has been Superfund's desire to make Method 5035 the predominant method for low level volatile soil analysis. However, due to technical uncertainties and logistic problems, the method has so far had limited use. AOC now believes that most of the technical and logistic issues have been resolved, at least on an interim basis, and therefore will be requesting the Regions to specify the use of the CLP Method 5035.)

OLM04.3 Modification Changes: No changes to are to be made to the above language.

OLM04.2A Modification Changes:
Section 7.1.1 - Delete 7.1.1 as written and insert the following.
Soil/sediment samples should be collected in the field in either field core sampling/storage containers (i.e. Encore™ or equivalent) or pre-prepared closed-system purge-and-trap sample vials as described in Section 9.3. If field core sampling containers are used, the field should send at least three containers per field sample containing approximately 5 g each, and at least one 60 mL sealed glass vial containing sample with minimum headspace. The Contractor shall transfer the contents of the field core sampling containers immediately upon receipt into the closed-system sample vial prepared as described in Section 9.3 below and record the date and time of transfer. If

Reference 10

USEPA CONTRACT LABORATORY PROGRAM

STATEMENT OF WORK

FOR

INORGANIC ANALYSIS

Multi-Media, Multi-Concentration

ILM05.3
March 2004

ILM05.3 to ILM05.4
Summary of Changes

The ILM05.3 SOW document has been revised to ILM05.4 as identified in the Exhibit section(s) (and any other applicable sections within the ILM05.3 SOW) shown below. All changes identified in this document should be adhered to in conjunction with the ILM05.3 SOW as stipulated below.

Exhibit Section(s)	Revisions
Global	All references to “ILM05.3” are changed to “ILM05.4”.
Exhibit A: Section 4.2.3.1	The reporting requirement has been modified as follows: The Contractor shall be responsible for completing and submitting analysis data sheets and computer-readable data on diskette or compact disc (CD) (or via an alternate means of electronic transmission approved in advance by USEPA) in a format specified in this SOW and within the time specified in Exhibit B, Section 1.1.
Exhibit B: Section 2.7	The Data in Computer-Readable Format has been modified as follows: The Contractor shall provide a computer-readable copy for all samples in the SDG, as specified in Exhibit H and delivered as specified in Exhibit B, Section 1.1. Computer-readable data deliverables shall be submitted on DOS/Windows formatted 3.5-inch high-density 1.44 MB diskette(s), compact disc (CD), or via an alternate means of electronic transmission, if approved in advance by USEPA.
Exhibit B: Section 2.7.1	Add the following to the end of the section: The CD shall be packaged and shipped in such a manner that the CD cannot be bent or folded and will not be exposed to extreme heat/cold. The CD shall be included in the same shipment as the hardcopy data, and, at a minimum, be enclosed in a CD mailer.
Exhibit C: Section 1.0	The ICP-MS CRQL in water (µg/L) for vanadium has been modified from 1 to 5.
Exhibit D: Introduction: Section 1.6.2	The temperature range for the oven has been modified to 105˚C (± 5˚C).

Reference 11

ANA-LAB CORPORATION

QUALITY MANUAL

Revision 13

June 2006

PO Box 9000
Kilgore, TX 75663-9000

2600 Dudley Road
Kilgore, TX 75662

Phone 903-984-0551
Fax 903-984-5914

http://www.ana-lab.com
corp@ana-lab.com

Issuing authority:

C.H. Whiteside, Ph.D	Bill Peery, M.S.	Roy White, M.S
President	Executive Vice President	Quality Manager

June 23, 2006

TABLE OF CONTENTS

Title Page
Table of Contents

ANA-LAB CORPORATION 1.0
IDENTIFICATION 1.1
SIGNATORIES 1.2
TECHNOLOGIES 1.3
ORGANIZATION 1.4
Management 1.4.1
Structure 1.4.2
Facilities 1.4.3
Security 1.4.4
QUALITY SYSTEM 2.0
QUALITY POLICY 2.1
QUALITY OBJECTIVES 2.2
QUALITY PLAN 2.3
Process Control 2.3.1
Standards 2.3.2
Requirements 2.3.3
Audits 2.3.4
Improvement Projects 2.3.5
CLIENT SERVICES 2.4
ADMINISTRATION 2.5
Responsibilities 2.5.1
Performance Evaluation 2.5.2
Documentation Structure 2.5.3
DOCUMENT CONTROL 2.6
Internal Documents 2.6.1
QUALITY MANUAL 2.7
PROCESS OUTLINE 2.8
ACCREDITATION AND CERTIFICATIONS 2.9
PERSONNEL 3.0
TRAINING 3.1
SUPERVISION 3.2
CONDUCT 3.3
Ethics 3.3.1
Inappropriate Activities 3.3.2
Pressures and Conflict of Interest 3.3.3
TEST METHODS AND OPERATING PROCEDURES 4.0
STANDARD TEST METHODS 4.1
NON-STANDARD TEST METHODS 4.2
CONTRACT REVIEW 4.3
SUBCONTRACTING 4.4
STANDARD OPERATING PROCEDURES 4.5

Original **internal** document is **located in a secure electronic file.**

ACCOMMODATIONS AND ENVIRONMENTAL CONDITIONS 5.0
ACCOMMODATIONS 5.1
AMBIENT CONDITIONS IN THE TEST AREA 5.2
PURCHASING SERVICES AND SUPPLIES 6.0
PURCHASES 6.1
EQUIPMENT 6.2
Quality Control 6.2.1
Restricted Use 6.2.2
Maintenance 6.2.3
REFERENCE MATERIALS, CHEMICALS, REAGENTS, SUPPLIES 6.3
SAMPLE MANAGEMENT 7.0
SAMPLING PLAN 7.1
COLLECTION 7.2
RECEIPT 7.3
TRACKING 7.4
PREPARATION 7.5
STORAGE AND DISPOSAL 7.6
QUALITY CONTROL 8.0
TEST SELECTION 8.1
PROCEDURE CAPABILITY 8.2
TEST CONDITIONS 8.3
REAGENT QUALITY 8.4
TRACEABILITY 8.5
ACCURACY 8.6
QUALITY CONTROL SAMPLES 8.7
VARIABILITY 8.8
DATA REDUCTION 8.9
PREVENTIVE AND CORRECTIVE ACTIONS 9.0
PREVENTIVE ACTION 9.1
CORRECTIVE ACTION 9.2
Corrective Action Report 9.2.1
COMPLAINTS 9.3
CLIENT NOTIFICATION 9.4
RECORDS 10.0
CONFIDENTIALITY 10.1
DATA COLLECTION AND STORAGE 10.2
DATA VERIFICATION 10.3
ANALYTICAL REPORT 10.4
Review 10.4.1
Signatories 10.4.2
Revisions 10.4.3
RETENTION 10.5
DISPOSAL 10.6
WASTE DISPOSAL 11.0
SAFETY 12.0

Original **internal** document is **located in a secure electronic file.**

APPENDIX

ORGANIZATION CHART ..... Appendix I
DEPUTIES CHART ..... Appendix II
QUALITY POLICY ..... Appendix III
EMPLOYEE ETHICS POLICY ..... Appendix IV
STATEMENT OF VALUES ..... Appendix V
ETHICAL CONDUCT AND DATA INTEGRITY AGREEMENT ..... Appendix VI
ABBREVIATIONS ..... Appendix VII

1.0 ANA-LAB CORPORATION

Ana-Lab Corporation is a privately owned business incorporated according to the laws of the State of Texas.

Ana-Lab provides a wide variety of environmental testing for federal, state, commercial, industrial and municipal clients.

Ana-Lab is committed to meeting the needs of our clients and the requirements of ISO/IEC 17025, NELAC, NLLAP, NMX-EC-17025-IMNC-2000, regulatory authorities, and organizations providing recognition.

1.1 IDENTIFICATION

Name:	Ana-Lab Corporation	
Mailing Address:	P.O. Box 9000 Kilgore, TX 75663-9000	
Physical Location:	2600 Dudley Road Kilgore, TX 75662	
e-mail:	Corporation	corp@ana-lab.com
	Executive VP (Technical Director)	bpeery@ana-lab.com
	Quality Manager (Ethics Officer)	rwhite@ana-lab.com
	Operations Manager	skeeter@ana-lab.com
	Laboratory Manager	greg@ana-lab.com
	Project Manager	rmendez@ana-lab.com
	Project Manager	tvarvel@ana-lab.com
	Director of Business Development	paulbaumgarder@earthlink.net
Web page:	http://www.ana-lab.com	
Incorporation:	Charter No. 238677	August 31, 1967
Federal Tax ID#:	75-1255643	

1.2 SIGNATORIES

Personnel are authorized to sign and/or initial documents and records as appropriate. A file of signatures and initials is maintained. Electronic signatures are acceptable. **Electronic signature of authorized signatory may be used by the signatory's designee when authorized on a case by case basis.**

Refer to: SOP – Personnel: Job Descriptions

AUTHORIZED SIGNATORIES

CLASSIFICATION	NAME / INITIALS	POSITION
Legal Representative	C..H. Whiteside	Corporation President
Authorized Representative	Bill Peery	Executive Vice President
Analytical Reports	C..H. Whiteside Bill Peery Roy White Greg Oliver **Skeeter Ludewig** **Rocio Mendez** **Tracey Varvell**	Corporation President Executive VP (Technical Director) Quality Manager Laboratory Manager **Operations Manager** **Project Manager** **Project Manager**
Quality Manual	C. H. Whiteside Bill Peery Roy White	Corporation President Executive VP (Technical Director) Quality Manager
Standard Operating Procedures	Bill Peery	Executive VP (Technical Director)
Sample Collection Login Support	Personnel	Operations Manager Sample Collectors Login Technicians Support Technicians
Analytical Data	Personnel	Executive VP (Technical Director) Laboratory Manager Laboratory Technicians
QA/QC	Personnel	Executive VP (Technical Director) Quality Manager Project Managers Quality Technicians
Business Office Procedures	**Debbie Dudley**	**Office Manager**

1.3 TECHNOLOGIES

Testing is provided for a variety of matrices, including drinking water, wastewater, industrial waste, hazardous waste, soil, sludge, solids, air, gases, fuels, petroleum, and environmental lead. Other analyses may be available upon consultation with the Executive Vice President or Laboratory Manager.

