APPENDICES TO ATTACHMENT II (RFI SOW)
SCOPE OF WORK FOR INTERIM MEASURES
AT
GENERAL MOTORS CORPORATION
SAGINAW, MICHIGAN
U.S. EPA ID NO.: MID 041 793 340
U.S. EPA DOCKET NO.: V-W-003-95

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APPENDIX A

INTERIM MEASURES WORKPLAN

If Interim Measures are determined to be necessary as specified in Section VII.A. of the Order, Respondent shall prepare an Interim Measures Workplan. The Workplan shall include the development of several plans which shall be prepared concurrently.

A. Interim Measures Objectives

The Workplan shall specify the objectives of the interim measures, demonstrate how the interim measures will abate releases and threatened releases, and to the extent possible, be consistent and integrated with any long-term solution at the Facility. The Interim Measures Workplan will include a discussion of the technical approach, ecological effect, engineering design, engineering plans, schedules, budget, and personnel. The Workplan will also include a description of qualifications of personnel performing or directing the interim measures, including contractor personnel. This plan shall also document the overall management approach to the interim measures.

B. Health and Safety Plan

Respondent shall prepare a Facility Health and Safety Plan for all field activity.

1. Major elements of the Health and Safety Plan shall include:

   a. Facility description, including availability of resources such as roads, water supplies, electricity and telephone services;

   b. Description of known hazards and evaluate the risks associated with each activity conducted;

   c. A list of key personnel and alternates responsible for site safety, response operations, and for protection of human health;

   d. Description of protective clothing or other protective items;

   e. Delineation of work area;

   f. Procedures to control site access;

   g. Description of decontamination procedures for personnel and equipment;

   h. Site emergency procedures;

   i. Emergency medical care needed for injuries and toxicological problems;

j. Description of requirements for an environmental surveillance program;

k. Routine and special training required for response personnel;

l. Procedures for protecting workers from weather-related problems; and

m. Facility emergency procedures.

2. The Facility Health and Safety Plan shall be consistent with:

a. NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985);

b. U.S. EPA Order 1440.1 - Respiratory Protection;

c. U.S. EPA Order 1440.3 - Health and Safety Requirements for Employees engaged in Field Activities;

d. Facility Contingency Plan;

e. U.S. EPA Standard Operating Safety Guide (1984);

f. OSHA regulations particularly in 29 CFR 1910 and 1926;

g. State and local regulations; and

h. Other U.S. EPA guidance as provided.

3. The Health and Safety Plan shall be revised to address the activities to be performed at the Facility to implement the interim measures.

C. Public Involvement Plan

Respondent shall prepare a plan for the dissemination of information to the public regarding interim measure activities and results. The plan shall address: the preparation and distribution of fact sheets following U.S. EPA review, participation in public meetings where people can talk to U.S. EPA officials and knowledgeable representatives of Respondent on a one-to-one basis, the conduct of scheduled site tours (with adequate notice so that U.S. EPA may participate), the provision of information in a foreign language to a predominantly non-English speaking community, and maintaining an easily accessible repository (such as a town hall or public library) of information on the corrective action program, including the Order, approved workplans, and reports. Respondent's plan shall identify levels of public interest triggering each information dissemination activity.

APPENDIX B

INTERIM MEASURES INVESTIGATION PROGRAM

A. Data Collection Quality Assurance Plan

Respondent shall prepare a plan to document all monitoring procedures, sampling, field measurements and sample analysis performed during the investigation to characterize the environmental setting, source, and contamination, so as to ensure that all information, data, and resulting decisions are technically sound, statistically valid, and properly documented.

1. Data Collection Strategy

The strategy section of the Data Collection Quality Assurance Plan shall include but not be limited to the following:

a. A description of the intended uses for the data, and the necessary level of precision and accuracy for these intended uses;

b. A description of methods and procedures to be used to assess the precision, accuracy, and completeness of the measurement data;

c. A description of the rationale used to assure that the data accurately and precisely represent a characteristic of population, parameter variations at a sampling point, a process condition or an environmental condition.

2. Sampling

The Sampling section of the Data Collection Quality Assurance Plan shall discuss:

a. Selecting appropriate sampling locations, depths, etc.;

b. Providing a statistically sufficient number of sampling sites;

c. Measuring all necessary ancillary data;

d. Determining which media are to be sampled (e.g., groundwater, air, soil, sediment, etc.);

e. Determining which parameters are to be measured and where;

f. Selecting the frequency of sampling and length of sampling period;

g. Selecting the types of samples (e.g., composites vs. grabs) and number of samples to be collected;

h. Documenting field sampling operations and procedures, including;

i) Documentation of procedures for preparation of reagents or supplies which become an integral part of the sample (e.g., filters, and adsorbing reagents);

ii) Procedures and forms for recording the exact location and specific considerations associated with sample acquisition;

iii) Documentation of specific sample preservation methods;

iv) Calibration of field devices;

v) Collection of replicate samples;

vi) Submission of field-biased blanks, where appropriate;

vii) Potential interferences present at the facility;

viii) Construction materials and techniques, associated with monitoring wells and piezometers;

ix) Field equipment and sample containers listing;

x) Sampling order; and

xi) Decontamination procedures.

i. Selecting appropriate sample containers;

j. Sample preservation; and

k. Chain-of-custody, including:

i) Standardized field tracking reporting forms to establish sample custody in the field prior to shipment; and

ii) Pre-prepared sample labels containing all information necessary for effective sample tracking.

3. Sample Analysis

The Sample Analysis section of the Data Collection Quality Assurance Plan shall specify the following:

a. Chain-of-custody procedures, including:

i) Identification of a responsible party to act as sample custodian at the laboratory, who is authorized to sign for

incoming field samples, obtain documents of shipment, and verify the data entered onto the sample custody records;

ii) Provisions for a laboratory samples custody log consisting of serially numbered standard lab-tracking report sheets; and

iii) Specification of laboratory sample custody procedures for sample handling, storage, and dispersement for analysis.

b. Sample storage;

c. Sample preparation methods;

d. Analytical procedures, including;

i) Scope and application of the procedure;

ii) Sample matrix;

iii) Potential interferences;

iv) Precision and accuracy of the methodology; and

v) Method detection limits.

e. Calibration procedures and frequency;

f. Data reduction, validation and reporting;

g. Internal quality control checks, laboratory performance and system audits and frequency, including:

i) Method blank(s);

ii) Laboratory control sample(s);

iii) Calibration check sample(s);

iv) Replicate sample(s);

v) Matrix-spiked sample(s);

vi) "Blind" quality control sample(s);

vii) Control charts;

viii) Surrogate samples;

ix) Zero and span gases; and;

x) Reagent quality control checks.

A performance audit may be conducted by U.S. EPA on the laboratories selected by the Respondent.

h. Preventative maintenance procedures and schedules;

i. Corrective action (for laboratory problems); and

j. Turnaround time.

B. Data Management Plan

Respondent shall develop and initiate a Data Management Plan to document and track investigation data and result. This plan shall identify and set up data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and conclusions of the investigation.

All groundwater data shall be submitted in a computer accessible format, i.e., diskette. The format used shall be compatible with the U.S. EPA, Region V groundwater database known as the Ground Water Information Tracking System (GRITS), Version 4.0.

1. Data Record

The Data record shall include the following:

a. Unique sample or field measurement codes;

b. Sampling or field measurement location and sample or measurement types;

c. Sampling or field measurement raw data;

d. Laboratory analysis ID numbers;

e. Properties or components measured; and

f. Result of analysis (e.g., concentration).

2. Tabular Displays

The following data shall be presented in tabular displays:

a. Unsorted (raw) data;

b. Results for each medium, or for each constituent monitored;

c. Data reduction for numerical analysis;

d. Sorting of data by potential stratification factors (e.g., location, soil layer, topography); and

e. Summary data.

3. Graphical Displays

The following data shall be presented in graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleths plots, cross-sectional plots or transects, three dimensional graphs, etc.):

a. Display sampling location and sampling grid;

b. Indicate boundaries of sampling area, and areas where more data are required;

c. Display levels of contamination at each sampling location;

d. Display geographical extent of contamination;

e. Display contamination, levels, averages, and maxima;

f. Illustrate changes in concentration in relation to distance from the source, time, depth or other parameters; and

g. Indicate features affecting intramedia transport showing potential receptors.

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APPENDIX C

INTERIM MEASURES DESIGN PROGRAM

A. Design Plans and Specifications

The Respondent shall develop clear and comprehensive design plans and specifications which include but are not limited to the following:

1. Discussion of the design strategy and the design basis, including:

   a. Compliance with all applicable or relevant environmental and public health standards; and

   b. Minimization of environmental and public impacts.

2. Discussion of the technical factors of importance including:

   a. Use of currently accepted environmental control measures and technology;

   b. The constructibility of the design; and

   c. Use of currently acceptable construction practices and techniques.

3. Description of assumptions made and detailed justification of these assumptions;

4. Discussion of the possible sources of error and references to possible operation and maintenance problems;

5. Detailed drawings of the proposed design including:

   a. Qualitative flow sheets;

   b. Quantitative flow sheets;

   c. Facility layout; and

   d. Utility locations.

6. Tables listing materials, equipment and specifications;

7. Tables giving material balances;

8. Appendices including:

   a. Sample calculations (one example presented and explained clearly for significant or unique design calculations);

   b. Derivation of equations essential to understanding the report; and

c. Results of laboratory or field tests.

General correlations between drawings and technical specifications, is a basic requirement of any set of working construction plans and specifications. Before submitting the project specifications, the Respondent shall coordinate and cross-check the specifications and drawings and complete the proofing of the edited specifications and required cross-checking of all drawings and specifications.

B. Operation and Maintenance Plan

The Respondent shall prepare an Operation and Maintenance Plan to cover both implementation and long-term maintenance of each interim measure. The plan shall be composed of the following elements:

1. Equipment start-up and operator training

The Respondent shall prepare, and include in the technical specifications governing treatment systems, contractor requirements for providing: appropriate service visits by experienced personnel to supervise the installation, adjustment, start-up and operation of the treatment systems; and training covering appropriate operational procedures once the start-up has been successfully accomplished.

2. Description of normal operation and maintenance (O&M)

a. Description of tasks for operation;

b. Description of tasks for maintenance;

c. Description of prescribed treatment or operation conditions;

d. Schedule showing frequency of each O&M task; and

e. Common and/or anticipated remedies.

3. Description of routine monitoring and laboratory testing

a. Description of monitoring tasks;

b. Description of required laboratory tests and their interpretation;

c. Required QA/QC; and

d. Schedule of monitoring frequency and date, if appropriate, when monitoring may cease.

4. Description of equipment

a. Equipment identification;

b. Installation of monitoring components;

c. Maintenance of site equipment; and

d. Replacement schedule for equipment and installed components.

5. Records and reporting mechanisms required

a. Daily operating logs;

b. Laboratory records;

c. Mechanism for reporting emergencies;

d. Personnel and maintenance records; and

e. Monthly/annual reports to Federal/State agencies.

The Operation and Maintenance Plan shall be submitted with the Final Design Documents.

C. Project Schedule

The Respondent shall develop a detailed Project Schedule for construction and implementation of the interim measure(s) which identifies timing for initiation and completion of all critical path tasks. Respondent shall specifically identify dates for completion of the project and major interim milestones which are enforceable terms of the Order. A Project Schedule shall be submitted simultaneously with the Final Design Documents.

D. Final Design Documents

The Final Design Documents shall consist of the Final Design Plans and Specification (100%) complete, the final Draft Operation and Maintenance Plan, and Project Schedule. The Respondent shall submit the final documents 100% complete with reproducible drawings and specifications. The quality of the design documents should be such that the Respondent would be able to include them in a bid package and invite contractors to submit bids for the construction project.

