



**LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY**  
**LEAKING UNDERGROUND STORAGE TANK PROGRAM**  
**QUALITY ASSURANCE PROJECT PLAN**

**Revision 10**

## Document Review and Revision Record

**Note: Actions older than 5 yrs may be removed from this record**

| Approval Date | Revision No. | Record of Activity  |
|---------------|--------------|---|
| 5/30/00       | 3            | Document approved   |
| 10/15/01      | 4            | Minor revisions throughout document   |
| 10/04/02      | 5            | New Remediation Process Chart, addition of SW846 Method 5035/8021 or 8260B, change QA duties, and other minor revisions   |
| 02/25/04      | 6            | <ul style="list-style-type: none"> <li>• A3 -Added statement "Official version will be posted on DEQ's Intranet. The following DEQ personnel will be notified via interoffice mail that the latest version is posted";</li> <li>• A4 -Update QAR Identification; Figure 1 – Update Organization Chart to enhance Operations Group;</li> <li>• A6 -Deleted reference VII, Groundwater Monitoring and Reporting Guidance Document, now it is part of RECAP; specified Reference IV is used by DEQ personnel; deleted "LUST" from 1<sup>st</sup> paragraph; reworded groundwater monitoring and reporting requirements</li> <li>• A8 –deleted words "8 hours" from HAZWOPER Annual Refresher; Update References to reflect addition of QAPP documents location and revised reference numbers; Added "ETD Supervisors" and "ETD" to last sentence</li> <li>• A9 -paragraph 3 replaced "five years" with "ten years"- Title 33 changed minimum retention time of records; paragraph 4 changed reference from "Subpart C" to "Subchapter B";</li> <li>• B2 -Deleted Appendix K;</li> <li>• B3 -paragraph 3-changed in first sentence "...documentation used to..."; deleted last sentence which references DEQ COC stating that information must be provided on the chain of custody form; paragraph 4 replaced "DEQ representative" with "sampler";</li> <li>• B4- Combined last two sentences</li> <li>• B5 -Figure 4 was updated, added acceptable preparation methods, added MEK and MIBK as indicators for gasoline; deleted BTEX and PAH as indicators for Kerosene Jet Fuel as per new RECAP, added TCEQ 1005 as acceptable method for TPH analysis;</li> <li>• Deleted Reference VI DEQ Chain of Custody Form; and</li> <li>• Other minor spelling, formatting, and punctuation revisions.</li> </ul> |

| Approval Date | Revision No. | Record of Activity   |
|---------------|--------------|--|
| 4/1/05        | 7            | <ul style="list-style-type: none"> <li>• Section A3-moved Laboratory Services Division under Office of Environmental Assessment and delete the division under Office of Management and Finance. Change due to reorganization; added Engineer Group 4 Manager and Geologist/Engineer Team Leaders to Environmental Technology Divisions distribution list; added Environmental Scientist Team Leaders to Remediation Services Division distribution list; added Environmental Consultants to distribution list.</li> <li>• Section A4-added and defined the LUST Project QA Coordinator and defined this persons responsibilities; updated organization flowchart to show Project QA Coordinator independence; added a footnote to the RCAP 2003.</li> <li>• Section A5- updated the number of regulated USTs and referenced origin of this information; added a sentence to clearly define the purpose of the QAPP.</li> <li>• Section A6-Added a statement clarifying sampling and analytical work schedules can be found in investigation work plans.</li> <li>• Section A9-change RSD QAR to Project QA Coordinator.</li> <li>• Section B2-Added reference to DEQs SOP for Corrective Action System to be used to document any corrective actions required.</li> <li>• Section B3-added statement indicating labeling of samples; added reference to sample holding times; added reference to Title 33, Part I, Subpart 3, 5301 to clarify procedures followed when failures occur.</li> <li>• Section B5- added footnote 14 to the table figure 4</li> <li>• Section B6-Added statement about resolving equipment deficiencies and referenced Title 33 for laboratory equipment problems.</li> <li>• Section B7-Added reference to SOP for Instrument use and Calibration.</li> <li>• Section B10-Added reference to Title 33 covering SOP data handling</li> <li>• Section C1- Added reference to SOP for Corrective Action System</li> <li>• References – Added to list of references</li> </ul> |

| Approval Date | Revision No. | Record of Activity  |
|---------------|--------------|---|
| 3/31/2006     | 8            | <ul style="list-style-type: none"> <li>• Changed to new logo on cover page;</li> <li>• Updated EDT Administrator name on approval signature page and throughout document</li> <li>• In A3 added Toxicology Supervisor and changed to UST Trust Fund ES Manager from Supervisor</li> <li>• Updated the GEO QAR representative name</li> <li>• Updated in A5 estimated UST</li> <li>• Section A6 updated number of USTs and facilities. Also added reference pre-Katrina</li> <li>• Change LDEQ to DEQ throughout the document</li> <li>• Updated the web links in reference section</li> <li>• In A8 added documentation of training the Pathlore System</li> <li>• Page 8 moved QA Manager and QA Officer under Laboratory Services Division, added Geology and Engineering QAR</li> <li>• Updated links in Reference section</li> <li>• Updated page numbers in the table of contents</li> </ul> |
| 5/3/2007      | 9            | <ul style="list-style-type: none"> <li>• Removed QA Officer Signature – no longer a QA Officer position</li> <li>• Added Administrator UST division to signature page</li> <li>• Changed name of project QA Coordinator</li> <li>• Added new UST division changes to QAPP</li> <li>• In A3 added UST division to distribution list; moved QA Manager to IS division; deleted QA Officer and Manager from Laboratory Services Division; removed Engineering Group 4 from distribution list;</li> <li>• In A4 updated names to reflect new USTD</li> <li>• Updated Figure 1 to reflect USTD</li> <li>• Updated Figure 2 map indicating grouping of new divisions</li> <li>• In A6 added USTD role in project management</li> <li>• In A9 added UST Support Section role in tracking training</li> </ul>   |

| <b>Approval Date</b> | <b>Revision No.</b> | <b>Record of Activity</b>  |
|----------------------|---------------------|--|
| 6/4/2008             | 10                  | <ul style="list-style-type: none"><li>• Section A4 - Updated the tasks for the Project QA Coordinator, Operations Group, Technical Team Leaders, and Response Action Contractors/Environmental Consultants.</li><li>• Section A5 - Updated the description of the Problem Definition/Background.</li><li>• Section A6 - Updated the description of the Project/Task Description to reflect current conditions and data quality objectives.</li><li>• Section A7 - Updated the descriptions of data quality objectives for LUST sites.</li><li>• Section B2 - Updated the descriptions of sampling methods and guidance documents.</li><li>• Section B3 - Updated the requirements for chain-of-custody documentation and sampling holding time information.</li><li>• Section B6 - Updated the inspection procedures for field and laboratory equipment.</li><li>• Section B8 - Updated the inspections and acceptance requirements for supplies and consumables.</li><li>• Section C1 - Updated the inspection and maintenance of field equipment. Updated the records retention requirements for field laboratory equipment.</li><li>• Section C2 –Updated the procedure for notifying the QAR of deviations from and reconciliations of quality assurance requirements.</li><li>• Section D2 – Updated the instrument data validation and verification methods.</li></ul> |

**A1 APPROVAL SHEET**

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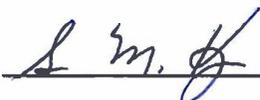
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Office of Environmental Assessment

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Name: **Audray Lincoln**

Title: LUST Project Officer

Signature:  Date: 6/4/08

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### **A3 DISTRIBUTION LIST**

#### **Louisiana Department of Environmental Quality**

The official version is posted on DEQ's Intranet. The Project Quality Assurance Coordinator will notify the following DEQ personnel via interoffice mail when the latest version is posted.