Testing technologies include but are not limited to: Inductively Coupled Plasma-Mass Spectrometry, Inductively Coupled Plasma-Atomic Emission Spectrometry, Atomic Absorption-Cold Vapor, Atomic Absorption-Graphite Furnace, Gas Chromatography, Gas Chromatography-Mass Spectrometry, High Performance Liquid Chromatography, Ion Chromatography, Spectrophotometry (Visible, UV, Fluorescence, and Semi-Automated), Total Organic Carbon, Total Organic Halide, Miscellaneous Electronic Probes (conductivity, pH, dissolved oxygen), Oxygen Demand, Gravimetry, Titrimetry, Turbidity, Microbiology, Hazardous Waste Characteristics Tests.

POTABLE WATER AND NONPOTABLE WATER: Metals, nutrients, demands, classical chemistry, purgeable organics, extractable organics, pesticides-herbicides-PCBs, microbiology.

SOLID WASTE / HAZARDOUS WASTE: Metals, nutrients, demands, classical chemistry, purgeable organics, extractable organics, pesticides-herbicides-PCBs, explosives, hazardous waste characteristics, microbiology.

ENVIRONMENTAL LEAD: Drinking water, soil, paint chips (residue), dust, air.

Original **internal** document is **located in a secure electronic file.**

A complete scope of testing is available upon request or on Ana-Lab's web page.

1.4 ORGANIZATION

Ana-Lab's management is committed to the quality system. Technical and quality personnel have defined responsibilities and deputies. The organization chart designates lines of the authority.

1.4.1 MANAGEMENT

Ana-Lab management consists of Corporation President, Executive Vice President, Quality Manager, Laboratory Manager, Operations Manager, Office Manager, and Director of Business Development. The Executive Vice President is the Technical Director. Monthly management meetings are held and include discussions pertaining to the quality system.

POLICIES

Ana-Lab's management adheres to the quality system outlined in this manual. Flexibility is allowed in specific laboratory operations through use of Standard Operating Procedures (SOPs).

Management policies are in keeping with company policies identified in the employee handbook, available from the Office Manager.

TECHNICAL AND QUALITY MANAGEMENT

Technical and quality management are responsible for the quality system establishment, administration, and compliance and have the resources to carry out their duties. If departures from the quality system or procedures are identified, management is responsible for implementing actions to prevent a recurrence. Technical and quality personnel areas of responsibility and their designees (deputies) are listed below.

TECHNICAL AND QUALITY MANAGEMENT

AREA	RESPONSIBLE PERSON	DEPUTY	QUALITY
Technical	Bill Peery, Executive VP (Technical Director)	Greg Oliver	Roy White
Quality	Roy White, Quality Manager	Bill Peery	Rocio Mendez
Analytical	Greg Oliver, Laboratory Manager	Bill Peery	Roy White
Operations	Skeeter Ludewig, Operations Manager	Bill Peery	Roy White

1.4.2 STRUCTURE

Ana-Lab has an organized structure with lines of authority and responsibility outlined in the Organization Chart. When personnel are absent, the assigned deputy covers their responsibilities. Job descriptions, job qualifications, and personnel lists are available upon request. Updated charts are addendums to the quality manual.

ORGANIZATION CHART

Appendix I

DEPUTIES CHART

Appendix II

Refer to: SOP – Personnel: Job Descriptions
SOP – Personnel: Laboratory Qualifications

1.4.3 FACILITIES

Ana-Lab occupies a permanent facility in Kilgore, TX and several regional service centers throughout the nation. All testing is performed at the permanent facility with the exception of on-site testing.

Facilities are maintained under the supervision of the Operations Manager in a condition suitable for environmental laboratory operations. Maintenance is performed by the maintenance department or by contracted services.

Routine hours are 7:00 a.m. to 5:00 p.m. Monday through Friday. The corporate office is also open from 8:00 a.m. to noon on Saturday.

CORPORATE OFFICE
The Corporate Office is located in Kilgore, Texas and is responsible for all corporate business, accounts receivable, accounts payable, personnel records, payroll, and analytical reports.

MAIN LABORATORY
The Main Laboratory building has areas for login, sample storage, sample preparation, analytical testing, data entry, glassware cleaning, bottle preparation, and sample disposal. Management and quality offices, the employee break room, and water stills are on the second floor.

VOLATILES LABORATORY
The Volatiles Laboratory is located in a separate building where all volatile analyses are conducted to prevent cross contamination. The building also contains the computer server room, with restricted access, and a conference room.

OTHER BUILDINGS
Other buildings include general storage, hazardous waste storage, and maintenance. The hazardous waste building has restricted access recorded in an entry log.

REGIONAL SERVICE CENTERS
Regional Service Centers (Collection/Sampling Sites) are located apart from the permanent laboratory facility. Regional personnel receive samples from clients, collect samples, perform on-site analyses, and ship or deliver samples to the permanent laboratory facility. They are under the direct supervision of the Executive Vice President, Quality Manager, and Operations Manager. They are also supervised by the Director of Business Development.

REGIONAL SERVICE CENTERS	
NAME	LOCATION
Alabama	Huntsville, AL
ArkLa	Shreveport, LA
Central Texas	Austin, TX
Gulf Coast	Houston, TX
North Texas	Arlington, TX
Oklahoma	Norman, OK
Panhandle	Amarillo, TX
Rio Grande Valley	Brownsville, TX

1.4.4 SECURITY
The laboratory facilities are secured within a fenced area. Entry requires an ID badge with a valid electronic bar code. Buildings are locked except during routine operation hours. Restricted information and records are kept in locked files or locked storage areas with limited access. Electronic data is protected by passwords and assigned rights.

EMPLOYEE ONLY AREAS
Employees are required to wear ID badges that bear their picture, name, and unique bar code. ID badges issued to couriers, vendors, and visitors are distinctively different. A record of issue is maintained.

Visitors are accompanied by an authorized employee. Service representatives and couriers are observed by an authorized employee. The contracted safety consultant works under the supervision of the Operations Manager.

2.0 QUALITY SYSTEM

Ana-Lab's quality system is a structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan to ensure quality in work processes and services.

The quality system is reviewed annually by management to ensure suitability, make necessary changes, and set goals.

Refer to: SOP – Management Review of the Quality System

Authority and responsibility to administer the quality system are defined. All personnel at the permanent facility, regional service centers, and on-site locations must adhere to the quality system and follow approved procedures.

TERMINOLOGY

Use of certain words conveys the advisory nature of a particular procedure or guideline. The word "may" indicates guidelines which, if incorporated, provide additional benefits to the quality system. All other statements of the quality system are considered mandatory.

ABBREVIATIONS

Common abbreviations may be used. For reference, a list is located in Appendix VII.

2.1 QUALITY POLICY

Quality is defined by Ana-Lab as client satisfaction – meeting the needs of our clients by establishing and maintaining an environment which encourages all employees to pursue improvements in service throughout our organization.

Ana-Lab is committed to quality. Management sets goals to achieve involvement of each employee in improving quality, reducing costs, and conforming to client and testing requirements. Laboratory personnel are included in quality improvement planning and are responsible for maintaining the quality system.

QUALITY POLICY

Appendix III

2.2 QUALITY OBJECTIVES

Ana-Lab's quality objectives are to maintain standards for laboratory competence that are outlined in ISO 17025, NELAC, NLLAP, NMX-EC-17025-IMNC-2000, and GALP. Specific quality requirements of regulatory agencies and clients are implemented. Together these provide the maximum opportunity to produce accurate and reproducible analytical results.

QUALITY POLICY

Appendix III

2.3 QUALITY PLAN

The quality plan identifies features and characteristics that fulfill the intended purpose and develop and maintain continuous improvement.

Development of the quality plan occurs jointly with the Executive Vice President and Quality Manager.

Quality planning includes development and implementation of procedures which maintain and improve quality characteristics.

Ana-Lab's Quality Plan:
- Identify critical characteristics of laboratory quality.
- Determine how these characteristics will be controlled.
- Develop methods of control and subsequent evaluation.

2.3.1 Process Control
Process control is the regulation of laboratory quality characteristics which affect data quality.

Sample handling is conducted in a manner to ensure the quality of analytical results. SOPs provide instructions for operations to be performed under controlled conditions in accordance with specified standards. Procedures are conducted only by qualified trained personnel. Initial and on-going training are provided and recorded. Conditions in testing areas are maintained to provide a suitable environment for analyses.

Records must be complete, legible, and of a reproducible quality. Records can be either electronic, manual, or a combination. Traceability of equipment calibration, standards, reagents and supplies provides a record of reliability. Results are checked and verified by quality department personnel. The analytical report is reviewed and signed by a designated signatory. Preventive and corrective action are initiated as necessary.

2.3.2 Standards
Ana-Lab uses methods that meet the requirements of the client, regulatory agencies and accrediting organizations. Typical national standards are EPA, Standards Methods, ASTM, and NMX. State standards are used where applicable.