APPENDIX D

INTERIM MEASURE CONSTRUCTION QUALITY ASSURANCE PLAN

A. Construction Quality Assurance Objectives

In the CQA plan, the Respondent shall identify and document the objectives and framework for the development of a construction quality assurance program including, but not limited to the following: responsibility and authority; personnel qualifications; inspection activities, sampling requirements; and documentation. The responsibility and authority of all organizations (i.e., technical consultants, construction firms, etc.) and key personnel involved in the construction of the interim measure should be described fully in the CQA plan. The Respondent must identify a CQA officer and the necessary supporting inspection staff.

B. Inspection Activities

The observations and tests that will be used to monitor the construction and/or installation of the components of the interim measure(s) shall be summarized in the CQA plan. The plan shall include the scope and frequency of each type of inspection. Inspections shall verify compliance with all environmental requirements and include, but not be limited to, air quality and emissions monitoring records, waste disposal records (e.g., RCRA transportation manifests), etc. The inspection should also ensure compliance with all health and safety procedures. In addition to oversight inspections, the Respondent shall conduct the following activities:

1. Preconstruction inspection and meeting

The Respondent shall conduct a preconstruction inspection and meeting to:

a. Review methods for documenting and reporting inspection data;

b. Review methods for distributing and storing documents and reports;

c. Review work area security and protocol;

d. Discuss any appropriate modifications of the construction quality assurance plan to ensure that site-specific considerations are addressed; and

e. Conduct a site walk-around to verify that the design criteria, plans, and specifications are understood and to review material and equipment storage locations.

The preconstruction inspection and meeting shall be documented by a designated person and minutes should be transmitted to all parties.

2. Prefinal inspection

Upon preliminary project completion, Respondent shall notify U.S. EPA for the purposes of conducting a prefinal inspection. The prefinal inspection will consist of a walk-through inspection of the entire project site. The inspection is to determine whether the project is complete and consistent with the contract documents and the U.S. EPA approved interim measure. Any outstanding construction items discovered during the inspection will be identified and noted. Additionally, treatment equipment will be operationally tested by the Respondent will certify that the equipment has performed to meet the purpose and intent of the specifications. Retesting will be completed where deficiencies are revealed. The prefinal inspection report should outline the outstanding construction items, actions required to resolve items, completion date for these items, and date for final inspection.

3. Final Inspection

Upon completion of any outstanding construction items, the Respondent shall notify U.S. EPA for the purpose of conducting a final inspection. The final inspection will consist of a walk-through inspection of the project site. The prefinal inspection will be used as a checklist with the final inspection focusing on the outstanding items have been resolved.

4. Sampling and Testing Requirements

The sampling and testing activities, sample size, sample and test locations, frequency of testing, acceptance and rejection criteria, and plans for correcting problems should be presented in the CQA.

C. Documentation

Reporting requirements for CQA activities shall be described in detail the CQA plan. This shall include such items as daily summary reports, inspection data sheets, problem identification and interim measures reports, design acceptance reports and final documentation. Provisions for the final storage of all records shall be presented in the CQA plan.

APPENDIX E

REPORTS

A. Progress

The Respondent shall at a minimum provide the U.S. EPA with signed, monthly progress reports containing:

1. A description and estimate of the percentage of the interim measures completed;

2. Summaries of all findings;

3. Summaries of all changes made in the interim measures during the reporting period;

4. Summaries of all contacts with representatives of the local community, public interest groups, or State government during the reporting period;

5. Summaries of all problems or potential problems encountered during the reporting period;

6. Actions being taken to rectify problems;

7. Changes in personnel during the reporting period;

8. Projected work for the next reporting period; and

9. Copies of daily reports, inspection reports, laboratory/monitoring data, etc.

B. Interim Measures Workplan

The Respondent shall submit an Interim Measures Workplan to describe how the elements of Appendices A, B, C, and D will be performed. (See paragraph VII.A.6 of the Order.) The Workplan is subject to U.S. EPA approval in accordance with Section IX.A. of the Order.

C. Final Design Documents

The Respondent shall submit the Final Design Documents as described in Appendix C and in accordance with the schedule contained in the U.S. EPA-approved IM Workplan.

D. Interim Measures Report

At the "completion" of the construction of the project (except for long-term operations, maintenance and monitoring), the Respondent shall submit an Interim Measures Report to the Agency. The Report shall document that the project is consistent with the design specifications, and that the interim measures are performing adequately. The Report shall include, but not be limited to the following elements:

1. Synopsis of the interim measures and certification of the design and construction;

2. Explanation of any modifications to the plan and why these were necessary for the project;

3. Listing of criteria, established before the interim measures were initiated, for judging the functioning of the interim measures and also explaining any modification to these criteria;

4. Results of facility monitoring, indicating that interim measures will meet or exceed the performance criteria; and

5. Explanation of the operation and maintenance (including monitoring) to be undertaken at the facility.

This report shall include the inspection summary reports, inspection data sheets, problem identification and corrective measure reports, block evaluation reports, photographic reporting data sheets, design engineers' acceptance reports, deviations from design and material specifications (with justifying documentation), and as-built drawings.

E. Revised Interim Measures Report

The Respondent shall revise the Interim Measures Report incorporating comments received on draft submissions. The revised Interim Measures Report is subject to U.S. EPA approval in accordance with Section IX.A. of the Order.

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Facility Submission Summary

A summary of the information reporting requirements contained in the Interim Measures Scope of Work is present below:

FACILITY SUBMISSIONS	*DUE DATE
INTERIM MEASURES WORKPLAN -Interim Measures Objectives -Health and Safety Plan -Community Relations Plan -Data Collection QA Plan -Data Management Plan -Construction QA Plan -Schedule for implementing workplan	30 days after Respondent receives a written request from U.S. EPA
Final Design Documents -Design Plans and Specs -O&M Plan -Project Schedule	In accordance with the schedule in the U.S. EPA-approved workplan
First Interim Measures Report	In accordance with the schedule in the U.S. EPA-approved workplan
Revised Interim Measures Report	In accordance with the schedule in the U.S. EPA-approved workplan
Progress Reports	Monthly, on the date specified in the U.S. EPA-approved workplan

*All dates are calculated from the effective date of this order unless otherwise specified.

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ATTACHMENT III
SCOPE OF WORK FOR A CORRECTIVE MEASURES STUDY
AT
GENERAL MOTORS CORPORATION
SAGINAW, MICHIGAN
U.S. EPA ID NO.: MID 041 793 340
U.S. EPA DOCKET NUMBER: V-W-003-95

Purpose

The purpose of the Corrective Measures Study (CMS) portion of the RCRA corrective action process is, consistent with Section IV of this Order, to identify and evaluate potential corrective measure alternatives for the releases of hazardous constituents into the environment from the Facility (EPA ID No. MID 041 793 340)[1]. Respondent shall perform the CMS at the Facility in compliance with all of the provisions of this CMS Scope of Work, unless Respondent demonstrates to U.S. EPA that specific facts, circumstances, or conditions at the Facility make one or more specified provisions of this Scope of Work inapplicable to the Facility. Respondent shall furnish the personnel, materials, and services necessary to prepare the corrective measures study, except as otherwise specified.

Scope

A Corrective Measures Study Workplan and Corrective Measures Study Report are required elements of the CMS. The CMS consists of the following components:

Section I: Corrective Measures Study Workplan

Section II: Corrective Measures Study Report

A. Introduction and Corrective Action Objectives

B. Description of Current Conditions

C. Media Cleanup Standards

D. Identification, Screening and Development of Corrective Measure Alternatives

E. Evaluation of One or More Screened Corrective Measure Alternatives

F. Recommendation by Respondent for a Final Corrective Measure Alternative

G. Public Involvement Plan

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[1]Unless otherwise expressly provided in the Order or in this Attachment, terms used in this Scope of Work which are defined in RCRA or in regulations promulgated under RCRA shall have the definitions given to them in RCRA or in such regulations.

Section III: Progress Reports

Section IV: Proposed Schedule

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Section I: Corrective Measures Study Workplan

The Corrective Measures Study (CMS) Workplan is required by U.S. EPA. It shall include the following elements:

1. A Facility-specific description of the overall purpose of the Corrective Measure Study and identification of actual or potential exposure pathways that should be addressed by corrective measures;

2. A description of the corrective measure objectives, including proposed target media cleanup standards (e.g., promulgated federal and state standards, risk derived standards) and points of compliance (e.g., see 40 CFR 264.100 for groundwater) or a description of how a risk assessment will be performed (e.g., by referencing risk assessment guidance documents);

3. A description of the specific corrective measure technologies and/or corrective measure alternatives which will be studied;

4. A description of the general approach to investigating and evaluating potential corrective measures, linking the measures to migration pathways;

5. A detailed description of any proposed pilot, laboratory and/or bench scale studies (i.e., treatability studies);

6. A proposed outline for the CMS Report including a description of how information will be presented; and

7. A description of overall CMS project management including overall approach, levels of authority (include organization chart), lines of communication, CMS project schedules (including treatability studies), budget and personnel. Include a description of qualifications for personnel directing or performing the work.

Section II: Corrective Measures Study Report

The Corrective Measures Study (CMS) Report shall include the following elements:

A. Introduction and Corrective Action Objectives

Respondent shall describe the purpose of the document and provide a summary description of the CMS corrective action objectives.

B. Description of Current Conditions

Respondent shall include a brief summary and discussion of any new information that has been discovered since the RFI Description of Current Conditions Report data collection was completed. This discussion should concentrate on those issues which could significantly affect the evaluation and selection of the one or

more corrective measures alternatives, such as interim measures stabilization activities.

C. Media Cleanup Standards

Respondent shall propose media cleanup standards. The standards must be based on promulgated federal and state standards, risk-derived standards, all data and information gathered during the corrective action process (e.g., from interim measures, RCRA Facility Investigation, any additional work, etc.), and applicable guidance documents. If no guidance exists for a given contaminant and media, Respondent shall propose and justify a media cleanup standard.

[NOTE: U.S. EPA may set cleanup standards before the CMS stage. The information to support U.S. EPA's decision may have been submitted by Respondent as part of the investigation analysis (see Task V of the RFI scope of work). Respondent may propose to modify the media cleanup standards during the CMS. As a result of this or other new information, U.S. EPA may modify the cleanup standards. Final media cleanup standards are determined by the U.S. EPA when one or more corrective measures are selected and are documented in the Statement of Basis/Response to Comments (SB/RTC).]

D. Identification, Screening, and Development of Corrective Measure Alternatives

1. Identification: List and briefly describe potentially applicable technologies for each affected media that may be used to achieve the corrective action objectives. (Respondent shall review and update its RFI Task II, Pre-Investigation Evaluation of Corrective Action Technologies, with respect to identification.) Respondent should consider including a table that summarizes the available technologies. Depending on the specific situation (with respect to nature of the release, hazardous constituent, and location), U.S. EPA may require Respondent to consider additional technologies.

   Respondent should consider innovative treatment technologies, especially in situations where there are a limited number of applicable corrective measure technologies. Innovative treatment technologies may require extra effort to gather information, to analyze options, and to adapt the technology to the specific situation. Treatability studies and on-site pilot scale studies may be necessary for evaluating innovative treatment technologies.

2. Screening: Respondent shall review the results of the RCRA Facility Investigation and reassess the technologies specified in Task II to identify any additional technologies which are applicable to the releases of hazardous

constituents at and from the Facility. Respondent shall screen the preliminary corrective measure technologies identified in Task II of the RCRA Facility Investigation and any supplemental technologies to eliminate those that may not prove feasible to implement, that rely on technologies unlikely to perform satisfactorily or reliably, or that do not achieve the corrective measure objective within a reasonable time period. This screening process focuses on eliminating those technologies which have several limitations for a given set of hazardous constituent and location-specific conditions. The screening step may also eliminate technologies based on inherent technology limitations.