##### Office of Environmental Assessment

Executive Section  
Assistant Secretary

Underground Storage Tank Division  
Administrator  
Environmental Scientist Managers and Supervisors  
Environmental Scientist Team Leaders

Remediation Services Division  
Administrator  
Environmental Scientist Managers and Supervisors  
Quality Assurance Representative  
Environmental Scientist Team Leaders

Environmental Technology Division  
Administrator  
Geologist Supervisors  
Geology Quality Assurance Representatives  
Geologist Team Leaders  
Toxicology Supervisor

Laboratory Services Division  
Administrator

##### Office of Management and Finance

Information Services Administrative  
Quality Assurance Manager

Financial Services Division  
UST Trust Fund Environmental Scientist Manager

#### **U.S. EPA Region 6 Personnel**

LUST Project Officer (receives an original copy)

### **Response Action Contractors (RACs)**

A copy of the QAPP will be supplied to each RAC listed on the current RAC List.

### **Environmental Consultants**

An Environmental Consultant carrying out a response action at a LUST site will be provided a copy of the LUST QAPP.

## **A4 PROJECT / TASK ORGANIZATION**

See Figure 1 of this section for an overview of the LUST Project Organization.

### **(1) U.S. EPA LUST Project Officer, Region VI - Audray Lincoln**

The EPA Region VI LUST Project Officer is responsible for coordination of EPA Region VI and DEQ Leaking Underground Storage Tank (LUST) Program administrative issues, including processing the LUST Grant Work Plan and approving the DEQ LUST Program Quality Assurance Project Plan (QAPP).

### **(2) Underground Storage Tank Division (USTD) Administrator – Steve Chustz Remediation Services Division (RSD) Administrator - Keith Casanova Environmental Technology Division (ETD) Administrator - Tom Harris**

The USTD, RSD, and ETD Administrators are responsible for overall implementation of the LUST Program and associated remediation process activities as they relate to assessment and corrective actions within USTD, RSD, and ETD.

### **(3) RSD Quality Assurance Representative - Erin Folse**

The QARs are responsible for all aspects and functions of the DEQ LUST Program QA/QC requirements including the following:

- Provide input to the department Quality Management Plan (QMP) and review of QAPP documents
- Orientation of the project staff to the quality assurance needs and requirements of the LUST program

### **(4) Project QA Coordinator – Sara Krupa**

The Project QA Coordinator is responsible for maintaining the official, approved LUST QAPP. Also responsible for the following:

- Revise and update the LUST QAPP to reflect current LDEQ practices
- Send the LUST QAPP to EPA for approval
- Post the updated QAPP on DEQ's intranet
- Notify and provide updated copies of LUST QAPP to appropriate personnel
- Conduct periodic assessments

**(5) Operations Group - USTD/RSD/ETD Administrators, UST/RSD Environmental Scientist Managers, and ETD Geology Supervisors.**

The Operations Group is responsible for overall performance of the LUST program within the Remediation process. These tasks include:

- Site classification and prioritization
- Balance the workload between regions and staff. Provide team leader assignments
- Ensure consistent implementation of remediation processes among regions (see Figure 2 - Regional Map)
- Oversee the workload and progress of assignments and provide assistance to Technical Team Leaders
- Ensure proper hand-offs are made and received from other departmental processes and divisions

**(6) Technical Team Leaders**

The Technical Team Leaders consist of Environmental Scientists from USTD; RSD; and Geologists and Toxicologists from ETD as well as Engineers from the Waste Permits Division.

Technical Team Leaders are responsible for managing the activities of LUST sites at the facility level. These tasks include:

- Provide oversight for assessment and remediation activities at LUST sites to ensure that they are completed in accordance with approved standard procedures and quality assurance requirements
- Review and approve site investigation and monitoring reports
- Maintain and calibrate all field equipment. Additionally, experienced personnel shall provide operator training for field equipment as needed for Technical Team Leaders who require training either due to lack of experience, updates, or refreshers.
- Maintain proper documentation of field activities, and ensure that proper labeling, handling, storage and shipping requirements are met
- Comply with all appropriate chain-of-custody procedures

- Notify the appropriate laboratory if circumstances exist that may adversely affect the quality of data derived from LUST site field activities
- Ensure that site investigation, corrective action, site monitoring, and completion sub-processes (see Figure 3) are performed in accordance with the remediation process standard operating procedures (SOPs) (Reference IV)
- Assist the QARs to create and revise the QAPP and relevant SOPs

## **(7) Response Action Contractors/Environmental Consultants**

A response action is any technical services activity or specialized services activity including, but not limited to, assessment, planning, design, engineering, construction, operation of a recovery system, or ancillary services that is carried out in response to any discharge, release or threatened release of motor fuels into the groundwater or subsurface soils. (See Section A5 for an explanation of the Trust Fund.) When emergency conditions exist as a result of a release from a motor fuels UST, this shall include any person performing department-approved emergency response actions during the first 72 hours following the release.

Response actions may be performed by Response Action Contractors (RACs) or Environmental Consultants (ECs). It is required to use a Response Action Contractor (RAC) to complete response actions for LUST sites in Louisiana that are seeking reimbursement from the Louisiana Motor Fuel Underground Storage Tank Trust Fund. A RAC is a person who has been approved by the department to carry out any response action at a Motor Fuel UST Trust Fund (here in after referred to as the "Trust Fund") eligible site, excluding a person retained or hired by the RAC to provide services relating to a response action. Sites that are not Trust Fund eligible, those that qualify for federal reimbursement, or sites funded by a private entity are not required to use a RAC to conduct response actions. Instead they may use an Environmental Consultant (EC) to perform response actions. An EC is a person other than a RAC who carries out response action(s) at a non- Trust Fund eligible LUST site

RACs and ECs are responsible for performing remediation activities in accordance with the following guidance and regulations:

- DEQ Risk Evaluation/Corrective Action Program 2003 (RECAP) (Reference I)<sup>1</sup>
- DEQ/LDOTD Construction of Geotechnical Boreholes and Monitoring Well Systems Handbook, (Reference II)

In this document, the term "RAC/EC" will be used to indicate those persons who perform response actions on Trust Fund eligible sites (RAC) and/or Trust Fund non-eligible sites (EC).