When specified by the client, their standards take precedence over all other standards and are filed for subsequent reference.

2.3.3 Requirements
Precision and accuracy requirements are established by standards and specifications appropriate to each test method and matrices. Precision and accuracy are determined and maintained by personnel training and proficiency testing.

Refer to: Quality Manual Section 8
SOPs – Test specific

2.3.4 Audits
Audits verify compliance with the quality system and method-specific requirements. Internal audits of all policies and procedures are conducted annually according to the schedule prepared by the Quality Manager, or designee. Additional audits may be conducted. The area of activity audited, the audit findings, and corrective actions that arise from them are recorded.

External audits of the quality system provide objectivity and ensure that the quality evaluation is impartial. They are routinely conducted by accreditation and regulatory agencies.

Ana-Lab utilizes authorized personnel for internal audits and accrediting agencies such as A2LA, NELAC, and EMA for external audits. Clients and prospective clients may conduct an external audit upon request and with management's approval.

Refer to: SOP – Audits, Internal
SOP – Corective Action

2.3.5 IMPROVEMENT PROJECTS
Ana-Lab strives to improve quality and production through the use of technology improvement, personnel training, and facilities development.

Improvement projects are discussed at the monthly management meetings and at the annual management review of the quality system. Suggestions for quality improvements may be submitted to the Executive Vice President or Quality Manager at any time for consideration.

2.4 CLIENT SERVICES
Service to the client is emphasized throughout the quality system. Clients are able to communicate, directly or electronically, with management for advice and guidance in technical matters, to schedule pickup service, sample collection, and testing, to monitor the status of their testing, and for interpretations of the results. The client's data quality objectives can be customized into the production system with an emphasis on their permit limits.

Clients have electronic access to their analytical report as well as the printed report. Upon request, reports can be specialized and electronic deliverable data (EDD) furnished.

Clients are allowed reasonable access to SOPs, relevant areas of the laboratory for observations of procedures, testing proficiency evaluations, and reviews of external assessments.

Feedback is obtained directly from communications with the client and from independent surveys such as ACIL's seal of excellence.

2.5 ADMINISTRATION
Quality system administration defines individual responsibilities, provides specifications for performance reporting, identifies system audit scope and schedule, and establishes procedures for recording the quality status.

2.5.1 RESPONSIBILITIES
Ana-Lab's President is ultimately responsible for the quality of all laboratory services.

The Executive Vice President is responsible for planning and organizing resources necessary to provide quality laboratory services, coordinating a comprehensive quality program, and implementing the necessary quality procedures and has the authority to stop work procedures if doubt is cast on the validity of an analytical result and to authorize the resumption of work after corrective action has restored acceptable quality. The Executive Vice President has sufficient organizational freedom and authority to carry out these tasks.

The Quality Manager is responsible for the quality system, accreditations and certifications, and data verification and has the authority to stop work procedures if doubt is cast on the validity of an analytical result and to authorize the resumption of work after corrective action has restored acceptable quality. The Quality Manager has sufficient organizational freedom and authority to carry out these tasks and has direct access to the highest level of management.

Laboratory technicians are responsible for following applicable policies, procedures, and instructions relevant to their area of work.

The responsibility for quality begins with each employee and extends throughout the organization.

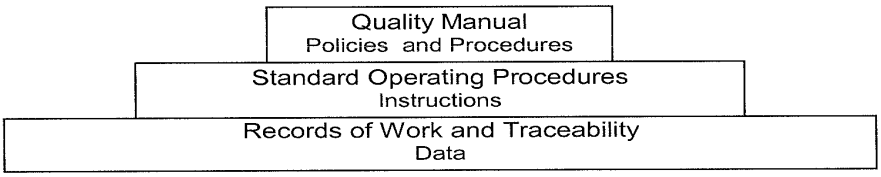
2.5.2 Performance Evaluation
The Executive Vice President is responsible for internal audits, informing appropriate personnel of audit results, and implementing required actions.

The Quality Manager is responsible for conducting internal audits, confirming compliance with corrective action, and reporting findings to the Executive Vice President.

Laboratory technicians are responsible for reporting quality concerns in their own work to their supervisor as they become aware of them.

All personnel are responsible for reporting concerns about any aspect of the quality system to their supervisor or the quality department.

2.5.3 Documentation Structure
The Quality Manual contains policies and procedures and references SOPs that provide detail instructions how to implement the procedures and record the data. Records are the raw data and traceability associated with the result. This hierarchical structure of documentation can be viewed as a pyramid.



2.6 DOCUMENT CONTROL
The most recent issue of a controlled document, internally generated or from an external source, is accessible to all personnel. A master list of controlled documents, indicating revision and distribution status, is maintained by the quality department.

When a controlled document is issued internally or received from an external source, affected personnel are notified by LDS note. Resolution of the note indicates access to and compliance with the controlled document.

Authorized copies, identified and distributed in accordance with document control procedures, are controlled and ensure the use of the current revision at the location where the activity is performed.

Obsolete controlled documents are retrieved and disposed of, and the distribution list is updated.

Unauthorized copies of controlled documents supplied to regulatory agencies, third party assessors, clients, and other organizations and persons are for information only, are not controlled, and are not retrieved for disposal.

2.6.1 Internal Documents
The Executive Vice President **or designee** has the authority to issue internally generated documents.

Where requirements for the document exist, they are met or exceeded. Internally generated documents follow any establish procedure for development, review, revision, approval, distribution, and disposal.

Original **internally generated documents are secure electronic files** located in a protected (read only) subdirectory that is maintained by the quality department.

Scanned images are available to all personnel as .tif files in Laboratory Data Services (LDS). Authorized copies may be issued in accordance with document control procedures and kept in work areas.

Internally generated documents are reviewed, revised as needed, and reissued in accordance with document control procedures to provide continued suitability and compliance. If practical, new text is identified in a revised document. Controlled documents may not be amended by hand; revision requires reissue of the document.

Internally generated documents may be translated into other languages but must remain a true and accurate representation o f the original and issued in accordance with document control procedures.

Refer to: SOP – Document Control: **Internal Document Preparation**
SOP – Document Control: Distribution

2.7. QUALITY MANUAL

The Quality Manual is a controlled document and is written, revised, and distributed in accordance with document control procedures. The Quality Manual defines Ana-Lab's quality system and contains or references policies, procedures, and methods used to ensure quality.

The Quality Manual establishes a framework to assign responsibilities and to ensure that services conform to this policy. Because of the diversity of services, it is not possible to describe a rigid, closed quality system. Management encourages development and use of the best analytical practices as dictated by each measurement situation.

Referenced SOPs are available in the quality department and**/or electronic** files.

MANAGEMENT

The Quality Manager is responsible for the Quality Manual. The Quality Manual is reviewed during the last quarter of each year by management. At any time during the year, personnel may submit requests for changes to the Quality Manager for consideration. If a review indicates the need for revision, a revised edition of the Quality Manual is issued in accordance with document control procedures.

It is the responsibility of the quality department, under the supervision of the Quality Manager, to revise the Quality Manual. The Quality Manual is approved by the President, Executive Vice President, and Quality Manager.

Refer to: Quality Manual Section 2.6.1, Internal Documents
SOP – Document Control: **Internal Document Preparation**
SOP – Document Control: Distribution

2.8. PROCESS OUTLINE

I. Request for Testing and Contract Review
   A. Scheduled Routes
      1. Routine Samples
      2. Non-routine Samples
      3. On-site Testing
   B. Client Delivered or Shipped
II. Login
   A. Assign sample number

B. Login requested testing
C. Determine testing priority
D. Check login
E. Notify Operations Manager of anomalies and/or problems via LDS notes
F. Store sample
G. Scan Chain of Custody (CoC) into LDS
H. Verify login

III. Review Login
IV. Print Work List
A. Schedule resources for testing
B. Notify supervisor of any assistance needed
V. Prepare Sample
VI. Perform Test
VII. Complete Records
VIII. Print Verification List
IX. Check and Verify Data
X. Print Analytical Report
XI. Print Anomaly Report
XII. Review and Sign Reports
XIII. Mail Signed Reports and Chain of Custody (CoC) to Client
XIV. Perform Quality System Evaluation

Refer to: SOPs – Specific topics

2.9 ACCREDITATIONS and CERTIFICATIONS

Accreditations, certifications, and scopes are available upon request or on Ana-Lab's web page.

STATE

Ana-Lab maintains the state certifications and accreditations necessary to provide services to our clients.

NATIONAL/INTERNATIONAL

Ana-Lab is accredited by A2LA, NELAC, and EMA and holds a permit for foreign soil from the USDA. A2LA and NELAC accreditation for environmental testing conforms to ISO/IEC 17025 criteria, and environmental lead testing conforms to NLLAP and HUD criteria. EMA conforms to NMX-EC-17025-IMNC-2000.

USE OF ACCREDITATIONS, CERTIFICATIONS, AND LOGOS

In compliance with the agency's criteria.

3.0 PERSONNEL

Laboratory management will ensure that **sufficient** staff is properly recruited, selected, trained, and encouraged to continually improve their performance to meet both professional and laboratory goals and objectives.

RECORDS

Personnel records are maintained by the Office Manager. Training records are maintained by the quality department.

Refer to SOP – Personnel: Training

QUALIFICATIONS

Ana-Lab has established qualifications for personnel to ensure a staff with the necessary education,

training, and experience to perform their duties. Ana-Lab's scope of testing requires multiple levels of technical skill.