Location, hazardous constituent, and technology characteristics which are used to screen inapplicable technologies are described in more detail below:

a. Location Characteristics: Location data should be reviewed to identify conditions that may limit or promote the use of certain technologies. Technologies whose use is clearly precluded by location characteristics should be eliminated from further consideration;

b. Hazardous Constituent Characteristics: Identification of hazardous constituent characteristics that limit the effectiveness or feasibility of technologies is an important part of the screening process. Technologies clearly limited by these characteristics should be eliminated from consideration. Hazardous constituent characteristics particularly affect the feasibility of in-situ methods, direct treatment methods, and land disposal (on/off-site).

3. Corrective Measure Development: As required by U.S. EPA, Respondent shall assemble the technologies that pass the screening step into specific alternatives that have potential to meet the corrective action objectives for each media.

Each alternative may consist of an individual technology or a combination of technologies used in sequence (i.e., treatment train). Different alternatives may be considered for each release or portion of a release of hazardous constituents at and from the Facility. List and briefly describe each corrective measure alternative.

E. Evaluation of One or More Screened Corrective Measure Alternative

For each corrective measure alternative which warrants a more detailed evaluation, Respondent shall provide detailed documentation of how the alternative will comply with each of the standards listed below. These standards reflect the major

technical components of corrective action remedies including cleanup of releases of hazardous constituents at and from the Facility, source control, and management of wastes that are generated by corrective action activities. The specific standards are provided below.

1. Protect human health and the environment.
2. Attain media cleanup standards set by U.S. EPA.
3. Control the source of releases so as to reduce or eliminate, to the extent practicable, further releases of hazardous constituents at and from the Facility that may pose a threat to human health and the environment.
4. Comply with any applicable standards for management of wastes.
5. Other Factors.

In evaluating the selected alternative or alternatives that passed the screening step, Respondent shall prepare and submit information that documents that each specific alternative will meet the standards listed above. The following guidance should be used in completing this evaluation. This guidance provides examples of the types of information that would be supportive; U.S. EPA may require additional information.

1. Protect Human Health and the Environment

Corrective measure alternatives must be protective of human health and the environment. Respondent shall include a discussion on what types of short term corrective measure alternatives are appropriate for the Facility in order to meet this standard. This information should be provided in addition to a discussion of how corrective measure alternatives meet this standard. Alternatives may include those measures that are needed to be protective, but are not directly related to media cleanup, source control, or management of wastes. An example would be a requirement to provide alternative drinking water supplies in order to prevent exposures to releases from an aquifer used for drinking water purposes. Another example would be a requirement for the construction of barriers or for other controls to prevent harm arising from direct contact with SWMUs or HWMUs.

a. Human Health: Respondent shall assess each alternative in terms of the extent to which it mitigates short and long-term potential exposure to any residual concentration of hazardous constituents and how it protects human health both during and after implementation of the corrective measure. The assessment will describe the levels and characterizations of hazardous constituents on-site (and in off-site releases from the Facility), potential exposure routes, and the potentially affected population. Each alternative will be evaluated to determine the level of exposure to contaminants and the reduction over time. The relative reduction of impact will be determined by comparing

residual levels of each alternative with existing criteria, standards, or guidelines acceptable to U.S. EPA.

b. Environmental: Respondent shall assess each alternative to determine its short and long-term beneficial and adverse effects on the environment. Each alternative will be evaluated for its impact on habitat types and plant and animal receptors located in, adjacent to, or affected by the Facility. Receptor impacts should include those occurring at the individual level (e.g., mortality, growth and reproductive impairments) and those occurring at higher levels of biological organization (i.e., at population, community, and ecosystem levels). The assessment should include proposed measures for mitigating adverse impacts.

2. Attain Media Cleanup Standards Set by U.S. EPA

Corrective measures will be required to attain media cleanup standards set by U.S. EPA which may be derived from existing state or federal regulations (e.g. groundwater standards) or other standards. The media cleanup standards for a corrective measure will often play a large role in determining the extent of and technical approaches to corrective action at the Facility. In some cases, certain technical aspects of the corrective measure alternatives, such as the practical capabilities of corrective action technologies, may influence to some degree the media cleanup standards that are established.

As part of the necessary information for satisfying this requirement, Respondent shall address whether the potential corrective measure will achieve the preliminary remediation objective as identified by U.S. EPA as well as other, alternative remediation objectives that may be proposed by Respondent. Respondent shall also include an estimate of the time frame necessary for each alternative to meet these standards.

3. Control the Sources of Releases

A critical objective of any corrective action must be to stop further environmental degradation by controlling or eliminating further releases of hazardous constituents from or at the Facility that may pose a threat to human health and the environment. Unless source control measures are taken, efforts to clean up releases may be ineffective or, at best, will essentially involve a perpetual cleanup. Therefore, an effective source control program is essential to ensure the long-term effectiveness and protectiveness of the corrective action program.

The source control standard is not intended to mandate a specific corrective measure or class of corrective measures. Instead, Respondent is encouraged to examine a wide range of options. This standard should not be interpreted to preclude the equal

consideration of using other protective measures to control the source, such as partial waste removal, capping, slurry walls, in-situ treatment/stabilization and consolidation.

As part of the CMS Report, Respondent shall address the issue of whether source control measures are necessary, and if so, the type of actions that would be appropriate. Any source control measure proposed should include a discussion on how well the method is anticipated to work given the particular situation at the facility and the known track record of the specific technology.

4. Comply With Any Applicable Standards for Management of Wastes.

Respondent shall include a discussion of how the specific waste management activities will be conducted in compliance with all applicable state or federal regulations (e.g., closure requirements, land disposal restrictions).

5. Other Factors

Five general factors will be considered by U.S. EPA in selecting one or more corrective measure alternatives that meet the four standards listed above. These factors represent a combination of technical measures and management controls for addressing the environmental problems at the facility. The five general decision factors include:

a. Long-term reliability and effectiveness;
b. Reduction in the toxicity, mobility or volume of wastes;
c. Short-term effectiveness;
d. Ease of Implementation; and
e. Cost.

U.S. EPA may request Respondent to provide additional information to support the use of these factors in the evaluation of viable corrective measure alternatives Examples of the types of information that may be requested are provided below:

a. Long-term Reliability and Effectiveness

Demonstrated and expected reliability is a way of assessing the risk and effect of failure. Respondent should consider whether the technology or a combination of technologies have been used effectively under analogous conditions, whether failure of any one technology in the alternative would have an immediate impact on receptors, and whether the alternative would have the flexibility to deal with uncontrollable changes in the vicinity of the Facility (e.g., heavy rain storms, extreme cold and snow, etc.).

Most corrective measure technologies, with the exception of destruction, deteriorate with time. Often, deterioration

can be slowed through proper system operation and maintenance, but the technology eventually may require replacement. Each corrective measure alternative should be evaluated in terms of the projected useful life of the overall alternative and of its component technologies. Useful life is defined as the length of time the level of effectiveness can be maintained.

b. Reduction in the Toxicity, Mobility or Volume of Wastes and Media Containing Hazardous Constituents

As a general goal, corrective measures will be preferred that employ techniques, such as treatment technologies, that are capable of eliminating or substantially reducing the inherent potential for the hazardous constituents to cause future environmental releases or other risks to human health and the environment. There may be some situations where achieving substantial reductions in toxicity, mobility or volume may not be practical or even desirable. As an example, wastes such as unexploded munitions would be extremely dangerous to handle, and the short-term risks of treatment outweigh potential long-term benefits.

Estimates of how much the corrective measures alternatives will reduce the waste toxicity, volume, and/or mobility may be helpful in applying this factor. This may be done through a comparison of initial Facility conditions to expected post-corrective measure conditions.

c. Short-term Effectiveness

Short-term effectiveness may be particularly relevant when corrective measures activities will be conducted in densely populated areas, or where waste characteristics are such that risks to workers or to the environment are high and special protective measures are needed. Possible factors to consider include fire, explosion, exposure to hazardous substances and potential threats associated with treatment, excavation, transportation, and re-disposal or containment of waste material.

d. Ease of Implementation

Ease of implementation may be a determining variable in shaping corrective action. Some technologies will require Federal, State of Michigan or local approvals prior to construction, which may increase the time necessary to implement the corrective measure. In some cases, Federal, State of Michigan or local restrictions or concerns may necessitate eliminating or deferring certain technologies or corrective measure alternatives from consideration in corrective measure selection. Information to consider when

assessing ease of implementation may include:

1. The administrative activities needed to implement the corrective measure alternative (e.g., permits, rights of way, off-site approvals, etc.) and the length of time these activities will take;

2. The feasibility of construction, time for implementation, and time for beneficial results;

3. The availability of adequate off-site treatment, storage capacity, disposal services, needed technical services and materials; and

4. The availability of prospective technologies for each corrective measure alternative.

e. Cost

The relative cost of a corrective measure may be an appropriate consideration, especially in those situations where several different technical alternatives to remediation will offer equivalent protection of human health and the environment, but may vary widely in cost. Cost estimates could include costs for: engineering, site preparation, construction, materials, labor, sampling/analysis, waste management/disposal, permitting, health and safety measures, training, operation and maintenance, etc.

F. Recommendation by Respondent for a Final Corrective Measure Alternative

In the CMS Report, Respondent may recommend one or more preferred corrective measure alternatives for consideration by U.S. EPA. Such a recommendation should include a description and supporting rationale for the proposed corrective measure alternatives, consistent with the standards and the decision factors discussed above. Such a recommendation is not required and U.S. EPA still retains the role of corrective measure selection.

G. Public Involvement Plan

After the CMS has been performed by the Respondent and U.S. EPA has selected a preferred alternative for disposal in the Statement of Basis, it is U.S. EPA's policy to request public comment on the Administrative Record and one or more proposed corrective measures. Changes to the proposed corrective measure(s) may be made after consideration of public comment. U.S. EPA may also require Respondent to perform additional corrective measures studies. If the public is interested, a public meeting may be held. After consideration of the public's comments on the

proposed corrective measure, U.S. EPA develops the Final Decision and Response to Comments (RTC) to document the selected corrective measure, U.S. EPA's justification for such selection, and responses to the public comments. Additional public involvement activities may be necessary, based on Facility-specific circumstances.

Section III: Progress Reports

Following approval of the CMS Workplan, Respondent shall, at a minimum, provide the U.S. EPA with signed monthly progress reports. These reports are required to contain the following information, but U.S. EPA requirements are not limited to this list:

1. A description and estimate of the percentage of the CMS completed;

2. Summaries of *all* findings in the reporting period, including results of any pilot studies;

3. Summaries of *all* changes made in the CMS during the reporting period;

4. Summaries of *all* contacts with representative of the local community, public interest groups or State government during the reporting period;

5. Summaries of *all* contacts made regarding access to off-site property;

6. Summaries of *all* problems encountered during the reporting period;

7. Actions being taken to rectify problems;

8. Changes in relevant personnel during the reporting period;

9. Projected work for the next reporting period; and

10. Copies of daily reports, inspection reports, laboratory/monitoring data, etc.

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Section IV: Due Date Summary

Respondent shall provide U.S. EPA with CMS reports according to the following schedule:

Facility Submission	Due Date
CMS Workplan (Section I)	10 days after U.S. EPA's approval of the RFI or earlier as required by U.S. EPA
First CMS Report (Section II)	In accordance with the U.S. EPA-approved CMS Workplan schedule
Revised CMS Report	In accordance with the due date specified in U.S. EPA's approval with conditions and/or modifications, disapproval, or disapproval with comments
Progress Reports on Section II	Monthly, on the specific date identified in the U.S. EPA-approved CMS Workplan schedule

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ATTACHMENT IV

Region 5
Model RCRA Quality Assurance Project Plan (QAPP)

The following model document has been prepared by U.S. EPA Region 5 to facilitate preparation of a QAPP based on U.S. EPA Quality Assurance Management Staff and Region 5 requirements. This model is intended to serve as a tool for the production of approvable QAPPs for a wide variety of RCRA investigations.