**(8) Laboratories**

Laboratories performing analyses on samples from LUST sites must use department-approved methods. Commercial laboratories must participate in DEQ's Louisiana Environmental Laboratory Accreditation Program (LELAP) (Reference III).

Figure 1

### LUST Project Organization

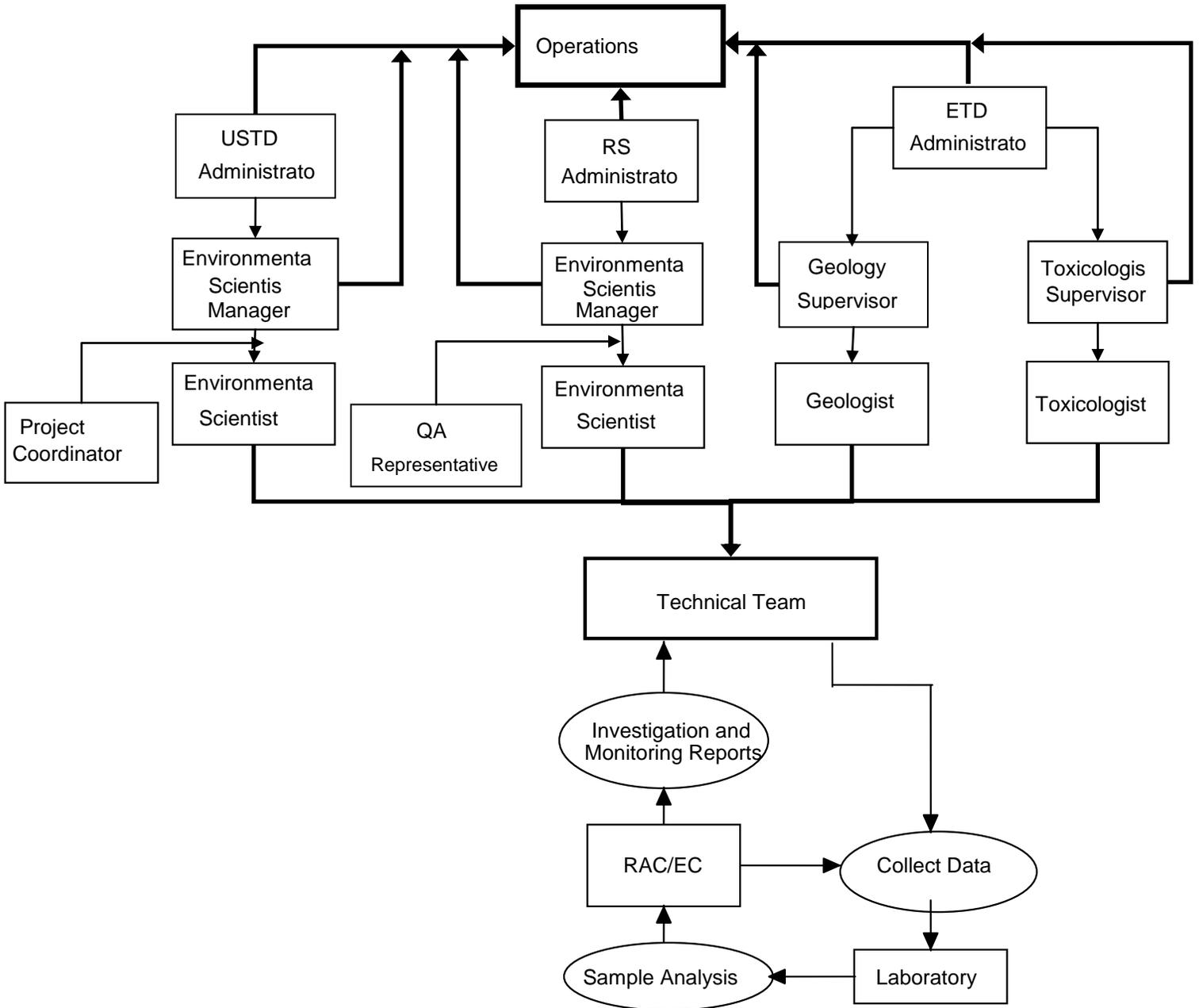


Figure 2

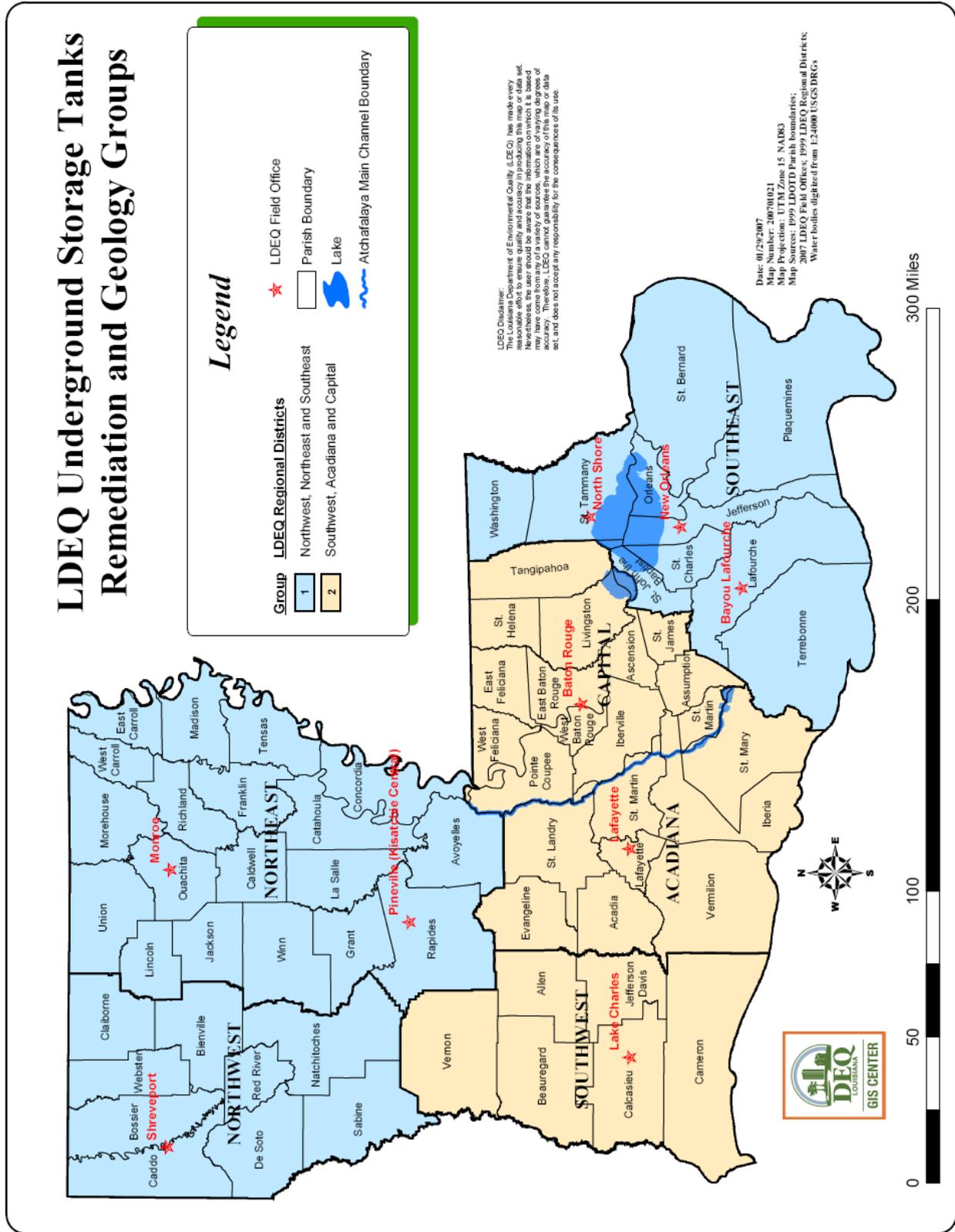


Figure 3

### UST Remediation Process



## **A5 PROBLEM DEFINITION/BACKGROUND**

The U.S. EPA estimates that there are approximately 640,000 underground storage tanks (USTs) located nationwide that contain petroleum or hazardous substances. USTs have been found to leak for a number of reasons such as corrosion of the system, faulty installation, inadequate or improper maintenance, etc. These leaking UST systems can release their contents into the soil and/or groundwater, and subsequently pose a threat to human health or the environment. In an effort to decrease the number and threat that leaking USTs pose to human health and the environment, Congress added Subtitle I to the Resource Conservation and Recovery Act (RCRA) in 1984. Subtitle I required EPA to develop a regulatory program for USTs storing petroleum and other hazardous substances (Reference VII).

In October of 1986, Congress amended Subtitle I of RCRA and therein created the federal Leaking Underground Storage Tank (LUST) Trust Fund. The fund was set up to oversee clean-ups by responsible parties; to pay for clean-ups at sites where the owner or operator is unknown, unwilling, or unable to respond; or for use in emergency conditions. Additionally, these funds are allocated to pay for field personnel time and other resources used in the remediation of sites.

In order to help UST owners meet the financial responsibility requirements of Subtitle I of RCRA, the Louisiana Legislature enacted Act 1767 on July 15, 1988. Act 1767 established the Motor Fuels UST Trust Fund (hereinafter referred to as "the Trust Fund"). The Trust Fund was designed to reimburse costs incurred during the rehabilitation and remediation of affected soils, groundwater, and inland surface waters at eligible motor fuel contaminated UST sites, provided these costs are necessary and appropriate. It was initially financed through a per-tank fee of \$100, but the fee structure changed with the adoption of Act 1014 on July 26, 1990. At that time the fee structure changed from a per tank rate to a per gallon delivered rate. On June 16, 1995, Act 336 of the 1995 Regular Session of the Legislature passed. This act increased the fee from \$27.00 to \$72.00 for each delivery of 9,000 gallons of fuel (\$0.008 per gallon) delivered to a UST. This fee is collected by bulk operators and remitted to the Louisiana DEQ on a monthly basis.

The Trust Fund only reimburses allowed costs, which return the site to the use and occupancy in effect at the time the release occurred. The staff involved in processing the reimbursement claims insure that the integrity of the Trust Fund is not jeopardized by the incorporation of inappropriate and/or excessive expenditures and that claims are processed in a reasonable time.

Through a cooperative agreement with the EPA, DEQ is responsible for the administration of these funds and for the enactment of LUST program activities in Louisiana. In accordance with EPA regulations (40 CFR Part 31), a quality assurance system must be developed if the program involves environmental measurements and/or data generation. The system must include policies, procedures, specifications, standards, and documentation sufficient to produce data of adequate quality.

The Quality Assurance Project Plan (QAPP), developed pursuant to EPA Requirements for QAPPs, EPA QA/R-5; March 2001 for the DEQ's LUST program, was created in an effort to provide guidance for DEQ Technical Team Leaders and RAC/EC who perform the critical procedures noted above.