Refer to: SOP – Personnel, Job Qualifications

RECRUITMENT
Laboratory personnel recruitment policy is to promote from within the company, when possible, and recruit from outside when necessary. Selection is based on qualification for the particular position. Salaried positions are filled at the discretion of management. Ana-Lab Corporation has an Affirmative Action program in place to provide guidance for hiring and promotion decisions.

Refer to: Employee Handbook.
Affirmative Action Statement

3.1 TRAINING

Ana-Lab's training program utilizes the guidelines in ISO 17025, NELAC, and ACIL ELII as a framework. Training is consistent with applicable standards and laboratory ethics and is overseen by the Quality Manager.

All employees must read and comply with the Quality Manual, Chemical Hygiene Plan, Employee Handbook, and relevant SOPs and policy statements.

Training needs are defined. Each SOP includes the skills that are necessary to perform the procedure and are part of the demonstration of capability. Authorization certificates are issued upon demonstration of capability. Procedures are conducted only by qualified trained personnel.

Each employee is responsible for keeping his or her training records current and complete. Department supervisors are responsible for maintaining training records for their personnel.

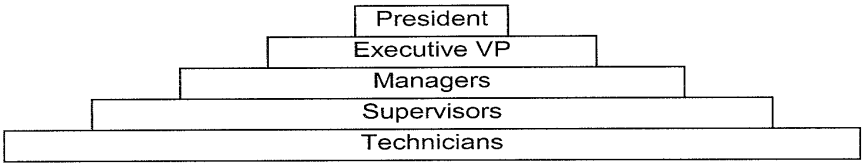
All personnel are expected to become cross-trained in as many areas as practical. When appropriate, employees are encouraged to participate in offsite training and college courses.

Refer to: Employee Handbook
SOP – Personnel: Training

3.2 SUPERVISION

Ana-Lab has a structured system of supervision. This structure is represented in the organization chart and can be viewed as a pyramid. Technicians are supervised by supervisors, supervisors by managers, managers by the Executive Vice President, Executive Vice President by the President.

Refer to: Organization Chart



3.3 CONDUCT

Ana-Lab only employs professional personnel. Employees are expected to exhibit characteristics which are consistent with Ana-Lab's professional philosophy of ethics and quality.

3.3.1 ETHICS

ACIL EDII provides guidelines for Ana-Lab Ethics Fitness Training. Ana-Lab's ethical standard is exemplified by management. Ethics training is provided to ensure that employees are knowledgeable about ethics in the work place and all employees are required to conduct work in an ethical manner. The Quality Manager is the Environmental Laboratory Data Integrity Officer (Ethics Officer).

Refer to: SOP – Guidelines for Analytical Decision Making and Ensuring Data Integrity

ETHICS POLICY
Appendix IV

STATEMENT OF VALUES
Appendix V

ETHICAL CONDUCT AND DATA INTEGRITY AGREEMENT
Appendix VI

3.3.2 INAPPROPRIATE ACTIVITIES

Ana-Lab's personnel cannot be involved in activities which could compromise confidence in Ana-Lab's competence, impartiality, judgment, or integrity. All employees complete a disclosure statement which informs management of any potential concerns.

Refer to: SOP – Personnel, Conduct
Disclosure Statement

3.3.3 PRESSURES AND CONFLICT OF INTEREST

Ana-Lab provides an atmosphere that is free from undue internal and external commercial, financial, and other pressures and influences that might adversely affect quality. Management is always available for consultation with personnel about concerns and pressures. Buffer zones between personnel and clients reduce potential problems.

Separation of duties prevents conflict of interest that might compromise results. Personnel who collect samples, receive samples, or have contact with clients are rarely involved in data generation. Laboratory personnel who perform testing do not verify results. Quality department personnel who verify results do not perform testing. Clients are rarely in contact with personnel who generate or verify results. Review of the analytical report is by management.

Computer "Rights" are assigned to allow personnel access to specified sections of Laboratory Data Services (LDS) programs. Sufficient rights are assigned to allow each employee access to the areas necessary for their work. Programs, files, records, etc. cannot be accessed without the appropriate rights.

Refer to: SOP – Personnel, Conduct
SOP – Guidelines for Analytical Decision Making and Ensuring Data Integrity

4.0 TEST METHOD AND OPERATING PROCEDURES

All personnel have access to reference materials and SOPs located in the quality department **and/or electronic files.** SOPs are accessible as a .tif file in LDS. Authorized copies may be issued and kept in work areas. A Master Controlled Document List is maintained by quality department.

Original **internal** document is **located in a secure electronic file.**

4.1 STANDARD TEST METHODS

Ana-Lab uses methods that meet the needs of the client and that are appropriate for the requested test. Methods published in international, national, or regional standards are preferred and used when possible. Only standard test methods are used in the analysis of accredited/certified tests. The analytical method associated with each result is printed on the analytical report. Method identification includes revision number or issue date. Methods used by Ana-Lab are listed in LDS under "Methods" and are referenced in individual SOPs. Methods are audited annually and monitored quarterly to ensure that current methods are used.

4.2 NON-STANDARD TEST METHODS

Non-standard test methods may be developed at the client's request or if a standard method is not available. If a non-standard test method is used, it must be approved by the client. Non-standard methods are fully documented, validated, and are identified in the analytical report either by reference, flags or comments. Documentation is available to the client upon request.

4.3 CONTRACT REVIEW

Review of contracts ensures that resources are available before committing to the contract. Bids must be reviewed and approved by the Executive Vice President or President. Management prepares quotes. Established contracts are considered routine work.

Refer to: SOP – Contract Review

4.4 SUBCONTRACTING

ANALYTICAL TESTING

Ana-Lab performs all analytical testing within its scopes of accreditation/certifications in-house unless a holding time issue necessitates subcontracting to another laboratory that has an equivalent accreditation/certification and is in our Approved Subcontractor List (ASL).

Testing that is not in Ana-Lab's scope of accreditation/certification or capability of testing is subcontracted to a laboratory maintaining the highest possible quality standards.

Bids and quotes clearly identify subcontracted tests. When a subcontracted sample is logged into LDS, the CoC is stamped subcontracted. Subcontracted results and the subcontractor are clearly identified on the analytical report.

APPROVED SUBCONTRACTOR LIST

Subcontractors are selected based on their qualifications and accreditations/certifications and are placed on the ASL. The ASL is reviewed at least annually and revised as necessary.

Refer to: SOP – Subcontracting: Analytical Testing
SOP – Contract Review
SOP – Login of Samples

4.5 STANDARD OPERATING PROCEDURES

SOPs are controlled documents and are written, reviewed, revised, and distributed in accordance with document control procedures. SOPs are developed from recognized standards or client instructions. The Executive Vice President is responsible for the development and revision of SOPs. New SOPs are written as needed, and existing SOPs are reviewed annually. If review indicates the need for revision, the document is revised and reissued in accordance with document control procedures. At any time, personnel may give requests for changes to management for consideration.

All employees must follow the SOP(s) pertaining to the task(s) they perform. Exceptions are approved by management and recorded in LDS notes under "Sample Analysis". A deviation is a temporary modification of a procedure. Each incident must be recorded in a LDS notes under the topic "Deviation" and approved by the Executive Vice President, Quality Manager, or Laboratory Manager.

Refer to: Quality Manual Section **2.6**, Document Control
SOP – Controlled Document: **Internal Document Preparation**

5.0 ACCOMMODATIONS AND ENVIRONMENTAL CONDITIONS

Testing is performed in a controlled environment with sufficient accommodations to ensure valid reliable results and minimize contamination. On-site sampling and test conditions are recorded. All employees are responsible for maintaining safe conditions in their work area and in the laboratory in general.

Refer to: Chemical Hygiene Plan
Employee Handbook

5.1 ACCOMMODATIONS

The laboratory is arranged in a manner to promote productivity and to minimize contamination. Volatile analyses are performed in a separate laboratory.

Samples are stored separately from chemicals and reagents. Volatile samples are stored in a designated refrigerator restricted to volatile samples only.

Blanks are analyzed with each batch to monitor environmental contamination in the laboratory. Refrigerator blanks are analyzed weekly to monitor contamination in the volatile refrigerator.

Refer to: SOP – Login of Samples, storage
SOP –Test specific

5.2 AMBIENT CONDITIONS IN THE TEST AREA

Constant and consistent test conditions where required by test method are maintained. Specific SOPs address ambient conditions in testing areas. The maintenance department and/or Operations Manager are notified if any conditions need attention.

MAIN LABORATORY
Temperature and humidity are maintained within limits to optimize instrument operations. Contaminants are controlled by ventilation, housekeeping, proper cleaning of equipment containers, bottles, etc. The microbiology area is maintained suitable for sterile bacterial analysis.

VOLATILES LABORATORY
In addition to the main laboratory requirements, the volatile laboratory is maintained free of volatile contaminants.

COLLECTION / SAMPLING SITES
Personnel performing on-site sampling and testing record the ambient conditions on the CoC or in a sampling log.

Refer to: SOPs – Test specific

6.0 PURCHASING SERVICES AND SUPPLIES

Ana-Lab has the necessary equipment, reagents, and supplies to accurately perform analytical testing.

Sensitivity is sufficient for the intended use. The required sampling equipment is available for a variety of sampling plans.

Quality critical services, such as equipment calibration and maintenance, are obtained from the manufacturer or an accredited/certified company. Critical supplies that could affect the quality of analytical data are purchased from ISO certified companies where possible. An approved vendor list (AVL) is maintained for critical services and supplies, reviewed at least annually, and revised as necessary.