How to use this document

This document describes the preparation of a QAPP in a series of elements. Each element contains two types of information:

1) Content Requirements (presented as smaller text characters): The first pages of each QAPP element contain requirements which must be described in that QAPP section in order to receive Region 5 approval.

2) Structural Guidance (presented as larger text characters and headed by appropriate section number): This example language is intended to be guidance to show to the QAPP preparer the level of detail that is typically needed to gain Region 5 approval. This example language will appear as follows:

a) Portions of the Model QAPP which are example language are indicated in regular print. During preparation of a facility-specific QAPP, these portions should, of course, be deleted and replaced with the pertinent information for your site.

b) Alternative language specific to RCRA sites, and general notes, are indicated in **bold print.**

c) Some of the example language in this QAPP is applicable to a broad range of sites, and may be considered "boiler-plate". **"Boiler-plate" language is indicated by a dark background, such as you see here.** The "boiler-plate" language should be of wide-ranging applicability, and has been pre-approved by the Region 5 QAS.

All of the requirements presented in this model are needed for QAPP approval by Region 5. If there is any requirement which is not fully understood, it should be brought to the attention of the U.S. EPA project manager BEFORE the QAPP is presented to U.S. EPA for review and approval. If concerns about the requirements in this document are not presented prior to the required submittal date of the draft workplan/QAPP, it will be assumed that the facility using the QAPP concurs with all requirements stated in this document.

If you have any comments regarding improvements on this model document, please contact George Schupp, Quality Assurance Section Chief, at (312) 886-6221.

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DOs AND DON'Ts TO FACILITATE QAPP APPROVAL

1. **DO NOT** submit the laboratory quality assurance program plan attached in an appendix in order to satisfy project-specific quality assurance project plan (QAPP) information. The generic lab QAPPs contain extraneous and ambiguous tables and information.

   DO append or otherwise incorporate into the QAPP the laboratory information that is project-specific (e.g. laboratory chain of custody, internal performance and system audits, etc.) to address certain elements outlined in this document.

2. **DO NOT** reproduce tables containing key information such as types of samples, numbers of investigational and quality control samples per matrix, or lists of target compounds. There should be one table of each kind of information contained in the QAPP.

   DO provide section-specific references when referring to the tabular information in the QAPP, Field Sampling Plan, or RFI Workplan. By doing so, errors caused by not changing duplicated or summarized tables will be minimized.

3. **DO NOT** submit photocopied pages from Test Methods For Evaluating Solid Waste (SW-846) as laboratory SOPs. If, for any reason, there is a need to refer to SW-846, specific references to it may be made.

   DO submit laboratory-specific SOPs for review.

4. **DO NOT** submit copies of manufacturer's guides to operating certain instrumentation such as the field equipment commonly used to detect volatile organic analytes, or for the measurement of pH, Eh, and specific conductance. The U.S. EPA evaluates the operator's standard operating procedure for calibrating and maintaining such instruments.

5. **DO NOT** submit a multiple choice list indicating which methods will be used to analyze certain hazardous constituents. Only the instrumental and preparatory/cleanup/extraction/digestion procedures that will actually be utilized for analysis must be indicated in the QAPP. If SW-846 offers a selection of possibilities for performing the analyses, then the QAPP must specify which methods will actually be used.

6. **DO NOT** submit a QAPP to the U.S. EPA for review until a laboratory has been selected by the facility for completing all work. Once a selection has been made, laboratories cannot be changed due to a possible lab audit by U.S. EPA.

7. **DO NOT** write the QAPP until a pre-QAPP meeting has been held. This meeting involves representatives of the laboratory, the facility, and the U.S. EPA for the purpose of defining project objectives and evaluating potential QA problems during implementation of the workplan.

8. **DO** provide in the QAPP the complete list of hazardous constituents to be measured and reported for the facility project. Such lists will be consistent with those constituent lists for which the methods have been validated.

9. **DO** provide information on sample tags. Sample tags are required for all samples taken in the field, as part of the chain of custody procedure.

10. **DO** provide a data deliverables package which will reflect a "CLP-like deliverables" format (the CLP forms are not required but the same information must be supplied).

11. **DO** provide for a data validation process which will validate 100% of the data by a party independent of the laboratory generating such data. This validation will be performed prior to transmittal to the U.S. EPA. All data must be made available to the U.S. EPA immediately upon request.

12. **DO** provide copies of the draft QAPP and revisions to the appropriate laboratory personnel in order to ensure the laboratory can meet the requirements of the QAPP.

13. **DO NOT** submit the entire QAPP document upon resubmittal.

DO submit only those pages which were revised from the previous submittal.

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QAPP ELEMENT 1

TITLE / SIGNATURE PAGE

The QAPP must contain a Title/Signature Page. This title page will document the following:

1) The complete title of the program and investigation (e.g. RCRA Facility Investigation, etc.) specifying the location (city, state) of the facility and its U.S. EPA identification number;

2) The firm that prepared the plan as well as the organization for whom it was prepared; and

3) The date and the revision number (the initial draft should be considered Revision 0 and subsequent revisions as Revision 1, 2 etc.).

Functionally, this page ensures that the desired content and level of detail are achieved through the review and approval (at a minimum) by the following personnel:

- Facility Quality Assurance Officer
- QAPP Preparer
- US EPA Project Coordinator/Permit Writer
- US EPA Regional Quality Assurance Manager
- Laboratory Directors

NOTE: The titles and names of all individuals appearing on the title page will be consistent with the references to these people elsewhere in the QAPP (e.g. project organization, corrective action, and QA reports to management sections).

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QUALITY ASSURANCE PROJECT PLAN
FOR THE RCRA [PROJECT TYPE] AT
[FACILITY NAME]
U.S. EPA ID NUMBER [ILD 000 000 000]
REVISION [NUMBER]
[DATE OF SUBMITTAL]

Prepared by: [Contractor Name]

Prepared for: [Facility/Contractor]

[Contractor Project Manager]	Date
[Contractor QA Officer]	Date
[Laboratory QA Manager] (if applicable)	Date
U.S. EPA RCRA Project Coordinator/ RCRA Permit Writer	Date
U.S. EPA Regional Quality Assurance Manager	Date

QAPP ELEMENT 2

TABLE OF CONTENTS

All QAPP sections, tables, figures, and appendices (and contents of individual Appendices) shall be included in a Table of Contents. All subsections shall be numbered as in the sample Table of Contents. For instance, in the submitted QAPP, section 3.2 should correspond to "Accuracy".

Additionally, the QAPP Table of Contents shall address each of the following items:

1. An "Introduction" to the QAPP shall be referenced in the QAPP's Table of Contents.
2. A serial listing of the 16 QAPP elements shall be presented according to the structure indicated in the sample Table of Contents.
3. A listing of any appendices and subsections which are required to augment the QAPP as presented (i.e., standard operating procedures (SOPs), summaries of past data, etc.) shall be presented.
4. Following the list of appendices, a listing of any tables and figures which are required to augment the QAPP requirements shall be presented.
5. After the list of appendices will follow a complete listing of recipients including the U.S. EPA Quality Assurance Section Chief who will receive official copies of the QAPP and any subsequent revisions.

Page numbers shall be added to the Table of Contents of the submitted QAPP. Furthermore, within the body of the submitted QAPP, page numbers will be presented in accordance with the Document Control Format (DCF). A DCF should be used to individually paginate each QAPP element to facilitate revisions as well as ensure that no pages are missing. The DCF to be placed in the upper right hand corner of each page shall include:

1. Project Name
2. Revision Number
3. Revision Date
4. Section
5. Page Number

The Project Name may be shortened or abridged as necessary. The Page Number will be stated relative to the total number in the section (e.g. Section 4, Page 2 of 8). A new QAPP section will be started at page one. All other documents which are referenced in the QAPP (Work Plan, Field Sampling Plan, etc.) and have become a part of the QAPP by such reference should also include the DCF. A sample Table of Contents is shown below. Although minor deviations from this example will be permissible, each of the section headings and subheadings shown in the example must be included in the submitted Table of Contents and the submitted QAPP must be organized as reflected in the following Table of Contents.

TABLE OF CONTENTS

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QAPP ELEMENT 3

PROJECT DESCRIPTION

All the QAPP elements are significant, in the sense that all can be viewed as integrally defining a process which when implemented can result in generated data that will be of documented quality, and also hopefully of a known reliable nature. However, the Project Description remains one of the most critical elements of a QAPP. For it is in this particular element that the purpose for implementing the project in a particular fashion, as well as the ultimate goals that are desired to be achieved, are fully explained.

Programmatic regulatory provisions usually require that environmental chemical measurements must be made in order to address certain Federal requirements or criteria, many of the project objectives that will be defined here shall, most often, be defined programmatically. However, this is the portion of the QAPP where it is necessary to define site-specific details so that generally stated Federal requirements, such as the need to investigate in order to "define the horizontal and vertical extent and rate of contamination" must be fully fleshed out into a working program for facility investigation.

QAPP preparers are encouraged to seek and present in this portion of the QAPP the known action or environmental criteria or health based levels (both State and Federal) which generated data may be eventually compared to. Outside of improper implementation of an approved QAPP through field sampling, or laboratory error, poorly defined project objectives may be the area most likely to result in unusable data. If the purpose of the overall project is not thought out carefully or conscientiously beforehand, then ultimately the generated data may not prove to be useful for any of a number of programmatic goals. Even if the data collected has been shown to be of known, documented quality and potentially useable for one particular function, if the data is later found not to address the real objectives that should have been defined before project implementation, then the investigation may have to be repeated!

The Project Description should include or reference the following items. (A technical person unfamiliar with the project must be able to understand what you have written.)

- A statement of the decision(s) to be made or the question(s) to be answered.
- A description of the site, facility, process, and/or operating parameters to be studied.
- The anticipated uses of the data.
- A list of all environmental measurements to be performed.
- A project schedule, indicating when samples are expected to be submitted to the laboratory.
- A summary table listing, for each sampling location, the total numbers of samples (including investigative, quality control, split and reserve), sample type or matrix, and all measurements to be performed, differentiating where applicable the critical measurements from the noncritical measurements.

The contents requirements for Project Description are more fully outlined below. If sections in the RFI Workplan, or Description of Current Conditions Report are found to address some of these items (shown in boldface), then specific sections (page or section numbers) of these identified reports may be referenced in the Project Description portion of the QAPP:

In the **Introduction** to the QAPP, the overall project objectives should be explained. This should be a succinct description of the project, including a brief statement addressing the phase(s) of the work and intended objectives and investigation. The section should answer the basic questions, "What is the purpose of the work effort?", and "Why has the facility been asked to complete the work?"

The **Site Description** should focus on a description of site-specific features, including location, size, borders, important physical features, topographic, geological and hydrogeological information. Each of these items should be clearly addressed. The QAPP preparer should also consider whether there are any unique or special site-specific features of any kind which may have some later bearing on the way in which data is obtained.