## **A6 PROJECT / TASK DESCRIPTION**

The responsibilities of the Leaking Underground Storage Tank (LUST) program in Louisiana are shared among different divisions within the DEQ. The bulk of the work primarily lies within the Underground Storage Tank Division (USTD) where corrective action, including investigation and remediation, is performed. The Remediation Services Division (RSD) and Environmental Technology Division (ETD) may also oversee these activities if the work load for these sites exceeds the staffing levels of the USTD. The associated Trust Fund lies within the Financial Services Division, which is responsible for disbursement of funds from the Trust Fund.

Currently, there are approximately 11,293 underground storage tanks (UST) located at UST facilities throughout Louisiana that have been registered with the DEQ (average is 2.4 tanks per facility). Each of these approximately 4,608 facilities is unique depending on its components, the type of products stored, the local hydro-geologic conditions and the history of releases. In addition, LUST facilities exist in virtually every type of Louisiana community, ranging from rural to metropolitan. At any Louisiana facility where a leak from a UST has occurred (LUST site), the staff of the USTD, RSD, and ETD is responsible for ensuring that all site activities are performed in accordance with accepted quality assurance procedures; however, the USTD, RSD, and ETD Administrators, through the QA Representatives and program supervisors, have overall responsibility for the implementation of all quality assurance procedures related to sites managed within the LUST program.

The DEQ's QAPP for the LUST program, presented in this document, describes the DEQ's quality assurance plan for Louisiana LUST site activities. The quality assurance plan attempts to ensure that LUST site activities pursued by, for, or under contract to the DEQ are conducted in a consistent manner and in accordance with the remediation process (Figure 3, Section A4). Specific objectives of the quality assurance procedures include:

- Ensure that all data generated for or by the DEQ will be of sufficient or greater quality to withstand scientific and legal challenge
- Ensure that the necessary levels of data quality are attainable by defining the intended use of all data before data collection efforts begin.
- Properly define all sample collections and analyses, these shall be project specific and included in the investigation work plan

- Certify that all data produced by or for the DEQ will be of known and acceptable precision, accuracy, representativeness, completeness and comparability
- Provide adequate supervision by the USTD, RSD, and ETD staff at LUST projects to ensure quality data are collected

DEQ recognized that some LUST site activities which generate and/or affect environmental data must follow a specific process to ensure consistency with environmental data generation in order to meet and exceed these objectives. Therefore in addition to the QAPP, all LUST sites activities shall be conducted in accordance with the following documents:

- Louisiana DEQ Risk Evaluation/Corrective Action Program 2003 (RECAP) (Reference I)<sup>1</sup>
- DEQ/LDOTD Construction of Geotechnical Boreholes and Monitoring Well Systems Handbook (Reference II)
- Applicable Remediation Process Standard Operation Procedures (SOPs) (Reference IV)

## **A7 QUALITY OBJECTIVES AND CRITERIA**

The DEQ's primary goal for quality assurance procedures is to produce sufficient environmental data of known quality that will support the objectives of any LUST site investigation. In addition, DEQ wants to ensure that activities which generate and/or affect environmental data follow a consistent process to ensure accuracy and consistency because this information may be used for the determination of the source, estimation of the magnitude and extent of contamination, determination of the nature of contamination, characterization of site conditions for development of remedial action procedures, and documentation of the effectiveness of remediation. The level of data quality and quantity required to achieve any of these objectives is defined in RECAP (Reference I).