Refer to: SOP – Purchasing Services and Supplies .

6.1 PURCHASES

A LDS program tracks purchases. Any employee may initiate a purchase if the item is listed in the LDS purchases data base. Approved vendors and items purchased are added to the data base by management. Selection of reference materials, chemicals and critical supplies is approved by the Laboratory Manager, Quality Manager, or designee, and may not be substituted without authorization.

Routine purchases are approved by management. Purchase of major equipment requires approval of the Executive Vice President.

Upon arrival, equipment is assigned a unique inventory number. Chemicals, reference materials, and supplies that affect quality are assigned a unique identification number.

Labels are checked for accuracy against contents of the package. If a MSDS is required, it is filed and is accessible to all employees.

Refer to: SOP – Purchasing Services and Supplies

6.2 EQUIPMENT

INVENTORY

An equipment inventory is maintained in LDS. Equipment associated with data is traceable via its unique equipment number. When a piece of equipment is permanently removed from service, it is marked inactive in the equipment inventory.

Refer to: SOP – Equipment: Inventory

ACCEPTABILITY

Before being placed into service, equipment is demonstrated to be acceptable, and the quality of analysis is verified. Proficiency Test samples may be utilized to demonstrate acceptability.

Refer to: Quality Manual Section 8

OPERATION

Equipment is operated by trained personnel. Operating procedures are detailed in equipment manuals that are provided by the manufacturer and are appendices to the SOP. SOPs may also contain additional operating instructions.

Refer to: Specific SOPs

6.2.1 QUALITY CONTROL

Equipment QC is monitored at an established frequency and compared to acceptance criteria to ensure accuracy of the data. Reference standards must be traceable to NIST or equivalent and be replaced or re-

certified at specified intervals. Thermometers have ≤1 degree increments, and analytical balances measure to 0.1 mg. Records and certificates are on file.

INSTRUMENT CALIBRATION AND VERIFICATION

Calibration is the adjustment of an instrument to a standard of known concentration (reference material) that is traceable to national standards. Verification is demonstrated by analytical data that corresponds to traceable standard concentrations.

Calibration and verification ensure uniform and consistent operation of analytical equipment. Equipment is calibrated prior to use, and the calibration is verified prior to and during use. Calibration procedures, frequency, acceptance criteria, and corrective actions are specified in SOPs. Records are associated with the analytical data.

On-site testing equipment is calibrated prior to leaving the laboratory or regional service center and immediately prior to each use as specified in SOPs.

If applicable, calibration service labels that include the date for the next required calibration are placed on equipment.

Calibration monitoring:

- Individual equipment calibration records
- Calibration procedures
- Calibration verification performed at required intervals
- Acceptability of calibrations
- Preventive Action
- Corrective Action

GENERAL EQUIPMENT

General laboratory equipment such as balances, weights, ovens, incubators, thermometers, etc. are routinely monitored, evaluated against acceptance criteria, and removed from service if acceptance criteria is not met. Records are on file.

Refer to: SOP – Equipment: Quality Control

6.2.2 RESTRICTIVE USE

Reference standards, such as the Master Certified Thermometer and Master Certified Weights, are used only as reference standards and are stored in the quality department. They may be used for other purposes only as approved by the quality department.

6.2.3 MAINTENANCE

Equipment is maintained in proper operating conditions. Calibrations and maintenance are recorded. Laboratory technicians perform routine cleaning procedures. The Laboratory Manager, Quality Manager, or professional service personnel perform advanced level installation and maintenance procedures.

Preventive maintenance is detailed in manuals provided by manufacturer and in specific SOPs. Method blanks are routinely analyzed to monitor for contamination which may indicate the need for maintenance. If an equipment problem is detected, a supervisor is notified who corrects the problem or removes the equipment from service. Equipment removed from service is labelled 'Out of Service'.

Equipment manuals are accessible to technicians and are located either in the work area or in a general equipment file. Maintenance is recorded either in an equipment maintenance log or a LDS note associated with the equipment.

Refer to: SOP – Equipment: Maintenance

6.3 REFERENCE MATERIALS, CHEMICALS, REAGENTS, AND SUPPLIES

REFERENCE MATERIALS AND CHEMICALS

Purchased reference materials and chemicals are traceable to NIST and to certificates of analysis (CoA), are at least ACS grade, meet the specified requirement of the analytical method, and cannot be used past the expiration date.

The concentration and accuracy of reference materials must be established prior to use. The CoA provides accuracy verification. If a CoA is not available, accuracy is verified in-house.

Upon receipt, reference materials and chemicals are logged in the Chemical Log (or equivalent) and are assigned a unique identification number. The corresponding identification number is written on the CoA. A file of CoAs in maintained.

The expiration date is recorded in the Chemical Log. If an expiration date is not on the label, a default expiration date is assigned. Method specification takes precedence over the manufacturer's expiration date, and the expiration is re-assigned accordingly. Expired reference materials and chemicals cannot be used and must be disposed of.

The label will contain at least: a unique identification number, reference material or chemical name, concentration (if applicable), expiration date, and date received. Date opened is required for some procedures.

Refer to: SOP – Chemical Log
SOP – Organics: Standard Solution Tracking
SOP – Specific procedures

REAGENTS

Reagents prepared in house are traceable to reference materials and chemicals. Preparation is recorded in the Reagent Log or equivalent and assigned a unique identification number.

The expiration date is assigned in accordance with the shelf life specified in the SOP. Expired reagents cannot be used and must be disposed of.

The label will contain at least the unique identification number, reagent name, concentration (if applicable), and expiration date.

Refer to: SOP – Reagent Log
SOP – Organics: Standard Solution Tracking
SOP – Specific procedures

WATER QUALITY

Water is distilled in-house and is routinely monitored for quality to demonstrate that it meets ASTM specifications. Records are on file. Each still has a unique equipment number, and the distilled water is identified by the same equipment number.

Refer to: SOP – Water Quality

SUPPLIES

Critical supplies that might affect the quality of data are logged into the Supply Log and assigned a unique

identification number. If a product certificate or statement of quality (SoQ) is available, the corresponding identification number is written on it, and a file is maintained. If a supply has an expiration date, it cannot be used beyond the expiration date unless it is re-certified.

Refer to: SOP – Supply Log

STORAGE
Reference materials, chemicals, and reagents are stored apart from samples. Supplies are stored appropriately following recommended storage conditions.

Refer to: SOP – Specific procedures

7.0 SAMPLE MANAGEMENT
Sample refers to any item being evaluated or tested.

7.1 SAMPLING PLAN
Sample collection routes are pre-determined and assigned to sample collectors. Routine sampling instructions are preprinted on a CoC. Typically, this includes the client's name and address, identification of the sampling site, requested testing, required sample bottles, and places to record on-site test results and observations such as sampling conditions. Special sampling projects are recorded in detail in a sampling log. CoCs and sampling logs are scanned into the network and printed with the analytical report.

Refer to: Sampling Handbook
SOP – Chain of Custody Documentation
SOP – Routes

7.2 COLLECTION
The objective is to collect samples which are representative of the original source and to preserve and store the samples appropriately for laboratory analyses. Collection information is recorded on the Chain of Custody (CoC). Each sample bottle has a unique label.

External contaminants are minimized by good sampling techniques. All samples must be placed in containers that are new or have been cleaned according to protocol. Preservation is determined by the type of required analysis. General storage temperature is 4°C±2.

Refer to: Sampling Handbook
Sample Bottle and Preservation Charts

7.3 RECEIPT
Dates and signatures for each relinquished and received step provide a record of an unbroken chain of custody. Upon receipt, sample CoC and bottles are examined. Typically, analytical requests are on the CoC. Acceptance and rejection criteria are followed.

Refer to: SOP – Login of Samples
SOP – Chain of Custody Documentation

7.4 TRACKING
All samples are logged into LDS and assigned a unique sequential sample number. As bottle information is entered, a unique sequential bottle number is assigned. The sample number and bottle number are written on the corresponding container.

Most samples are preserved at time of collection. A few samples are received at the laboratory requiring preservation. When this occurs, the original sample is logged in and is assigned a unique bottle number. A portion of the sample is preserved. The new bottle is recorded in LDS as "Derived in Laboratory" and is assigned a unique bottle number.

During testing, derived bottles are entered into LDS bottle information and are assigned a unique bottle number providing traceability through each step back to the original sample.

Refer to: SOP – Login of Samples
SOP – Sample Tracking
SOP – Specific procedures

7.5 PREPARATION

Sample preparation instructions are located in specific SOPs. All samples are considered original (unaltered) unless documentation on the bottle label or CoC indicates otherwise.

Refer to: SOPs – Test specific

7.6 STORAGE and DISPOSAL

Samples, sub-samples, and preparations are stored at 4°C±2 or as specified in the SOP.
Samples for volatile analysis are stored in a designated refrigerator restricted to volatile samples.

When sample storage time has expired, a Disposal List is generated by LDS. Samples, sub-samples, and preparations are removed from storage and disposed of as specified in disposal SOPs.

Refer to: SOP – Login of Samples
SOPs – Disposal of Samples

8.0 QUALITY CONTROL

Quality Control (QC) is the overall system of technical activities that measures the attributes and performance of a process against defined standards to verify that they meet the stated requirements of the client.

The frequency of QC procedures and the acceptance criteria are specified in SOPs. Each analytical SOP contains a Quality Control section that lists the QC type, minimum frequency, acceptance criteria, and corrective action and includes the statement: 'Any quality control outside acceptance control limits will be evaluated for the significance of nonconformance by the Quality Department' or equivalent statement. Where no acceptance/rejection criteria exist, comparable recoveries to the initial performance demonstration are required.