Under the **Site History** or **Background** section of this element, the chronological history of the site leading to its current status under RCRA should be outlined. Documentation of waste streams managed and releases known to have occurred on-site, a summary of any previous sampling and analysis efforts, data with overview of these results or copies of previous reports should be appended to the QAPP. Site histories are unique and often there are large historical gaps. Usually, much of the known information has already been gathered prior to the stage where an RFI is being conducted. Therefore, summaries of this information may only be required here, provided that the facility can identify previously generated reports precisely by title, date, and author.

The **Project Objectives** must be clearly outlined. There should be a succinct description of specific project objectives in terms of individual task or phase of work. This is the section where the QAPP preparer should discuss how the general programmatic goals can be addressed through specific tasks that will be implemented.

Target compounds and parameters must be described. The QAPP preparer must provide a list of all compounds that will be analyzed in samples taken from the facility. For the purposes of the RCRA program, such compounds, analytes, and parameters may be derived from any of a number of lists such as the Hazardous Substance List, the 40 CFR Part 261 Appendix VIII or IX lists, the toxicity characteristic list, method specific lists (where the methods have been validated for sets of constituents regulated under RCRA or by the U.S. EPA, such as the SW-846 1986 or 1990 version methods, the CLP methods), or other parameters such as those of possible use to hydrologists in assessing general groundwater quality.

In preparing a facility-specific target list, there are three rules of thumb to be aware of. First, any set of constituents representing a subset of the Appendix IX list must be supplemented with a good rationale for why certain constituents have been eliminated from the list of target compounds for the proposed project. Secondly, the selection of constituents must be shown to be consistent with the overall objectives or programmatic goals intended for the proposed project. Thirdly, even though the U.S. EPA shall consider the rationale presented for why certain constituents can be excluded from the facility list, if proposed analytical methods or strategies will still allow analytical measurement of those constituents (proposed for exclusion) anyway, then those constituents must also be reported in the RFI report. Tabular presentation of the actual list is preferred when used in conjunction with the rationale, and the list should address each matrix to be encountered, as well as the intended data usages, and anticipated method detection limits for each constituent in its respective matrix.

The Intended **Data usages** should provide a brief statement outlining the specific usages of all data to be obtained, including any data generated from field screening and/or field measurements. Please note that regulatory actions under such laws (and corresponding regulations) as RCRA, CERCLA, Safe Drinking Water Act, LUST, State regulatory authorities, the Clean Water Act, the Clean Air Act, may sometimes dictate the implementation of certain analytical methods, quality control, and chain-of-custody procedures. If possible, the intended data usages should be presented in tabular format.

These may include, but are not limited to, the following:

1. Qualitative or semi-quantitative analyses for selection of sample and/or sampling locations;

2. Future enforcement actions:

3. Data for remedial action alternatives:

4. Determination of hazardous waste characteristics for remedial removals:

5. Protection of Public Health:

6. Definition of extent of environmental contamination.

In addition to the rationale for target compounds and parameters, there should be a Sample Network and Rationale presented in the QAPP. At a minimum, inclusion of, or elaboration on, the following items is required:

1. Diagrams or site maps showing sampling locations:

2. Thorough rationale for selected sampling locations:

3. Summary table listing matrices, field and laboratory parameters, and their frequency of collection:

4. A categorized listing of matrix types to be encountered:

5. Any field screening to be performed:

6. Any field measurements to be performed:

7. Any measurements to be performed in conjunction with hydrogeologic investigations:

8. Ambient monitoring of media at the facility subject to investigation: and

9. Pertinent regulatory requirements.

Please note that for RCRA purposes when groundwater sampling is to be conducted for metals analyses, the QAPP must specify the procedures for collection of both field filtered and unfiltered samples. Furthermore, soil samples shall not be composited.

A **Project Schedule**, providing a description of dates anticipated for project initiation, milestones, and completion of the project as well as monitoring activities shall be provided. A milestone table or a bar chart consisting of project tasks and time lines is appropriate for this purpose.

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SECTION 1

PROJECT DESCRIPTION

1.0 Project Description

This project description outlines the overall scope of an investigation to be performed in accordance with pertinent permit requirements for a permit issued on a specific date. This QAPP presents the organization, objectives, planned activities, and specific QA/QC procedures associated with the RFI for this facility. Specific protocols for sampling, sample handling and storage, chain-of-custody, and laboratory and field analyses will be described. All QA/QC procedures will be structured in accordance with applicable technical standards. U.S. EPA's requirements, regulations, guidance, and technical standards. This QAPP was prepared in accordance with a guidance manual entitled, "Region 5 Model RCRA Quality Assurance Project Plan", May, 1993.

1.1 Introduction

In this section, the overall scope of this project plan shall be described. Current status and QAPP preparation guidelines shall be explained. This QAPP has been prepared in behalf of [the facility] by (the contractor). A Project Management Plan, a QAPP, and a Health and Safety Plan have been appended to the RFI Workplan, dated_____. A Field Sampling Plan has also been prepared, which has been entirely incorporated into the QAPP through specific reference.

1.1.1 Overall Project Objectives

The purpose of the RFI is to gather sufficient information to quantify risk to public health and environment (Baseline Risk Assessment) and to consider possible remedial alternatives (Corrective Measures Study at the Site). The objectives of the RFI are to determine the nature and extent of contamination at the facility.

Objectives of the data collection will be as follows:

- Verify and further define the nature and extent of contamination in previously identified on-site and off-site areas. Data quality must be sufficient to be able to compare with State health-based criteria, and other Federal regulatory criteria that are pertinent. (e.g. TSCA rules for PCBs, and RCRA).

- Determine the nature and extent of contamination in previously uninvestigated areas. Data will eventually be compared to State and Federal regulatory criteria. [Please include a Table indicating what the pertinent criteria are.]

- Collect sufficient data on all contaminated media to support a baseline risk assessment and feasibility study.

1.1.2 Project Status/Phase

[The Contractor] will utilize an integrated and phased approach for the RFI. During the RFI, data collection will be conducted in phases, with the results of the baseline risk assessment being a determining factor in decisions regarding the necessity for additional phases of investigation. The Phase I investigation will integrate existing data with information that will be gathered through direct field investigations.

The Phase I field investigation will include:

- Surface soil (0 to 18 inches) sampling for verification and site characterization both on- and off-site;

- Subsurface soil sampling along existing and previously excavated sewer lines, and in areas where deeper soil removals have occurred;

- Groundwater sampling;

- Residential well sampling;

- Sediment and surface water sampling; and

- In-situ permeability testing of aquifer materials.

Samples will be analyzed for volatile organics, organic extractables, pesticides/PCBs and/or metals. A limited number of samples will also be analyzed for cation exchange capacity (CEC), Atterburg limits, percent moisture, grain size distribution, and total organic carbon (TOC) to determine soil physical parameters and their effect on contamination migration. A limited number of samples will also be analyzed for the Toxicity Characteristic Leaching Procedure (TCLP) to characterize the waste for disposal. Soil pH tests will be conducted on a selected number of samples at the field screening laboratory.

Data from the Phase I investigation will be qualitatively and statistically evaluated in conjunction with existing data to determine whether a Phase II investigation is necessary. The rationale and scope of any Phase II investigation will be discussed with and approved by the U.S. EPA prior to implementation.

Potential Phase II work may include:

- o Additional soil/sediment sampling;
- o Asbestos sampling;
- o Installation of additional monitoring wells and a detailed groundwater investigation; and,
- o Treatability studies or pilot testing.

If Phase I data suggests that sufficient site characterization information has been collected [the Contractor] will proceed with the risk assessment for the site. A technical memorandum, presenting the Phase I data and recommendations of the risk assessment will be prepared and submitted to the U.S. EPA. After a review of the technical memorandum, the need for implementing a Phase II investigation will be evaluated in light of the data requirements for the feasibility study.

1.1.3 QAPP Preparation Guidelines

As explained above, this QAPP has been prepared in accordance with the "Region 5 Model RCRA Quality Assurance Project Plan", dated, May, 1993. Furthermore, in meetings held with the U.S. EPA in which the Region's protocol for presentation of QAPPs, additional guidance was received on how to prepare this QAPP. One of these meetings was a formal "pre-QAPP" meeting, and discussions held prior to the pre-QAPP meeting which focused on project scoping. At all meetings, representatives from the U.S. EPA's Environmental

Sciences Division were present and available for consultation.

1.2 Site/Facility Description

A brief description of the facility, its geological setting, and associated features is presented in the section below.

1.2.1 Location

The [RCRA Facility] is an inactive lead-acid battery manufacturing operation located in [facility, County, State]. The facility occupies approximately 18 acres on U.S. Highway [facility address] northwest of the city of [City], along the eastern bank of the [River name] River [Please provide a Map]. The facility is bordered on the north by [Street Name] Street, on the south by [Street Name] Street, on the west by a State Highway garage and on the east by the parking lot of a local inn. The study area for the [site name] RFI includes the [site name] property and off-site areas immediately surrounding the site.

1.2.2 Facility/Size and Borders

This section is addressed on pages _____ through _____ of the RFI Workplan, which is herein incorporated into this QAPP through reference, and in the drawings which have been submitted along with the RFI Workplan.

1.2.3 Natural & Manmade Features

This section is addressed on pages _____ through _____ of the RFI Workplan, which is hereby incorporated into this QAPP through reference.

1.2.4 Topography

See sections _____ of the RFI Workplan for information concerning the site's general topography.

1.2.5 Local Hydrology & Hydrogeology

See sections _____ of the RFI Work Plan for information concerning the site's physical features, population and land use, geology and soil, groundwater resources and surface hydrology and drainage.

1.3 Site/Facility History

1.3.1 General History

The facility was established in [Date] to manufacture lead acid batteries, primarily for cars and trucks, first by the [Historic Facility Names] Corporation and then by the [xxx] Corporation, which used the name [xxx] when it bought the facility from [xxx] in [Date]. [xxx] acquired the [xxx] Company in [year].

Over the years of operation, successive industrial sewer lines became plugged with lead sludge. The plugged line was typically left in place and a new line was installed. As a result of leaks and sewer line backups, the soils around some of these sewers and associated sumps were found to be contaminated with lead. The upper soils around the holding lagoon also showed elevated levels of lead. Other contaminants of concern are PCBs that were found in the soil around the transformer pad, the nearby water tower pad, and below a section of the main process building (see Figure xxx).

During normal plant operation, manufacturing process wastes and wastewater became laden with lead, lead oxides, sulfuric acid, and lead sulfates. The plant's ventilation system and processes released air laden with lead contaminants to the atmosphere around the facility [reference report]. Prior to 1978, wastewater was sent through the on-site industrial sewer system, then directly to the [City/County/etc.] sanitary sewer system. Beginning in [Date], wastewater effluent was subject to pH treatment on-site followed by placement into a wastewater sedimentation lagoon. Overflow from the lagoon went to the [Name] Publicly Owned Treatment Works.

Soil on and in the vicinity of the facility has been contaminated with lead, predominantly from airborne particulates. Malfunctions and accidental spills have also contributed to contamination of on-site soils with high concentrations

1.3.2 Past Data Collection Activities

The [site name] has been subject to a number of investigations since [Date]. The following summaries are based on a review of reports and supporting documents submitted by consultants and information obtained from the project files of the U.S. EPA and the State.

Beginning in [Date], [Company name] has contracted with [contractor names], to assess the degree of contamination at the facility, and evaluate remedial actions for the identified contamination problems. These include the contaminated surface soils both on-site and in certain off-site areas, the plugged sewer lines, the pH treatment system and surrounding soils, and the PCB contamination.