Data quality procedures and objectives for activities which are common to LUST sites (e.g. groundwater and soil sampling and analysis) are identified in RECAP (Reference I). Specific quality assurance procedures and data quality objectives (DQOs) for specialized activities at LUST sites are developed during the planning stages for site activities.

Environmental data collection activities which will most commonly be performed during the course of a LUST site project include boring and monitor well installations; groundwater, soil and surface-water screening and sampling; sample preservation and analysis. With respect to potential LUST site activities, some specific data collection techniques, associated analytical level requirements, and site project objectives are

summarized in the Louisiana DEQ RECAP Document and the DEQ/LDOTD Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook (see References I and II respectively). Generally, the most common data acquisition activities performed at LUST sites will require strict adherence to established quality assurance procedures for both sampling and analytical procedures. The USTD, RSD, and ETD Administrators have overall responsibility for the implementation of all quality assurance procedures related to sites managed within the LUST program, and it is the responsibility of the Technical Team Leader to ensure that these DQO's are met.

## **A8 SPECIAL TRAINING REQUIREMENTS/CERTIFICATION**

Each member of the technical staff has a training plan in DEQ's Student Center, which lists those courses that are required for that individual. Employees register online for required classes through the Student Training Center.

All DEQ technical staff involved in the remediation process working on LUST projects must have the following training:

- 40-Hour OSHA HAZWOPER
- OSHA HAZWOPER Annual Refresher

Additionally, the following training is highly recommended:

- Introduction to Groundwater Investigations
- Sampling for Hazardous Materials
- RECAP Training
- Sampling solid materials using EPA SW846 Method 5035

The UST Support Section works in association with the RSD Program Analyst and ETD Supervisors to track training through the Pathlore Training System. The Pathlore Training System is a database which documents training requirements for USTD/RSD/ETD technical staff.

## **A9 DOCUMENTATION AND RECORDS**

The LUST Project QA Coordinator is responsible for ensuring the appropriate DEQ project personnel have the most current approved version of the QAPP. Once approved, an official version of the QAPP shall be distributed to the RACs and posted on the DEQ Intranet (Reference V).

LUST program records and documents shall be retained in accordance with CFR Title 40, Chapter I, Subchapter B, Section 31.42. LUST program records and documents generated by or for DEQ will be scanned at DEQ into an electronic format and can be retrieved by DEQ employees via the Electronic Document Management System (EDMS). After being scanned, records and documents will be stored in a DEQ archive

file room for a minimum of three years. The three-year time period begins from the date of the DEQ final yearly LUST Grant expenditure report to the EPA.

In accordance with LAC 33:I, Subpart 3, 5315(A), testing laboratories shall retain on record all raw data and observations, calculations and derived data, calibration records, and the final test report for a minimum of ten years or as required by regulatory or legal requirement (Reference III).

## **B1 SAMPLING PROCESS DESIGN (EXPERIMENTAL DESIGN)**

Data collection design for LUST activities in Louisiana includes the types and numbers of samples required, the design of the sampling network, sampling locations and frequencies, sample matrices, measurement parameters of interest, and the rationale for the design shall be conducted in accordance with the following documents:

- DEQ Risk Evaluation/Corrective Action Program RECAP (Reference I)
- DEQ/LDOTD Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook (Reference II)

## **B2 SAMPLING METHODS**

To ensure consistency in representative sampling and in order to produce valid results, sampling procedures conducted at LUST site activities- including investigations and monitoring events- shall be conducted in accordance with the following guidance materials:

- The Louisiana DEQ RECAP Document (Reference I); Test Methods for Evaluating Solid Waste, Volume II: Field Manual Physical/Chemical Methods, SW846 (Reference VI); and the DEQ/LDOTD Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook (Reference II) shall be used to identify the EPA-approved sample collection, sample preservation, and field measurement methods.
- The EPA or manufacturers' specifications shall be used for proper calibration of field equipment. Refer to Section B7 of this document for instrument calibration requirements and frequency..
- The Louisiana DEQ RECAP Document (Reference I) and EPA-approved methodology shall be used to identify proper sample handling and integrity verification procedures.

All DEQ staff and/or RAC/EC involved in LUST site investigations shall be familiar with the sampling procedure requirements above.

Often times, LUST site investigations involve sampling multiple media, most commonly soil and groundwater. Guidance for conducting soil and groundwater sampling activities is provided in the Louisiana DEQ RECAP document, Appendix B, and the DEQ/DOTD Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook (References I and II respectively).

Sample collection and preservation shall be completed according to EPA approved methods. After collection, all samples will be handled as few times as possible. The sampler shall coordinate with the laboratory to ensure that proper sample handoffs

occur. All personnel will use extreme care to ensure that the integrity of the samples shall not be compromised from tampering and/or contamination from containers, pumps, tubing, bailers or any other equipment. Samples shall be properly identified, labeled, and transported to the laboratory in accordance with sample custody procedures in Section B3.

If for any reason it is determined that sample integrity is compromised, the incident must be corrected if possible and documented following the DEQ SOP for Corrective Action (Reference VIII).

### **B3 SAMPLE HANDLING AND CUSTODY**

Sample custody procedures are necessary to maintain and document sample possession and to adequately establish and support the use of sample data in potential enforcement, regulatory, or legislative actions. All sample handling and custody activities will be performed in accordance with Louisiana DEQ's Laboratory Accreditation Program described in LAC 33:I, Subpart 3 (Reference III). Section 5501 of Subpart 3 specifically addresses sample integrity.

The principle of sample custody is to account for the integrity of the sample from the moment the sample is placed in a container until all analytical tests have been completed and any remaining sample is discarded. This means that proper sample custody is a joint effort of the sampling crew, the sample transporter, and the laboratory staff.

The investigation work plan will provide sample labeling and handling details. Each sample will be labeled with a unique sample number, time, date, preservatives, and analytical parameters. This information should match the sample identification and testing information that is listed on the chain-of-custody form for the sample(s). The chain-of-custody form is the primary documentation that is used to track proper sample custody from the time of sampling to the arrival of the sample at the laboratory. A chain-of-custody form will be completed for every sample event at any LUST site.

The documentation of sample custody shall be considered to be incomplete if any of the required information is omitted from the chain-of-custody form. This shall include any sample identification information or any of the required signatures or official change of possession times. In this case, the laboratory custodian should question whether the sample should be accepted or not. If possible the question should be referred to the sampler for consideration.

After the sample has been collected, sample integrity must be protected by preventing the intentional and/or accidental contamination of the sample. The receiving laboratory should reject any sample that is suspect of tampering or contamination. The laboratory must record and document these instances of sample rejection.