QC requirements of federal and state environmental and public health agencies are met or exceeded.

8.1 TEST SELECTION

Test methods are selected for their intended purpose.

Refer to: Quality Manual Section 4

8.2 PROCEDURE CAPABILITY

Prior to analyzing samples, limits of detection and quantitation are established, an acceptable initial Demonstration of Capability (DOC) is performed, and the method is approved for use. On-going demonstration of method performance is required. Any time there is a change in method,

instrument, or personnel, a DOC is required. Records are on file.

Refer to: **SOP – Method Evaluation**
SOPs – Test specific

8.3 TEST CONDITIONS

Where required by the method, constant and consistent test conditions are maintained. Test conditions are specified in SOPs.

Refer to: Quality Manual Section 5

8.4 REAGENT QUALITY

SOPs specify the required quality of reagents. Protocol for purchase and traceability are followed. Reagent water is routinely monitored. Records are on file.

Refer to: Quality Manual Section 6

8.5 TRACEABILITY

Traceability is the ability to trace the history of a procedure by means of recorded identifications. Calibrations and data are traceable to national or international standards and basic physical constants. Elements to be traced are specified in SOPs. Records are on file.

Refer to: Quality Manual Section 6

8.6 ACCURACY

The level of accuracy is specified in SOPs. Records are on file.

Standard curves and/or calibrations are performed and recorded. Acceptance criteria and minimum frequency are specified in SOPs. If the acceptance criteria is not achieved, the problem is resolved before continuing.

Reference materials are traceable to national or international certificates, such as NIST, and documentation is kept on file. Interlab Proficiency Test samples and internal certified reference materials are routinely utilized to monitor accuracy.

Demonstration of Capability **(DOC)** per method per matrix is initial and on-going to evaluate the accuracy and precision of data generated by laboratory personnel.

Refer to: **SOP – Method Evaluation**
SOPs – Test specific

8.7 QUALITY CONTROL SAMPLES

When variance of QC samples occurs between regulations and methods, the most stringent requirement is applied. Frequency and acceptance criteria for QC samples are specified in SOPs. Records are on file.

In general, a batch is 20 samples or less of like matrix and accompanying QC samples. QC samples monitor analytical testing and shall include, as appropriate, method blank, laboratory control sample (LCS), sample duplicate, matrix spike, matrix spike duplicate, surrogates, and/or internal QC samples. Blanks are negative controls. Standards, LCS, matrix spikes, and surrogates are positive controls. Duplicates and matrix spike duplicates demonstrate reproducibility.

QC samples are prepared, analyzed, stored, and disposed of according to the applicable SOP.

Refer to: SOPs – Test specific

8.8 VARIABILITY

Uncertainty is calculated in accordance with ISO "Guide to the Expression of Uncertainty in Measurement" using a coverage factor of k=2 to a 95% confidence level. Uncertainty is printed on the analytical report, if required or requested by the client.

Refer to: SOP – Uncertainty

8.9 DATA REDUCTION AND VERIFICATION

Formulas are validated prior to use. Where possible, electronic software is utilized, and data is downloaded directly from the instrument into LDS. Electronic calculations are verified prior to use and checked periodically. Manual calculations are repeated to verify accuracy. Results are reviewed and evaluated as they are produced and verified by a second level of review that is independent of production.

Refer to: SOP – Data: Verification

9.0 PREVENTIVE ACTION and CORRECTIVE ACTION

Diagnostic procedures to identify areas for improvement are established and recorded. Preventive action is pro-active evaluation, and corrective action is initiated by a concern.

9.1 PREVENTIVE ACTION

Preventive action identifies opportunities for improvement and identification of potential sources of nonconformances. Plans are developed and implemented to take advantage of these opportunities and to reduce the likelihood of nonconformances.

The quality system is reviewed at regular intervals to obtain information about the laboratory's operations, determine improvements to implement, and determine if corrective action is needed. Data analysis, such as the use of control charts and proficiency testing, are useful preventive action tools.

Preventive actions are monitored to access effectiveness and to determine if corrective action is required.

PERFORMANCE EVALUATIONS

Proficiency testing and quality procedures identify areas for improvement and potential quality problems. Ana-Lab participates in performance evaluations for Water Pollution (WP), DMR-QA, Water Supply, (WS) Soil Studies, Microbiology (WP and WS), NIOSH Environmental Lead Proficiency Analytical Testing (ELPAT), and additional proficiency evaluation samples as needed. Proficiency samples are analyzed in the same manner as routine samples, and the result of a single analysis is reported. Each year, the minimum participation is met or exceeded. A four year proficiency testing plan is established, and an annual schedule is determined.

In addition to interlab proficiency testing studies, internal certified reference materials are routinely utilized to monitor accuracy.

Demonstration of capability for each method and for each matrix is initial and on-going to evaluate the accuracy and precision of data generated by laboratory personnel.

CONTROL CHARTS

Control charts are used to monitor variations in precision and accuracy of routine analyses and detect trends in these variations. The construction of a control chart requires initial data to establish the mean

and range of measurements and consists of tabulated data and graphical portrayal. Analytical data is compared to control chart limits to determine if the analyses in the set are under control. The control chart consists of Lower Control Limit, Lower Warning Limit, Mean, Upper Warning Limit, and Upper Control Limit. As data is added to the LDS database, the control chart is updated. Control charts are method and matrix specific.

PREVENTIVE ACTION REPORT
When appropriate, a Preventive Action Report (PAR) is initiated and assigned to the person best suited to handle the concern. The concern is investigated and appropriate action taken. Records are on file.

Refer to: SOP – Preventive Action
SOP – Proficiency Testing

9.2 CORRECTIVE ACTION

A nonconformance is a departure from Ana-Lab policies and procedures or client requirements and requires corrective action. The identification of a nonconformance within the quality system may be related to quality control, internal audits, management review of the quality system, client or internal requests, client or internal complaints, or any other concerns brought to the attention of management or the quality department.

.

Nonconformances are evaluated for significance, and the selection of a corrective action is appropriate to the magnitude and risk of the problem. Corrective action may include halting of work, withholding reports, and/or notification of clients.

CORRECTIVE ACTION
Corrective action eliminates the cause(s) of a nonconformity that might adversely affect quality and prevents the recurrence.

Procedures for implementing corrective action may include internal audit, management review, re-evaluation or retesting of a nonconforming item or an analytical batch, or other actions necessary to correct the nonconformance and prevent its recurrence.

Refer to: SOP – Corrective Action

9.2.1 CORRECTIVE ACTION REPORT

When appropriate, a Corrective Action Report (CAR) is initiated and assigned to the person best suited to handle the concern. The investigation of the root cause ('real problem') is conducted, the potential problem is identified, and potential corrective action is recommended.

Managers have the responsibility and authority to select and implement corrective action that is appropriate to the magnitude and risk of the problem and that will eliminate the problem and prevent its recurrence.

Management monitors a corrective action to ensure effectiveness. Additional audits may be required. When the corrective action is satisfactory, the Executive Vice President or Quality Manager **or designee** closes the CAR. Records are on file.

Refer to: SOP – Corrective Action

9.3 COMPLAINTS

A complaint is defined as a written statement detailing a specific concern about a possible non-conformance. The Executive Vice President will ensure that all complaints are resolved within a timely

manner. Records are on file.

Refer to: SOP – Complaints

9.4 Client NOTIFICATION

The client is notified in writing **as soon as possible, not to exceed 30 days, from time management becomes aware of an** inadequate test procedure, equipment, or traceability casts doubt on the validity of reported results. If necessary, corrected reports are printed in accordance with reporting procedures.

Refer to: Quality Manual, Revision 12, 10.4.3 – Analytical Reports, Revisions
SOP – Report: Supplemental
SOP – Corrective Action

10.0 RECORDS

Records provide evidence of **all** laboratory activities. **Unless a longer retention time is specified**, records are held secure and in confidence for five (5) years from the date of completion and then disposed of in a manner to preserve confidentiality. Environmental Lead records are retained for ten (10) years, **hazardous waste records are retained permanently, and business records are retained appropriately for the type of record.** Original paper records may be replaced with scanned images.

Records include all necessary information, including links to supporting data, to establish an audit trail.

Refer to: SOP – Record Management
SOP – Records: Electronic Data Security

10.1. CONFIDENTIALITY

Data is held in confidence to the client. Reports are issued only to the client. If the client desires others to receive reports, this must be communicated to the laboratory in writing. Fax and/or e-mail are acceptable notification.

ELECTRONIC DATA

Information maintained in Ana-Lab's computer system is protected. Access from network terminals is limited by passwords. Access via WebLDS is limited by permission from the Executive Vice President. A password and an established e-mail address are required for access.

Refer to: SOP – Confidentiality and Proprietary Rights
SOP – Records: Electronic Data Security

10.2 DATA COLLECTION and STORAGE

Data is collected and stored in LDS either by direct instrument interface or by manual data entry.

ELECTRONIC DATA ENTRY

Data is recorded directly into LDS via software specifically designed to interface instrumentation with LDS. Each terminal is linked to the network and printouts are generated for review. Data is permanently stored in LDS backups and archived **electronically**. Data that cannot be reprinted is scanned into the network and archived **electronically.**

MANUAL DATA ENTRY

Data is recorded directly on approved preprinted data sheets which are scanned into the network and archived **electronically.**

Refer to: SOP – Record Management
SOP – Scanning
SOP – Records: Electronic Backup
SOP – Data: CD Backup

10.3 DATA VERIFICATION

Data is reviewed to verify accuracy, repeatability, and integrity of the data collected. If acceptable, the data is verified during the second level of review and released to be printed on the analytical report. Any quality control outside acceptable control limits will be evaluated for significance of nonconformity by the Quality Department.