Pursuant to these studies more then 7,000 cubic yards of lead and PCB-contaminated soil have reportedly been removed from on and off-site [Previous study reference]. The clean-up standard was to remove all lead-contaminated soil down to a level below 1000 ppm, as recommended and approved by the State. This standard was coupled with a requirement to lime all remaining soils where lead levels exceeded 250 ppm in order to maintain a soil pH greater than 7.0 and thereby reduce the mobility of the lead still in the soil. Soils contaminated with PCBs were removed from the facility in two separate actions. In the first action, PCB soils were reportedly removed down to a level below 50 ppm [Previous study reference]. In the second action, soils were removed to a level below 10 ppm [Previous study reference]. Verification samples following removal actions will be taken in accordance with this QAPP.

1.3.3 Current Status

Based on reports and documents reviewed for the site, and a current assessment of all available information, the following target compounds and source area release mechanisms have been targeted for further investigation.

- Past Facility Operations. Records indicate that during the active period of battery manufacture, the plant's ventilation system and processes released lead-laden air and possibly other contaminants to the atmosphere. Malfunctions and accidental spills also may have released both organic and inorganic contaminants to the environment. Other metals which may have been released along with lead include: antimony, arsenic, tin, calcium, strontium, tellurium, and barium. Organic chemicals that were used at the facility identified from RCRA documentation, include: trichloroethane, methylene chloride, paint thinner, epoxy resin, refined coal tar, and lubricant containing trichloroethylene.

- Wastewater Sewers. During plant operations, manufacturing process wastewater, containing lead oxides, lead sulfates, sulfuric acid, and possibly other metals was sent through the industrial sewer system to be discharged to the [City] publicly owned treatment works (POTW). After [Date], wastewater was subject to pH adjustment and sedimentation prior to discharge to the POTW. Documents indicate that as

industrial sewers became plugged with lead, they were left in place and new sewer lines were installed adjacent to the old. Reports indicate the soils around some of the sewer lines were heavily contaminated with lead, suggesting leaks. Other reports indicate that plugged sewers caused wastewater to back up in sumps and manholes causing wastewater releases to the ground surface.

- Surface Impoundment. The surface impoundment located in the southwest corner of the facility received pH adjusted wastewater for sedimentation. Documents indicate concerns over cracks in the concrete lining and the integrity of joints in the concrete construction. Concerns regarding overtopping of the impoundment have also been reported. Sample analysis of the sludge which settled in the wastewater lagoon indicates that high levels of waste lead, iron, aluminum, arsenic, barium, and calcium were generated during the manufacturing process.

- PCB Transformers. Records indicate that two PCB transformers located near the northwest corner of the facility leaked, releasing contaminated dielectric fluid to surrounding soils.

The historical release of contaminants as described above resulted in the contamination of on- and off-site soils and potentially the [Facility] facility and nearby buildings. Although significant attempts have been made to remediate the contamination i.e., on- and off-site soil removal, sewer excavations, etc., potentially significant concentrations of lead may remain in soils even though the primary sources have been removed. At this time, these soils constitute a secondary source of contamination, potentially affecting human and environmental targets in the area of the site. Similarly, lead contamination in on- and off-site structures may present a continuing exposure point for workers, residents, and visitors to the area.

1.4 Project Objectives

Data Quality Objectives (DQOs) are qualitative and quantitative statements which specify the quality of data required to support decisions made during RI/FS activities and are based on the end use of the data to be collected. As such, different data uses may require different levels of data quality. There are at least five analytical levels which address various data uses and the QA/QC effort and methods required to achieve the desired level of quality.

1.4.1 Specific Objectives and Associated Tasks

For this project, it will be necessary to gather sufficient information to evaluate the nature

and extent of releases from _____ solid waste management units, and also to determine whether unreasonable health risks are associated by the _____ areas. This could include evaluation of the impact of releases on human health and the environment both within and beyond the facility property boundary, if applicable.

The specific objectives of the data collection at the [Facility name] are as follows:

Some field monitoring will be utilized for purposes of screening for "hot spot" areas and for worker health safety. Site characterization to locate areas for subsequent and more accurate analyses will be conducted. These types of data include those generated on-site through the use of HNu, pH, conductivity, and other real-time monitoring equipment at the site. The field data requirements are summarized in the submittal table.

In order to assess the presence or absence of hazardous constituents at the _____ and the _____, soil samples will be screened during this Phase I RFI for likely contaminants of concern, including volatile organics, organic extractables, pesticides/PCBs and (both) total and TCLP metals. In the event that metals are found to exceed TCLP action levels in soil or sediment, then any excavated soil will be regarded as hazardous waste by characteristic. A limited number of samples will also be analyzed for cation exchange capacity (CEC) and other soil characteristics. Groundwater samples will also be tested for the parameters indicated in the laboratory (with exception of CEC & other soil properties). This information will be used to compare results to representative background soil characteristics. If detectable low levels of constituents are identified, then the values shall be subject to a risk assessment study to be sent to the U.S. EPA at the conclusion of the study. This risk assessment shall be prepared according to guidance contained in a document, "Guidance for Data Useability in Risk Assessment". (EPA/540/G-90/008), October, 1990. For purposes of performing the risk assessment study, levels of undetected contaminants shall be assumed to be present at concentrations equal to 1/2 of the respective measured method detection limits. If the risk assessment results appear favorable, then the need for Phase II may be obviated, and [Facility name] will seek the "No Action Alternative" option through a modification to its RCRA permit.

In order to accomplish these goals, a confirmational level of analytical quality is needed. This provides the highest level of data quality and includes, but is not limited to the purposes of risk assessment, evaluation of remedial alternatives and establishing cleanup levels. These analyses require full documentation of SW-846 analytical methods, sample preparation steps, data packages and data validation procedures necessary to provide defensible data. Quality Control must be sufficient to define the precision and accuracy of these procedures at every step.

If the data generated during Phase I does not support the case for the "No Action Alternative", then a second planned Phase of activity will begin subject to an approved modification to this QAPP.

1.4.2 Project Target Parameters and Intended Data Usages

The list of target parameters for this project is included in (the Appendix to this Model QAPP). Intended data usages are to screen for Phase I analytes. The data shall be compared to background soil levels, or to measured detection limits and other (low level) health based criteria with the ultimate objective being to develop a risk assessment study. Data may also be used to assess feasibility of using certain remediation technologies if contamination is found to exist. However, it is understood that a QAPP modification to allow bench scale testing of a remediative process, or simply to allow further evaluation of remediative process feasability may be required.

1.4.2.1 Field Parameters

The intended field parameters are stated in (the Appendix to this Model QAPP).

1.4.2.2 Laboratory Parameters

The intended laboratory parameters are stated in (the Appendix to this Model QAPP).

1.4.3 Data Quality Objectives

The intended data quality objectives for this project are summarized in (the Appendix to this Model QAPP).

1.5 Sample Network Design and Rationale

The sample network design and rationale for sample locations (in respective media) is fully described in detail in section _____ of the Field Sampling Plan. Rationale for why certain groups or classes of hazardous constituents listed in 40 CFR Part 261, Appendix IX, will not be analyzed during Phase I is also described in the Field and Sampling Plan.

1.5.1 Sample Network by Task and Matrix

Sample matrices, analytical parameters and frequencies of sample collection can be found in

(the Appendix to this Model QAPP).

1.5.2 Site Maps of Sampling Locations

Maps showing intended soil, sediment and surface water sampling locations are included as Figures in the Field Sampling Plan, which is fully incorporated into this QAPP through reference. It is possible, however, that depending on the nature of encountered field conditions some of these locations will be changed. The person who shall be responsible for making such decisions will be the Site Field Manager whose responsibilities are described in Section 2 of this QAPP. Locations of monitoring and residential wells to be sampled, with associated screen depths is also indicated in the Field Sampling Plan.

1.5.3 Rationale of Selected Sampling Locations

The rationale for why the selected sampling locations (and depths) were chosen in conjunction with each solid waste management unit and area of concern is fully described in the Field Sampling Plan, along with statistical arguments supporting the number of samples to be taken. (e.g. A total of seven background soil samples shall be taken to fully characterize background conditions with respect to each parameter, at a statistically high level of confidence.)

1.5.4 Sample Network Summary Table

The sample network for this project is presented in tabular format in the Field Sampling Plan (and in the Appendix to this Model QAPP).

1.6 Project Schedule

1.6.1 Anticipated Date of Project Mobilization

The earliest date for which samples are planned to be collected is _____. However, as indicated in the submitted Task Bar Chart, some activities such as installation of monitoring wells are scheduled to begin on _____.

1.6.2 Task Bar Chart and Associated Timeframes

The dates of projected milestones are indicated in the submitted Task Bar Chart.

QAPP ELEMENT 4

PROJECT ORGANIZATION AND RESPONSIBILITY

This element will include the following sections:

1) Management Responsibilities

All managers who will have some responsibility in this project will be stated and their responsibilities will be specifically defined. This includes the facility, their contractors, U.S. EPA, and State management (if applicable).

2) QA Responsibilities

The responsibilities of all QA personnel involved in this project will be stated by position and their responsibilities will be delineated. As part of the detail of this section, the QA personnel responsible for the following will be specified:

a) data validation

b) data assessment

c) internal performance and system audits

3) Field Responsibilities

The responsibility of the field personnel will be outlined in this section. Included in this section will be the person responsible for identifying and documenting nonconformances through corrective action.

4) Laboratory Responsibilities

Laboratory responsibilities will be outlined in this section. This includes stating the location of the laboratory (city and state) and listing the analytes and matrices that will be tested at the laboratory. Any lab staff with responsibility during this project will have those duties stated (e.g. lab sample custodian, etc.).

5) Project Organization Diagram

This diagram will include ALL personnel (no more, no less) discussed in the text and will show the lines of authority and communication.

Examples of the level of detail necessary are provided in the example that follows. Any information inside square brackets ([]) denotes replacing this information with facility and/or contractor-specific names or information.

SECTION 2

PROJECT ORGANIZATION AND RESPONSIBILITY

[The example language for this section includes a wide variety of types of individual responsibilities. In writing a QAPP, you may use or modify whichever of the following examples are applicable to your project.]

At the direction of the [U.S. EPA RCRA Permit Writer/RCRA Project Coordinator(RPC)/State Project Manager], [Contractor] has overall responsibility for all phases of the RFI/CMS. [Contractor/Facility] will perform the field investigation, prepare the RFI report, and perform the subsequent CMS. Project management will also be provided by [Contractor/Facility]. The various quality assurance, field, laboratory and management responsibilities of key project personnel are defined below.

2.1 Project Organization Chart

The lines of authority for this specific project can be found in Figure 2-1. This chart includes all individuals discussed below.

2.2 Management Responsibilities

U.S. EPA RCRA Permit Writer/RCRA Project Coordinator/State Project Manager

The [U.S. EPA RCRA Permit Writer (RPW)/RCRA Project Coordinator (RPC)] has the overall responsibility for all phases of the RFI/CMS. The State Project Manager has overall responsibility for [ ] phases of the RFI/CMS with oversight by the U.S. EPA [RPC/RPW].

[Facility] Project Manager

The [Facility] project manager is responsible for implementing the project, and has the authority to commit the resources necessary to meet project objectives and requirements. The [Facility] manager's primary function is to ensure that technical, financial, and scheduling objectives are achieved successfully. The [Facility] project manager will report directly to the [U.S. EPA Region 5 RPW/RPC/State Project Manager] and will provide the major

point of contact and control for matters concerning the project. The [Facility] project manager will:

- o Define project objectives and develop a detailed work plan schedule;
- o Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task;
- o Acquire and apply technical and corporate resources as needed to ensure performance within budget and schedule constraints;
- o Orient all field leaders and support staff concerning the project's special considerations;
- o Monitor and direct the field leaders;
- o Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product;
- o Review the work performed on each task to ensure its quality, responsiveness, and timeliness;
- o Review and analyze overall task performance with respect to planned requirements and authorizations;
- o Approve all reports (deliverables) before their submission to U.S. EPA Region 5;
- o Ultimately be responsible for the preparation and quality of interim and final reports; and
- o Represent the project team at meetings and public hearings.