The laboratory must follow all holding times for samples as indicated in SW-846. Refer to chapter three, table 3.1 for sample holding times, recommended digestion volumes,

and recommended collection volumes for inorganic analysis. Refer to chapter 4, table 4-1 for information regarding proper sample containers, techniques, and holding times for volatile organics. (Reference VI)

#### **B4 ANALYTICAL METHODS**

Samples collected at LUST sites in Louisiana must be analyzed at an accredited, commercially-contracted laboratory. DEQ also maintains a staff at its own laboratory in Baton Rouge, which is available to perform analytical services for the LUST program as needed. Contracted and DEQ laboratories shall only use EPA approved methods when analyzing DEQ LUST site samples for suspected or known contaminants as specified in Figure 4. For information regarding EPA approved methods, refer to the Louisiana DEQ RECAP Document (Reference I) and Test Methods for Evaluating Solid Waste, Volume II: Field Manual Physical/Chemical Methods, SW846 (Reference VI);

Accredited laboratories as per Title 33, Part I, Subpart 3, 5301, shall maintain a Quality Assurance/Quality Control (QA/QC) Program using appropriate document control practices. This includes the development and documentation of quality control procedures for each analytical procedure, demonstrating compliance with all quality control procedures, and having procedures in place for feedback and corrective action measures whenever testing discrepancies are detected or when there are departures from documented policies and procedures (Reference III).

#### **B5 QUALITY CONTROL (QC)**

Quality Control (QC) activities performed for each sampling, analysis, or measurement technique must be performed in accordance with Sections 2.4 and 2.5 of RECAP and LAC 33: I, Subpart 3, 5301 (Reference I and III respectively) and as stated in specific analytical methods.

Figure 4 Petroleum Hydrocarbons Sample Analyses and Methods

| Product Stored      | Sample Media            | Analysis Required  | Acceptable SW-846 Preparation Methods | Acceptable SW-846 Analytical Methods         |
|---------------------|-------------------------|--|---------------------------------------|--|
| Gasoline            | Soil                    | BTEX <sup>1</sup>  | 5035                                  | 8021B <sup>2</sup> , 8260B <sup>14</sup>     |
|                     | Water                   | BTEX <sup>1</sup>  | 5030                                  | 8021B <sup>2</sup> , 8260B <sup>14</sup>     |
|                     | Soil                    | TPH-GRO <sup>3</sup> (C <sub>6</sub> -C <sub>10</sub> )  | 5035                                  | 8015B, TCEQ 1005 <sup>12</sup>               |
|                     | Water                   | TPH-GRO <sup>3</sup> (C <sub>6</sub> -C <sub>10</sub> )  | 5030                                  | 8015B  |
|                     | Soil                    | Lead <sup>5</sup>  | 3050B, 3051                           | 6010B, 6020, 7420, 7421                      |
|                     | Water                   | Lead <sup>5</sup>  | 3005, 3010A, 3015                     | 6010B, 6020, 7420, 7421                      |
|                     | Soil                    | MTBE <sup>6</sup>  | 5035                                  | 8260B  |
|                     | Water                   | MTBE <sup>6</sup>  | 5030                                  | 8260B  |
|                     | Soil                    | MEK, MIBK <sup>11</sup>                                  | 5035                                  | 8015B  |
| Water               | MEK, MIBK <sup>11</sup> | 5030   | 8015B                                 |  |
| Diesel              | Soil                    | TPH-DRO <sup>3</sup> (C <sub>10</sub> -C <sub>28</sub> ) | 3540, 3541, 3545, 3550, 3560          | 8015B, TCEQ 1005 <sup>12</sup>               |
|                     | Water                   | TPH-DRO <sup>3</sup> (C <sub>10</sub> -C <sub>28</sub> ) | 3510, 3520                            | 8015B  |
|                     | Soil                    | PAHs <sup>7</sup>  | 3540, 3541, 3545, 3550, 3560, 3580    | 8100, 8270C, 8310 <sup>8</sup>               |
|                     | Water                   | PAHs <sup>7</sup>  | 3510, 3520                            | 8100, 8370C, 8310 <sup>8</sup>               |
| Crude Oil           | Soil                    | TPH-DRO <sup>3</sup> (C <sub>10</sub> -C <sub>28</sub> ) | 3540, 3541, 3545, 3550, 3560          | 8015B, TCEQ 1005 <sup>12</sup>               |
|                     | Water                   | TPH-DRO <sup>3</sup> (C <sub>10</sub> -C <sub>28</sub> ) | 3510, 3520                            | 8015B  |
|                     | Soil                    | TPH-GRO <sup>3</sup> (C <sub>6</sub> -C <sub>10</sub> )  | 5035                                  | 8015B, TCEQ 1005 <sup>12</sup>               |
|                     | Water                   | TPH-GRO <sup>3</sup> (C <sub>6</sub> -C <sub>10</sub> )  | 5030                                  | 8015B  |
|                     | Soil                    | TPH-ORO <sup>3</sup> (>C <sub>28</sub> )                 | 3540, 3541, 3545, 3550, 3560          | 8015B <sup>4</sup> , TCEQ 1005 <sup>13</sup> |
|                     | Water                   | TPH-ORO <sup>3</sup> (>C <sub>28</sub> )                 | 3510, 3520                            | 8015B <sup>4</sup>                           |
|                     | Soil                    | PAHs <sup>7</sup>  | 3540, 3541, 3545, 3550, 3560, 3580    | 8100, 8270C, 8310 <sup>8</sup>               |
|                     | Water                   | PAHs <sup>7</sup>  | 3510, 3520                            | 8100, 8370C, 8310 <sup>8</sup>               |
| Refined Oils        | Soil                    | TPH-DRO <sup>3</sup> (C <sub>10</sub> -C <sub>28</sub> ) | 3540, 3541, 3545, 3550, 3560          | 8015B, TCEQ 1005 <sup>12</sup>               |
|                     | Water                   | TPH-DRO <sup>3</sup> (C <sub>10</sub> -C <sub>28</sub> ) | 3510, 3520                            | 8015B  |
|                     | Soil                    | TPH-ORO <sup>3</sup> (>C <sub>28</sub> )                 | 3540, 3541, 3545, 3550, 3560          | 8015B <sup>4</sup> , TCEQ 1005 <sup>13</sup> |
|                     | Water                   | TPH-ORO <sup>3</sup> (>C <sub>28</sub> )                 | 3510, 3520                            | 8015B <sup>4</sup>                           |
| Used Oil            | Soil                    | TPH-ORO <sup>3</sup> (>C <sub>28</sub> )                 | 3540, 3541, 3545, 3550, 3560          | 8015B <sup>4</sup> , TCEQ 1005 <sup>13</sup> |
|                     | Water                   | TPH-ORO <sup>3</sup> (>C <sub>28</sub> )                 | 3510, 3520                            | 8015B <sup>4</sup>                           |
|                     | Soil                    | Metals <sup>9</sup>                                      | 3050B, 3051                           | 6010B, 6020, 7000 series <sup>10</sup>       |
|                     | Water                   | Metals <sup>9</sup>                                      | 3005, 3010A, 3015                     | 6010B, 6020, 7000 series <sup>10</sup>       |
|                     | Soil                    | PAHs <sup>7</sup>  | 3540, 3541, 3545, 3550, 3560, 3580    | 8100, 8270C, 8310 <sup>8</sup>               |
|                     | Water                   | PAHs <sup>7</sup>  | 3510, 3520                            | 8100, 8270C, 8310 <sup>8</sup>               |
| Kerosene & Jet Fuel | Soil                    | TPH-GRO <sup>3</sup> (C <sub>6</sub> -C <sub>10</sub> )  | 5035                                  | 8015B, TCEQ 1005 <sup>12</sup>               |
|                     | Water                   | TPH-GRO <sup>3</sup> (C <sub>6</sub> -C <sub>10</sub> )  | 5030                                  | 8015B  |
|                     | Soil                    | TPH-DRO <sup>3</sup> (C <sub>10</sub> -C <sub>28</sub> ) | 3540, 3541, 3545, 3550, 3560          | 8015B, TCEQ 1005 <sup>12</sup>               |
|                     | Water                   | TPH-DRO <sup>3</sup> (C <sub>10</sub> -C <sub>28</sub> ) | 3510, 3520                            | 8015B  |