Refer to: SOP – Data: Verification

10.4 ANALYTICAL REPORT

Ana-Lab analytical reports are printed on corporation letterhead and bear the signature of a designated signatory. Electronic signature is acceptable.

The analytical report will contain at least a unique sample number, sample identification, client identification, bottle information, parameter, analytical result, method identification, detection limits, related quality control data, analysis date, time, and the initials of the responsible person, verification date, time, and the initials of the responsible person, subcontracting information (if applicable), and the report print date. All applicable accreditations, identification numbers, and statements are included.

Results are reported in international standard units (SI) unless the requirements of the client specify the use of alternate units.

The analytical report may contain additional information for clarification or as required by the client and flags to mark particular items. When required, applicable data qualifiers are utilized.

Reports may be faxed to a confirmed number or e-mailed to a confirmed address at the client's request. With the approval of the Executive Vice President, a client may access verified results via WebLDS. Raw data and supporting records are available upon request by the client.

10.4.1 REVIEW

Analytical reports are reviewed and evaluated by a designated signatory. Where data was verified as components, the analytical report is reviewed as a whole. Depending upon the testing performed, relationships may exist between components.

EXCEPTION REPORT

The exception report includes special reporting instructions and an anomaly list. Samples with an anomaly (analytical result that is outside the historical and/or expected range) are scrutinized for cause by the designated signatory. If the anomaly can be legitimately explained, the result is accepted. If no logical cause can be found, the sample may be marked for retesting.

Refer to: SOP – Report: Analytical

10.4.2 SIGNATORIES

Signatories for analytical reports are authorized. Electronic signatures are acceptable.

Refer to: Quality Manual, Section 1.2
Refer to: SOP – Report: Analytical

10.4.3 REVISIONS
If reissue of an analytical report for correction, revision, or supplement is necessary, the supplemental report references the original report. The revised report is printed with the current date and is reviewed and signed in the same manner as the original. The print date identifies the issue date. An explanation for the re-issued report is recorded in an associated LDS note.

Refer to: SOP – Report: Supplemental

10.5 RETENTION
Records are secure, protected from loss or damage, and retrievable. Where practical, records are scanned into the network and archived **electronically**.

The main computer system is a multi-component system, residing in separate locations. Multiple backups are made at regular intervals and access is limited to the Executive Vice President, the Information Technology Manager, or their designees.

In progress analytical data is stored on instrument hard drives, in a fireproof filing cabinet, and/or in LDS. Data generated prior to scanning procedures is stored in a secure area with limited access recorded in a log.

Electronic files are stored in multiple backups. Access is limited to the Executive Vice President and the Information Technology Manager.

In the event that the laboratory discontinued operations or ownership was transferred, all clients would be notified 60 days in advance and an agreement reached ensuring that the records are maintained or transferred according to the client's instructions and applicable regulations.

Refer to: SOP – Record Management
SOP – Records: Electronic Backup
SOP – Records: Electronic Data Security
SOP – Scanning

10.6 DISPOSAL
Records, paper and electronic, are disposed of in an appropriate manner to preserve confidentiality.

Refer to: SOP – Confidentiality and Proprietary Rights
SOP – Record Management

11.0 WASTE DISPOSAL
When possible, Ana-Lab participates in recycling.

All wastes are disposed of by EPA and state approved disposal protocols or returned to the client. A licensed hazardous material company is contracted for hazardous waste disposal and documentation is on file. Foreign soil is disposed of according to USDA protocols.

Refer to: SOP – Disposal of Samples
SOP – Disposal of Hazardous Waste
SOP – Foreign Soil: Handling and Disposal

12.0 SAFETY
Ana-Lab's safety program is in compliance with OSHA and is outlined in the Chemical Hygiene Plan. A

contracted safety consultant conducts monthly safety meetings, addresses safety concerns, and investigates safety-related incidents.

The Chemical Hygiene Plan includes personnel safety, emergency preparedness, and emergency response. Material Safety Data Sheets (MSDSs) are on file and accessible to all employees. Each SOP has a safety section and includes specific additional safety statements if applicable.

Supervisors are notified immediately of any chemical spills, accidents or hazardous conditions. Absorbent or neutralizing material is available in testing and storage areas. Spilled chemicals and cleanup supplies are disposed of in accordance with disposal procedures.

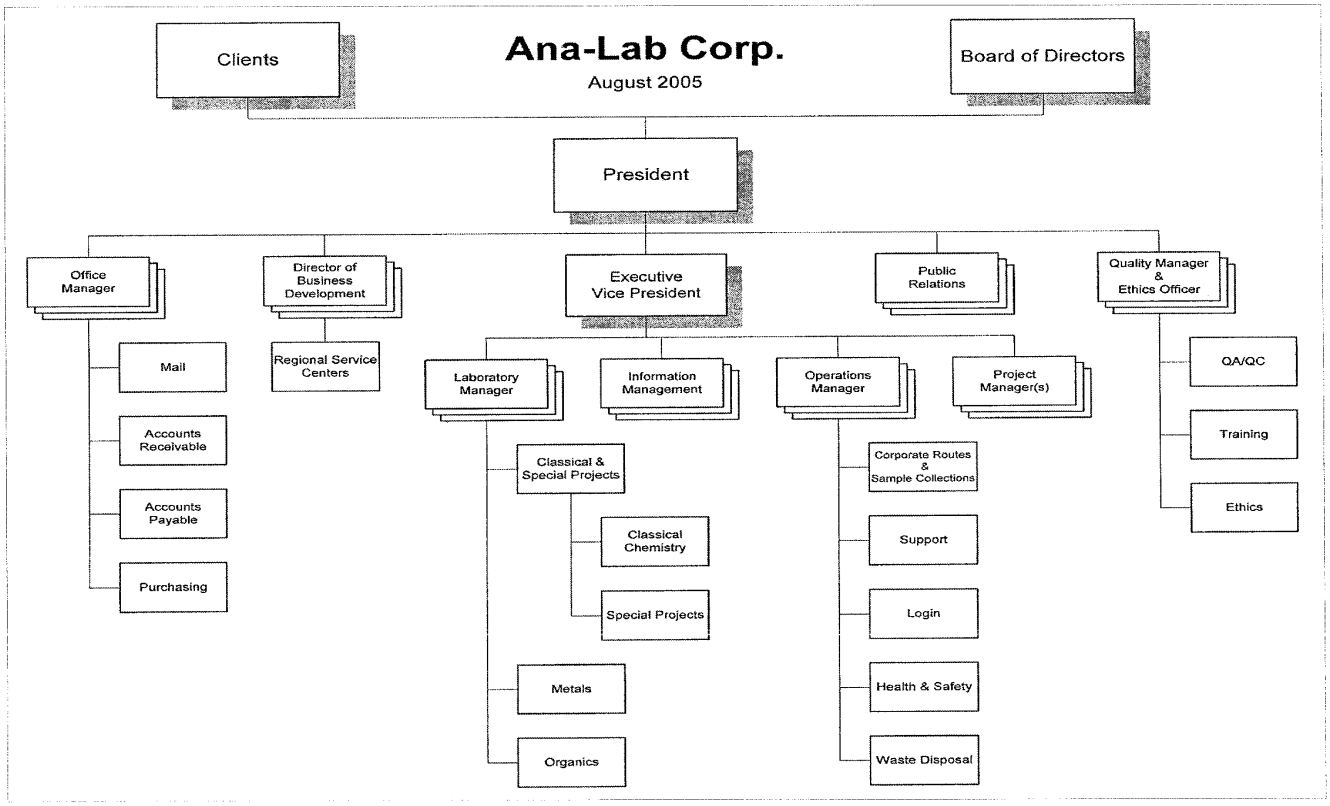
Access to the hazardous waste containment area is restricted and a log is maintained.

For safety concerns, contact management and/or the safety consultant via LDS notes.

Refer to: Chemical Hygiene Plan
SOP – Safety: Concerns
SOP – Disposal of Hazardous Waste

APPENDIX I

Organization Chart



APPENDIX II

Deputies Chart

ABSENT	DEPUTY
President	Executive Vice President Quality Manager
Office Manager	President
Executive Vice President (Technical Director)	President Quality Manager Laboratory Manager
Quality Manager (Ethics Officer)	President Executive Vice President
Laboratory Manager	Executive Vice President
Operations Manager	Executive Vice President
Dir of Bus Development	President

ABSENT	DEPUTY
Office Personnel	Office Manager
Dir Communications	Pres & IT Manager
Info Technology Mgr	Executive VP
IT Technicians	Info Technology Mgr
Project Managers	Exec VP & Ops Mgr
Quality Techs	Quality & Project Mgrs
Sample Collectors	Quality & Ops Mgrs
Login Techs	Ops Manager
Support Supervisor	Ops Manager
Support Techs	Support Supervisor
Maintenance	Ops Manager

ABSENT	DEPUTY
Organic Supervisor	Lab Manager
Organic Techs	Organic Supervisor
Metals Supervisor	Lab Manager
Metals Techs	Metals Supervisor
Classical/Proj Super	Lab Manager
Classical Supervisor	Special Projects Super
Classical Techs	Classical Supervisor
Asst. Dir of Bus Dev	Director of Bus Dev
Regional Managers	Dir & Asst Dir of Bus Dev
Regional Personnel	Regional Managers
Safety Consultant	Ops Manager

APPENDIX III

Quality Policy

Ana-Lab Corporation is committed to providing superior environmental analyses and services that meet the needs of our clients.