[Contractor] Project Manager

The [Contractor] project manager has overall responsibility for ensuring that the project meets U.S. EPA's objectives and [Contractor] quality standards. The [Contractor] project manager will provide assistance to the [Facility] project manager in terms of writing and distributing the QAPP to all those parties connected with the project (including the

laboratory). The [Contractor] project manager will report directly to the [Facility] project manager and is responsible for technical quality control and project oversight.

2.3 Quality Assurance Responsibilities

[Facility] QA Manager

The [Facility] QA manager will remain independent of direct job involvement and day-to-day operations, and have direct access to corporate executive staff as necessary, to resolve any QA dispute. He/she is responsible for auditing the implementation of the QA program in conformance with the demands of specific investigations, [Contractor's] policies, and U.S. EPA requirements. Specific functions and duties include:

- o Providing QA audit on various phases of the field operations;
- o Reviewing and approving of QA plans and procedures;
- o Providing QA technical assistance to project staff;
- o Reporting on the adequacy, status, and effectiveness of the QA program on a regular basis to the program manager and executive vice president for technical operations.

[Contractor] QA Manager

The [Contractor] QA manager reports directly to the [Contractor] project manager and will be responsible for ensuring that all [Contractor] procedures for this project are being followed. In addition, the [Contractor] QA manager will be responsible for the data validation of all sample results from the analytical laboratory.

U.S. EPA Region 5 Quality Assurance Manager (RQAM)

EPA RQAM has the responsibility to review and approve all Quality Assurance Project Plans (QAPPs). Additional U.S. EPA responsibilities for the project include:

- o Conducting external Performance and System Audits of RFI Laboratory

o Reviewing and evaluating analytical field and laboratory procedures

2.4 Laboratory Responsibilities

[Laboratory] Project Manager

The [Laboratory] project manager will report directly to the [Contractor] project manager and will be responsible for the following:

- o Ensuring all resources of the laboratory are available on an as-required basis; and
- o Overviewing of final analytical reports.

[Laboratory] Operations Manager

The [Laboratory] operation manager will report to the [Laboratory] Project Manager and will be responsible for:

- o Coordinating laboratory analyses;
- o Supervising in-house chain-of-custody;
- o Scheduling sample analyses;
- o Overseeing data review;
- o Overseeing preparation of analytical reports; and
- o Approving final analytical reports prior to submission to [The Contractor/Facility].

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[Laboratory] Quality Assurance Officer

The [Laboratory] QA officer has the overall responsibility for data after it leaves the laboratory. The [Laboratory] QA officer will be independent of the laboratory but will communicate data issues through the [Laboratory] project manager. In addition, the [Laboratory] QA officer will:

- o Overview laboratory quality assurance;
- o Overview QA/QC documentation;
- o Conduct detailed data review;
- o Determine whether to implement laboratory corrective actions, if required;
- o Define appropriate laboratory QA procedures;
- o Prepare laboratory Standard Operation procedures; and
- o Sign the title page of the QAPP.

[Laboratory] Sample Custodian

The [Laboratory] sample custodian will report to the [Laboratory] operations manager. Responsibilities of the [Laboratory] sample custodian will include:

- o Receiving and inspecting the incoming sample containers;
- o Recording the condition of the incoming sample containers;
- o Signing appropriate documents;
- o Verifying chain-of-custody and its correctness;
- o Notifying laboratory manager and laboratory supervisor of sample receipt and inspection;

o Assigning a unique identification number and customer number, and entering each into the sample receiving log;

o With the help of the laboratory manager, initiating transfer of the samples to appropriate lab sections; and

o Controlling and monitoring access/storage of samples and extracts.

Final responsibility for project quality rests with [Contractor's] Project Manager. Independent quality assurance will be provided by the [Laboratory] Project Manager and QA Officer prior to release of all data to [Contractor/Facility].

[Laboratory] Technical Staff

The [Laboratory] technical staff will be responsible for sample analysis and identification of corrective actions. The staff will report directly to the [Laboratory] operations manager.

2.5 Field Responsibilities

[Contractor/Facility] Field Leader

The [Facility] project manager will be supported by the [Facility/Contractor] field team leader. He/she is responsible for leading and coordinating the day-to-day activities of the various resource specialists under his/her supervision. The [Facility/Contractor] field team leader is a highly experienced environmental professional and will report directly to the [Facility] project manager. Specific field team leader responsibilities include:

o Provision of day-to-day coordination with the [Facility] project manager on technical issues in specific areas of expertise;

o Developing and implementing of field-related work plans, assurance of schedule compliance, and adherence to management-developed study requirements;

o Coordinating and managing of field staff including sampling, drilling, and supervising field laboratory staff;

o Implementing of QC for technical data provided by the field staff including field

measurement data;

o Adhering to work schedules provided by the project manager;

o Authoring, writing, and approving of text and graphics required for field team efforts;

o Coordinating and overseeing of technical efforts of subcontractors assisting the field team;

o Identifying problems at the field team level, resolving difficulties in consultation with the [Facility] project manager, implementing and documenting corrective action procedures, and provision of communication between team and upper management; and

o Participating in preparation of the final report.

[Laboratory] On-Site Laboratory Manager [if applicable]

The on-site laboratory manager is responsible for leading and coordinating the day-to-day laboratory activities. Specific on-site laboratory manager responsibilities include:

o Providing day-to-day coordination with the RFI field team leader on technical issues in specific areas of expertise;

o Implementing QC for analytical data;

o Identifying problems at the laboratory level and discussing and documenting resolutions with the field team leader.

[Contractor] Field Technical Staff

The technical staff (team members) for this project will be drawn from [Contractors's] pool of corporate resources. The technical team staff will be utilized to gather and analyze data, and to prepare various task reports and support materials. All of the designated technical team members are experienced professionals who possess the degree of specialization and technical competence required to effectively and efficiently perform the required work.

[Laboratory] On-Site Lab Staff (if applicable)

The on-site laboratory staff will be responsible for maintaining all aspects of the laboratory to meet the requirements outlined in this QAPP. They will also be responsible for notifying the field team leader when nonconformances are noticed and when corrective action is warranted.

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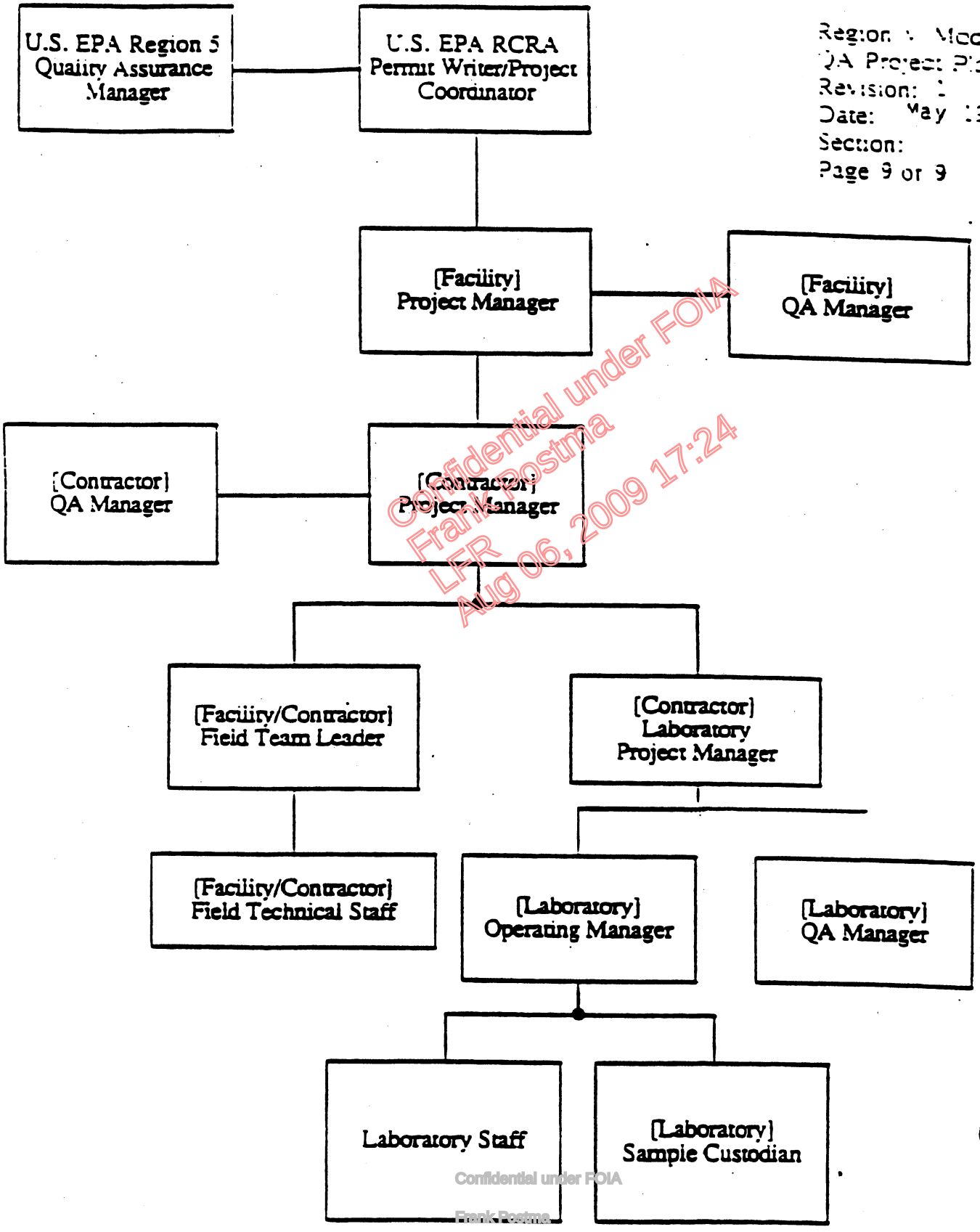

QAPP ELEMENT 5

QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The purpose of this section is to address project-specific objectives for accuracy, precision, completeness, representativeness, and comparability.

This section will include the following:

1) Discussion of Quantitative QA Objectives

a) Summary Tables

- A table will have the QA limits required for the project (Project Quantitation Limits, PQLs). Also, this table will include the laboratory method detection limits. If this table is presented in the Project Description section, then a reference to that section will be given.

- A table of control limits will be supplied in this section. The control limits for all QC samples (e.g., matrix spikes/matrix spike duplicates, surrogates, etc.) for all analytes to be quantitated will be stated.

b) Precision - The definition for precision and a description of how precision will be assessed for field and laboratory measurements will be presented.

c) Accuracy - The definition for accuracy and a description of how accuracy will be assessed for field and laboratory measurements will be presented.

d) Completeness - The definition of completeness along with the percent of completeness to be obtained for the project will be stated for both field and laboratory analyses.

2) Discussion of Qualitative QA Objectives

a) Representativeness - The measures to be employed to ensure representativeness for field and laboratory measurements will be stated.

b) Comparability - The measures to be employed to ensure comparability for field and laboratory measurements will be stated.

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SECTION 3

QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective for this project is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results which are legally defensible in a court of law. Specific procedures for sampling, chain-of-custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, audits, preventive maintenance of field equipment, and corrective action are described in other sections of this QAPP.

3.1 Precision

3.1.1 Definition

Precision is a measure of the degree to which two or more measurements are in agreement.