<sup>1</sup> BTEX – Benzene, Toluene, Ethyl-benzene, and Xylenes<sup>2</sup> If detected, 2<sup>nd</sup> column confirmations required (8000B, Section 7.9, page 29).<sup>3</sup> TPH-DRO, GRO, ORO – Total Petroleum Hydrocarbons – Diesel Range Organics, Gasoline Range Organics, and Oil Range Organics<sup>4</sup> Modified for RECAP Reporting Requirements<sup>5</sup> When suspected to be present. Required for all gasoline USTs operated before 1/1/86.<sup>6</sup> MTBE – Methyl tert-butyl ether<sup>7</sup> PAHs – Polynuclear Aromatic Hydrocarbons (Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Flouanthene, Fluorene, Indeno(1,2,3-cd)pyrene, Naphalene, Pyrene)<sup>8</sup> Use for RECAP screening standards if 8270C does not obtain screening standard.<sup>9</sup> Metals – Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver<sup>10</sup> Use methods in 7000 series of SW-846 for each metal specified in footnote 9.<sup>11</sup> MEK – Methyl Ethyl Ketone, MIBK – Methyl Isobutyl Ketone. When suspected to be present.<sup>12</sup> TCEQ – Texas Commission on Environmental Quality. Use SW846 5035 with modifications listed in section 6.1 of method TCEQ 1005.<sup>13</sup> TCEQ – Texas Commission on Environmental Quality. Use SW846, Chapter 4, Section 4.1.<sup>14</sup> Must use 8260B if MTBE analysis is also required to be eligible for trust fund reimbursement for analysis.

## **B6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE**

All field equipment and electronic laboratory equipment used for LUST site activities shall be maintained in accordance with the manufacturer's requirements and specifications.

Field instruments that are commonly used by DEQ personnel in association with LUST activities are the organic vapor analyzers (OVA), water level indicators, explosimeters, and Global Positioning System equipment. A separate logbook shall be maintained for each type of equipment whether field or laboratory. All preventive or corrective maintenance will be recorded in these logbooks and should be performed in accordance with the manufacturer's specifications.

In order to ensure consistently high quality data, general field equipment and/or supplies shall be inspected and determined to be of sufficient quality to provide acceptable quality environmental data prior to use. Technical team members shall perform routine and periodic inspections as well as any necessary preventative maintenance on all equipment. If for any reason equipment is found to be deficient, it should be taken out of operation until repaired. All of these procedures shall be documented in the equipment logbook, which shall be maintained for the life of the equipment and made available for systems audits.

As per Title 33, Part I, Subpart 3, 5303 all laboratory equipment shall undergo periodic and routine inspections per manufacturer's specifications. If equipment is found to be defective, the equipment shall be removed from service until it has been repaired. All equipment maintenance, both preventative and corrective, must be documented in the equipment logbook (Reference III).

Permanent records of all equipment maintenance will be kept locally, dated, and reviewed by the appropriate USTD Manager, RSD Manager, or ETD Supervisor. Logbooks containing maintenance records will be kept with the equipment. When the equipment is de-commissioned, the maintenance logbooks will be stored at the DEQ headquarters building.

## **B7 INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY**

Field equipment (organic vapor analyzers, water level indicators, explosimeters and Global Positioning System) used by DEQ staff shall be calibrated in accordance with the manufacturer's requirements and specifications and the DEQ SOP for Instrument Use and Calibration. It is the responsibility of the Technical Team Leader to ensure that equipment is properly calibrated prior to use.

The RACs/ECs are responsible for maintaining field equipment that they use. The equipment shall be calibrated according to the manufacturer's requirements and specifications. It is the responsibility of the RAC/EC to ensure that the equipment is properly functioning and calibrated prior to use.

Laboratory equipment shall be maintained and calibrated in accordance with LAC 33: I, Subpart 3, 5303 and 5305 (Reference III).

## **B8 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES**

All supplies and consumables, including support equipment, reagents, etc. must meet or exceed standards set forth in EPA publication SW846 (Reference VI), DEQ's Laboratory Accreditation Program (Reference III), as well as any specifications recommended by the manufacturer. DEQ Technical Teams are responsible for inspecting and ensuring that all supplies and consumables used to collect environmental data meet acceptance requirements. Since most of the environmental data collected for the LUST program is performed by RACs/ECs, the RACs/ECs are responsible for the inspection and acceptance requirements for all supplies and consumables used to support their sampling and analytical operations. All support equipment, reagents, etc. must meet, at a minimum, standards as set forth in EPA publication SW846 and DEQ's Laboratory Accreditation Program, as well as, any recommended by the appropriate manufacturers. The same applies to any support equipment used by DEQ staff.

## **B9 NON-DIRECT MEASUREMENTS**

For use in the prioritization of and the planning for work at LUST sites, data from the sources listed below may be used:

- DEQ files
- Water well maps and files
- Federal, state, and local groundwater resources
- Geological publications
- Studies by academic entities
- U.S. Dept. of Agriculture Soil Conservation Service surveys
- Applicable information from other federal, state or local agencies or authorities

Descriptions of site geology, soil properties, and groundwater classification for use in final reports and calculations must be based on data from field sampling and direct measurements.

## **B10 DATA MANAGEMENT**

Sampling is conducted at LUST sites by DEQ staff and/or RAC/EC. A chain-of-custody form accompanies the samples to the laboratory. A copy of the chain-of-custody form will also accompany the laboratory personnel sample report. As per Title 33, Subpart 3, 5301, accredited labs are required to have SOPs covering document control, data handling which includes processing, compiling, analyzing, and transmitting accurate and reliable data, data archival and retrieval procedures, and procedures for acceptable hardware and software configurations. The analytical data results are ultimately conveyed to the DEQ Technical Team.