Ana-Lab is committed to the highest quality of testing through good professional practices, modern instrumentations, and well-trained personnel. Management sets goals to achieve involvement of each employee in improving quality, reducing costs, and conforming to the client and testing requirements. Laboratory personnel are included in quality improvement planning and are involved in maintaining the quality system.

Ana-Lab's goals are to:

- Meet the Data Quality Objectives of the client.
- Comply with applicable government standards and regulations.
- Operate in accordance with current laboratory accreditation standards.

Ana-Lab's quality objectives are to maintain standards for laboratory competence that are outlined in ISO 17025, NELAC, NLLAP, and GALP. Specific quality requirements of regulatory agencies and clients are implemented. Together these provide the maximum opportunity to produce accurate and reproducible analytical results.

Ana-Lab's quality objectives are to:

- Assure the data produced is reliable.
- Assure the data and documentation meet or exceed the client's Data Quality Objectives.
- Assure adequate document control.
- Enable personnel to identify and implement preventive and corrective actions necessary to ensure data integrity.
- Meet requirements of regulatory agencies and organizations providing recognition.
- Provide a system for continuous improvement.

All employees are trained for the testing and administrative activities in which they are involved and are familiarized with the quality documentation and implementation of the policies and procedures in their work. Monthly training sessions with all employees address issues in the quality system.

C. H. Whiteside, Ph.D. President	Bill Peery, M.S Executive Vice President	Roy White, M.S. Quality Manager

APPENDIX IV

Employee Ethics Policy

All Employees will record data accurately.

Errors must be corrected immediately.

Any employee who discovers errors on the part of another employee must bring it to the attention of that employee at once.

Data falsification is intolerable. Employee Handbook states that data falsification may result in termination.

Any employee who discovers falsification on the part of another employee must bring it to the attention of a supervisor.

"I have read and understand the above information and will comply."

_____

Name Date

APPENDIX V

Ana-Lab Corporation
Statement of Values

Ana-Lab's heritage has as its core the ethical treatment of everyone involved with our business. As a corporate community, we embrace our heritage of integrity and strive to live by the following principles:

Fairness and honesty in all our relationships.
Mutual respect
A respect for ourselves and others.
A sense of caring that leads us to act responsibly toward each other and society.
Loyalty to our clients and one another.
A spirit of open-mindedness as we deal with all.
Dedication to service.
Good stewardship of our resources.
A commitment to flexibility and continuous improvement.

We each take personal responsibility to live these values in all of our dealing, knowing full well our pledge may involve difficult choices, hard work, and courage.

APPENDIX VI

Ethical Conduct and Data Integrity Agreement

Ana-Lab is committed and dedicated to providing the highest quality analytical service possible to its clients. Data produced, managed, and reported by Ana-Lab must meet the requirements of its clients and comply with both the letter and spirit of the various municipal, state, and federal regulations and guidelines. Protocols and procedures utilized by Ana-Lab's laboratory are based primarily on EPA guidelines for the analysis of multimedia samples for a broad range of inorganic and organic contaminants. Ana-Lab's Quality Assurance/Quality Control (QA/QC) program encompasses the requirements for producing and reporting traceable, defensible data to its clients. It is understood that Ana-Lab's analytical data is used by clients to make rational, confident, cost effective decisions regarding assessment and resolution of their environmental compliance requirements. Therefore, all activities of Ana-Lab must be conducted in an ethical manner.

POLICY

It is the policy of Ana-Lab to incorporate the highest standard of quality into all procedures adhering to the following practices:

1. All Ana-Lab personnel are committed to the practice of complete honesty in all activities, including the production and reporting of data.
2. Personnel who are aware of misrepresentation of facts or the manipulation of data are required to immediately inform the Quality Manager, Executive Vice President, Laboratory Manager, or another appropriate member of the corporate leadership team.
3. Ana-Lab is operated under an Open Door Policy that enables every personnel member to have free access to the corporate leadership. This Open Door Policy is intended to foster two way communications and encourage each personnel member to carefully consider their duty and responsibility to report unethical practices to the corporate leadership. It is clearly understood that such information brought forth shall be treated confidentially.

REVIEW REQUIREMENTS

1. The Ethical Conduct and Data Integrity Agreement is reviewed and signed during orientation.
2. All personnel are required to review and sign this agreement annually.

ETHICAL CONDUCT AND DATA INTEGRITY AGREEMENT

1. PERSONAL PLEDGE
   I understand that I am charged with meeting the highest degree of ethical standards in performing all of my duties and responsibilities, and pledge to report data, test results, and conclusions that are to the best of my ability, accurate, precise, and of the highest quality.
2. TRAINING ACKNOWLEDGMENT
   I have been formally instructed to consider quality as the most important aspect of all my job responsibilities and requirements. I have received, reviewed, and understand Ana-Lab's Ethics Policy, Statement of Values, and Guidelines for Ethical Decision Making and Ensuring Data Integrity. I further agree to participate in Ana-Lab's Ethical Fitness Program. Through these activities, I acknowledge that I have been formally instructed to be honest in all activities, including the production and reporting of data, and to insist on excellence in quality control.
3. PROTOCOL PLEDGES
   I agree to adhere to the following protocols and principals of ethical conduct in fulfilling my work assignments at Ana-Lab:
   a. All work assigned to me will be performed using Ana-Lab Standard Operating Procedures (SOPs)

or other approved instructions.

b. I will only report data that match the actual results observed or measured.
c. I will not intentionally or improperly manipulate or falsify data in any manner, including both sample and QC data. Furthermore, I will not modify data values unless the modification can be technically justified through a measurable analytical process or method acceptable to Ana-Lab. All such modifications will be clearly and thoroughly documented on the raw data and include my initials or signature and date.
d. I will not intentionally report dates and times for data that are not the actual dates and times that the data was generated.
e. I will not intentionally represent another individual's work as my own or represent my work as someone else's.
f. I will not make false statements to, or seek to otherwise deceive, Ana-Lab personnel, leaders or clients. I will not, through acts of commission, omission, erasure or destruction, improperly report measurements, quality control, data, analytical results, conclusions, or any other information

4. GUARDIAN PLEDGE
   a. I will not condone any unethical practice including accidental or intentional reporting of unauthentic data by other Ana-Lab personnel and will immediately report such occurrences to my supervisor, the Laboratory Manager, the Quality Manager, the Executive Vice President, or other corporate leadership. I understand that failure to report such occurrences may subject me to immediate discipline, including termination.
   b. If a supervisor or other member of the Ana-Lab leadership group requests me to engage in or perform an activity that I feel is unethical including compromising data validity or quality, I have the right to not comply with the request and appeal this action through Ana-Lab's ethic program.
   c. I understand that, if my job includes supervisory responsibilities, then I will not instruct, request, or direct any subordinate to perform any laboratory practice that is unethical or improper. Also, I will not discourage, intimidate, or inhibit a personnel member who may choose to appropriately appeal my supervisory instruction, request, or directive that may be perceived to be improper, nor retaliate against those who do so.
5. AGREEMENT SIGNATURE
   I have read and fully understand all provisions of the Ethical Conduct and Data Integrity Agreement. I further realize and acknowledge my responsibility as an Ana-Lab personnel member to follow these standards. I clearly understand that adherence to these standards is a requirement of continuing employment at Ana-Lab.

_____
Printed Name

_____
Signature

_____
Date

APPENDIX VII

ABBREVIATIONS

A2LA	American Association for Laboratory Accreditation
ACIL	American Council of Independent Laboratories
AIHA	American Industrial Hygiene Association
ASL	Approved Subcontractor List
AVL	Approved Vendor List
CoA	Certificate of Analysis
CoC	Chain of Custody
DOC	**Demonstration of Capability**
DMR-QA	Discharge Monitoring Report - Quality Assurance
EDII	Environmental Laboratory Data Integrity Initiative Program
ELPAT	Environmental Lead Proficiency Analytical Testing
EMA	Entidad mexicana de Acreditacion, a.c.
EPA	US Environmental Protection Agency
IEC	International Electrotechnical Commission
ISO	International Standardization Organization
LCS	Laboratory Control Sample
LDS	Laboratory Data Services (in-house LIMS software)
MSDS	Material Safety Data Sheet
NELAC	National Environmental Laboratory Accreditation Council
NELAP	National Environmental Laboratory Accreditation Program
NIST	National Institute for Standards and Technology
NLLAP	National Laboratory Lead Accreditation Program
NMX	Norma Mexicana
OSHA	Occupational Safety and Health Administration
QA	Quality Assurance
QC	Quality Control
QS	Quality System
SI	Standard International

SOP	Standard Operating Procedure
SoQ	**Statement of Quality**
TCEQ	Texas Commission on Environmental Quality (formerly TNRCC)
USDA	United States Department of Agriculture
WebLDS	Ana-Lab's web page that allows access to verified data.
WP	Water Pollution
WS	Water Supply

Revised by:	Date	Reviewed by:	Date
NGT, Sr. Quality Tech	June 2006	MRM, Project Manager VRW, Quality Manager	June 2006

Reference 12

RECORD OF DECISION

OKLAHOMA REFINING COMPANY SUPERFUND SITE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VI

JUNE 1992

Reference 13

RECORD OF DECISION

OKLAHOMA REFINING COMPANY SUPERFUND SITE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VI

JUNE 1992

Reference 14

RECORD OF DECISION

OKLAHOMA REFINING COMPANY SUPERFUND SITE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VI

JUNE 1992