The investigation report generated by or for DEQ will be scanned at DEQ into an electronic format and can be retrieved by DEQ employees via the Electronic Document Management System (EDMS). After being scanned, records and documents will be stored in a DEQ archive file room.

## **C1 ASSESSMENTS AND RESPONSE ACTIONS**

Those performing field or laboratory work must use approved equipment and methods when obtaining environmental samples and when producing field or laboratory measurements. This equipment must undergo periodic verification to ensure that it is performing at level to produce the required quality. The verification is accomplished by conducting performance and systems audits. The project QA Coordinator shall conduct periodic audits.

Prior to the initiation of field activities, the operating personnel shall verify that proper equipment is available for all field activities. This shall include sampling, safety, and field measurement equipment. The USTD Managers, RSD Managers, and/or ETD Supervisors should verify that all personnel involved in field activities have received sufficient training to properly use the equipment. It is the responsibility of the RACs/ECs to ensure that their field personnel have received sufficient training to properly operate the equipment. Training shall include proper operational procedures-including calibration standards and decontamination procedures.

All field equipment used for LUST projects must be inspected and maintained in accordance with the applicable operations manual. Prior to use of any field equipment, a performance audit shall be conducted by the operator to ensure that the operation of the field equipment provides acceptable quality environmental data. If the results of the performance audit conclude that the field equipment produces insufficient data, the field equipment shall be repaired if possible or otherwise replaced. For DEQ equipment, the Technical Team Leader shall notify the appropriate USTD Manager, RSD Manager, and/or ETD Supervisor of the audit results and solutions undertaken to rectify problems discovered during the audit. DEQ SOP for Corrective Action System should be used as documentation (see reference VIII). RACs/ECs are responsible for inspecting and maintaining all field equipment that is owned and/or operated by their personnel.

Records of maintenance and repairs shall be kept in the calibration logbook for the specific piece of equipment. Appropriate ETD Supervisors and/or USTD/RSD Managers shall verify that logbook records are maintained properly.

All laboratories participating in LUST site sampling analyses must perform QA/QC operations in accordance with Sections 2.4 and 2.5 of RECAP and LAC 33:I, Subpart 3, 5301. To assure that quality data is generated at the laboratory, routine performance audits shall be conducted in accordance with LAC 33:I, Subpart 3, 5101 (Reference III).

## **C2 REPORTS TO MANAGEMENT**

The Technical Team Leader who oversees the LUST project shall identify any quality assurance issues in the field. The Technical Team Leader ensures that any problems that are encountered are corrected in the field, and at that time he/she shall document the problems and resolutions on a Field Interview Form (FIF). In addition, the Technical Team Leader shall report the problems verbally to his/her supervisor. A copy of the FIF

shall be distributed to the RAC/EC, and a copy of the FIF shall be delivered to the Technical Team Leader's supervisor.

The Technical Team Leaders, supervisors and/or managers are responsible for informing the QAR either informally or by formal memoranda of any quality assurance problems encountered and solutions adopted. A written report, prepared by the appropriate USTD/RSD Manager/ETD Supervisor, outlining any problems and solutions employed discovered during any performance audits shall be submitted to the QAR for review and disbursement to upper Management/EPA as appropriate. The QAR shall ensure that this information is disseminated to upper level management for distribution to appropriate staff.

## **D1 DATA REVIEW, VERIFICATION, AND VALIDATION**

The criteria used to review and validate data in an objective and consistent manner are stated in Section 2.5 of RECAP (Reference I).

## **D2 VERIFICATION AND VALIDATION METHODS**

The validation and verification method for field screening analysis requires that those instruments used for field screening must be able to identify the concentration of petroleum hydrocarbons within the detection range limit of the specific screening instrument.

Specific validation and verification methods are defined in the acceptable analytical methods of SW846 listed in Figure 4. These include the acceptable methods for identifying an analyte, minimum/maximum percent recovery of the target analytes and QA/QC compounds. In addition, these methods set the performance criteria for instrument calibration, analyte identification, and identification/recovery of the QA/QC compounds.

Laboratory personnel are required to follow procedures outlined in SW846 or other department approved methods. The assigned DEQ field staff or RAC/EC is responsible for completing accurate chain-of-custody forms that accompany samples to the laboratory.

## **D3 RECONCILIATION WITH USER REQUIREMENTS**

When the procedures and guidelines to meet the specified levels of data quality established in this project plan are not successful, corrective action may be required.

Any personnel involved in LUST program activities that has observed or been made aware of any variance from quality assurance protocol may initiate corrective action. Variances from quality assurance protocol which may require corrective action may include, but are not limited to the following:

- Field and/or laboratory equipment problems or failures
- Field and/or laboratory procedural problems or failures
- Exceedance of precision and accuracy control limits
- Sample custody, safety, transportation, holding time, or handling problems or failures
- Preventive maintenance deficiencies
- Documentation of deficiencies or problems

## REFERENCES

NOTE: Available links to the current versions have been provided.

| <u>Number</u> | <u>Description</u>   |
|---------------|--|
| I             | Risk Evaluation/Corrective Action Program (RECAP)<br><a href="http://www.deq.louisiana.gov/portal/tabid/131/Default.aspx">http://www.deq.louisiana.gov/portal/tabid/131/Default.aspx</a>   |
| II            | DEQ/DOTD Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook<br><a href="http://www.dotd.state.la.us/intermodal/wells/wellhandbook.asp">http://www.dotd.state.la.us/intermodal/wells/wellhandbook.asp</a> |
| III           | LAC 33:I, Subpart 3 - DEQ Laboratory Accreditation Program<br><a href="http://www.deq.louisiana.gov/portal/tabid/1674/Default.aspx#Title33">http://www.deq.louisiana.gov/portal/tabid/1674/Default.aspx#Title33</a>                      |
| IV            | Remediation Process Standard Operating Procedures<br>Official versions are available on DEQ's Intranet at<br><a href="http://intranet/sop/soplist.asp">http://intranet/sop/soplist.asp</a>   |
| V             | Quality Assurance Project Plan (QAPP)<br>Official version is available on DEQ's Intranet at<br><a href="http://intranet/sop/soplist.asp">http://intranet/sop/soplist.asp</a>   |
| VI            | SW846 Methods<br><a href="http://www.epa.gov/epaoswer/hazwaste/test/main.htm">http://www.epa.gov/epaoswer/hazwaste/test/main.htm</a>   |
| VII           | EPA Underground Storage Tank Program Facts (December 2006)<br><a href="http://www.epa.gov/swrust1/pubs/ustfacts.pdf">http://www.epa.gov/swrust1/pubs/ustfacts.pdf</a>  |
| VIII          | DEQ's SOP for Corrective Action System (SOP 1667)<br><a href="http://intranet/sop/shared/sop_1667_r00.pdf">http://intranet/sop/shared/sop_1667_r00.pdf</a>   |

## Footnotes

<sup>1</sup>Management of an AOC/AOI may continue under RECAP 2000 until the current phase/task of the project has been completed and approved by the Department. Further assessment of the AOC/AOI shall be in compliance with RECAP 2003 unless otherwise approved by the Department.