3.1.2 Field Precision Objectives

Field precision is assessed through the collection and measurement of field duplicates at a rate of 1 duplicate per 10 analytical samples. The total number of duplicates for this project are found in [the Appendix to this Model QAPP] of the project description section.

3.1.3 Laboratory Precision Objectives

Precision in the laboratory is assessed through the calculation of relative percent differences (RPD) and relative standard deviations (RSD) for three or more replicate samples. The equations to be used for precision in this project can be found in section 12 of this QAPP. Precision control limits are given in [the Appendix to this Model QAPP] and are referenced to the provided SOPs.

3.2 Accuracy

3.2.1 Definition

Accuracy is the degree of agreement between an observed value and an accepted reference value.

3.2.2 Field Accuracy Objectives

Accuracy in the field is assessed through the use of field and trip blanks and through the adherence to all sample handling, preservation and holding times.

3.2.3 Laboratory Accuracy Objectives

Laboratory accuracy is assessed through the analysis of matrix spikes (MS) or standard reference materials (SRM) and the determination of percent recoveries. The equation to be used for accuracy in this project can be found in section 12 of this QAPP. Accuracy control limits are given in [the Appendix to this Model QAPP] and are referenced to the provided SOPs.

3.3 Completeness

3.3.1 Definition

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions.

3.3.2 Field Completeness Objectives

Field completeness is a measure of the amount of valid measurements obtained from all the measurements taken in the project. The equation for completeness is presented in section 12 of this QAPP. Field completeness for this project will be greater than 90 percent.

3.3.3 Laboratory Completeness Objectives

Laboratory completeness is a measure of the amount of valid measurements obtained from all the measurements taken in the project. The equation for completeness is presented in section 12 of this QAPP. Laboratory completeness for this project will be greater than 95 percent.

3.4 Representativeness

3.4.1 Definition

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

3.4.2 Measures to Ensure Representativeness of Field Data

Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the field sampling plan (FSP) is followed and that proper sampling techniques are used.

3.4.3 Measures to Ensure Representativeness of Laboratory Data

Representativeness in the laboratory is ensured by using the proper analytical procedures, meeting sample holding times and analyzing and assessing field duplicated samples. The sampling network was designed to provide data representative of facility conditions. During development of this network, consideration was given to past waste disposal practices, existing analytical data, physical setting and processes, and constraints inherent to the RCRA program. The rationale of the sampling network is discussed in detail in the field sampling plan (FSP).

3.5 Comparability

3.5.1 Definition

Comparability is an expression of the confidence with which one data set can be

compared with another.

3.5.2 Measures to Ensure Comparability of Field Data

Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the FSP is followed and that proper sampling techniques are used.

3.5.3 Measures to Ensure Comparability of Laboratory Data

Planned analytical data will be comparable when similar sampling and analytical methods are used and documented in the QAPP. Comparability is also dependent on similar QA objectives.

3.6 Level of Quality Control Effort

Field blank, trip blank, method blank, duplicate, standard reference materials (SRM) and matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs.

Field and trip blanks consisting of distilled water, will be submitted to the analytical laboratories to provide the means to assess the quality of the data resulting from the field sampling program. Field blank samples are analyzed to check for procedural contamination at the facility which may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage.

Method blank samples are generated within the laboratory and used to assess contamination resulting from laboratory procedures. Duplicate samples are analyzed to check for sampling and analytical reproducibility. Matrix spikes provide information about the effect of the sample matrix on the digestion and measurement methodology. All matrix spikes are performed in duplicate and are hereinafter referred to as MS/MSD samples. One matrix spike/matrix spike duplicate will be collected for every 20 or fewer investigative samples. MS/MSD samples are designated/ collected for organic analyses only.

MS/MSD samples are investigative samples. Soil MS/MSD samples require no extra volume for VOCs or extractable organics. However, aqueous MS/MSD samples must be collected at triple the volume for VOCs and double the volume for extractable organics. One MS/MSD sample will be collected/designated for every 20 or fewer investigative samples per sample matrix (i.e., groundwater, soil).

The general level of the QC effort will be one field duplicate and one field blank for every 10 or fewer investigative samples. One volatile organic analysis (VOA) trip blank consisting of distilled deionized ultra pure water will be included along with each shipment of aqueous VOA samples.

The number of duplicate and field blank samples to be collected are listed in [the Appendix to this Model QAPP]. Sampling procedures are specified in the Field Sampling Plan.

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QAPP ELEMENT 6

SAMPLING PROCEDURES

This section will provide detailed, stepwise sampling procedures for each matrix (soil borings, sediment, surface water, groundwater, air, biota, etc.) to be evaluated. A matrix will be defined as a unique stratum which may be solid, liquid, gaseous, animal, or vegetable. Solid matrices may be similar (i.e. soil boring and sediment) but are considered separate matrices. Each sampling procedure will specify:

1) All equipment necessary to sample the matrix,

2) Detailed, "cookbook" procedures to collect investigative samples,

3) Explicit instructions for collecting each applicable type of QC sample for each matrix and associated analytical parameter. These QC samples will include field duplicates, field blanks, trip blanks (for aqueous volatile samples), matrix spike, matrix spike duplicates, etc.,

4) The order of analytical parameter sample fraction collection (i.e. "volatiles first, followed by extractable organics...") for each matrix,

5) Sample containers for each analytical fraction, matrix type, and concentration level. Specifically, the following will be addressed:

   a) The type of container

   b) The container volume

   c) The number of containers required for each analysis

   d) Specific chemical/temperature preservations required

6) Obtaining contaminant-free sample containers. Specifically, the following will be addressed:

   a) Detailed procedures used to prepare contaminant-free sample containers for each container/analytical fraction type,

   b) The criteria all containers must meet (i.e. "benzene < 1 ppb," etc.)

   c) How the criteria are verified and the frequency of the verification (i.e. "{Laboratory} will conduct a GC/MS analysis using CLP OLM01.8 at a frequency of one volatile and semivolatile container perlot of 100 sample containers.")

   d) Who will prepare the containers (i.e. "Containers will be prepared by [Sample Container Company].)"

   e) How the criteria are documented (i.e. "[Sample Container Company] will provide a certified analysis for each sample container lot.")

7) Decontamination procedures for field equipment,

8) Any ancillary procedures such as monitoring well installation or hydropunch work,

9) Sample packaging and shipping procedures to be used as part of the field chain-of-custody procedures since many considerations of sample shipping are integral to custody.

NOTE: If a Field Sampling Plan (FSP) is being prepared, the information to be supplied in the QAPP can be referenced to the FSP. However, the information in the FSP must 1) address ALL requirements stated in this section, 2) provide very detailed information, and 3) provide the specific reference to the FSP where the requested information is located. If these criteria cannot be met by the FSP, then this information must be detailed in this section of the QAPP.

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SECTION 4

SAMPLING PROCEDURES

[The following is an example of a sampling procedures section where a Field Sampling Plan (FSP) has been prepared. If a FSP is not prepared, this information must be stated in this section.]

The sampling procedures to be used in this site investigation will be consistent for the purpose of this project. The field sampling plan outlines all the sampling procedure information. Please refer to the following sections and subsections of the FSP for the following information:

- Groundwater Monitoring Well Installation - Section 2.1
- Groundwater Monitoring Well Equipment - Section 2.2
- Groundwater Sampling Procedures - Section 2.3
- Sample Containers - Section 2.4
- Obtaining Contaminant-Free Sample Containers - Section 2.4.1
- QC Sample Procedures - Section 2.5
- Field Blank Collection - Section 2.5.1
- Field Duplicative Collection - Section 2.5.2
- Matrix Spike/Matrix Spike Duplicate Collection - Section 2.5.3
- Trip Blank Preparation - Section 2.5.4
- Groundwater Sampling Equipment Decontamination - Section 2.5.5
- Groundwater Sampling Order - Section 2.5.6

[NOTE: This reference orientation was presented for groundwater only. However, the same referencing would be applied to ALL matrices (i.e. soil, sediments, wipes, fish, etc.)]

QAPP ELEMENT 7

CUSTODY PROCEDURES

Chain of custody is defined as the sequence of persons who have the item in custody. Chain of custody will be demonstrated by documenting that the item in question was always in a state of custody. This will be accomplished through a combination of field and laboratory records that demonstrate possession and transfer of custody.

This section will provide detailed procedures for chain of custody for field activities, laboratory activities, and final evidence files as follows:

1) Field Custody Procedures

Detailed custody procedures will be stated for evidence collected in the field. All documents, logbooks, photographs, measurements, analyses, samples collected, etc. must be addressed in the field custody procedures. Detailed explanations will include:

- Procedures for transfer of custody between individuals.
- A sample numbering system (if not presented in another QAPP section).
- Sample packaging and shipment procedures to an off site laboratory.
- Chronological sequences and instructions for completing all field custody documents as well as copies of each document (as applicable):

i. Field logbooks: The field logbook entry shall provide all information pertinent to the collection of field samples including locations, number/types of samples, measurements, sampling/atmospheric conditions, observations, etc. The field logbook will be a bound volume assigned to an individual field team member. All entries will be completed with a permanent inkpen with no erasures or whiteout used. All entries will be signed/dated. Any entry which is to be deleted shall use a single crossout which is signed/dated.

ii. Sample tags: A sample tag is attached to each individual sample aliquot for each investigative or quality control sample. An example of a U.S. EPA sample tag with instructions for completion is found as a figure appended to this Model QAPP (see section entitled "chain of custody samples"). At a minimum, the tag will include the field sample number, location (if not already encoded in the sample number), date/time of collection and type of analysis. A space for lab sample number (provided by the lab upon log-in) is also required.

A sample tag may be attached to the sample container with a wire around the container neck through a reinforced hole in the tag. All tag entries are made with a waterproof, permanent ink.

While sample labels (described below) may be used in addition to tags, tags must always be used whenever chain of custody is required! The sample tag is the only physical evidence of the sample aliquot as carried through the entire custody process outside of keeping all sample containers. Sample labels cannot usually be removed intact and often do not include enough space for information on smaller containers.

Sample tags allow for disposal of sample containers once the samples have exceeded their holding times.

iii. Sample labels: As noted above, sample labels are optional when chain-of-custody is required. Sample labels may repeat some of the information provided on tags but usually cannot be removed intact.

iv. Chain of custody record form: A chain-of custody record form is the form used to record information pertinent to all samples being shipped in the same cooler. In general, the form will record samples which may be shipped together (i.e. extractable organics or metals) to the same laboratory. The form will also include spaces for transfers of custody by the field team as well as for log-in by the lab sample custodian.

v. Shipping cooler custody seals: Shipping cooler custody seals are placed on the edges of the cooler between the lid and sides to determine whether coolers may have been tampered with. The custody record form, along with all associated samples/tags, preservative (i.e., ice) and packing material are placed in the cooler prior to sealing with one or more seals.

vi. Airbills: Airbills used by the shipping company are often overlooked in the custody chain. Airbills are the only means to document and ensure continuity in custody between the shipment of samples from the field until their arrival at the laboratory. Copies of all completed airbills must be included as part of the final custody documentation.

2) Laboratory Custody Procedures

Detailed laboratory custody procedures specific to each laboratory associated with the project will be stated. The RCRA facility and its field contractor must ensure continuity between field and lab custody procedures. Laboratory custody procedures will:

- begin when samples are received by the laboratory.
- maintain the chain of custody initiated in the field.
- provide the chronological sequence from sample log-in through sample analysis and disposal.
- provide detailed log-in procedures.
- detail the internal sample tracking and numbering systems.
- identify the sample custodian.
- detail transfers of custody within the laboratory.
- provide examples of internal custody documents (with instructions for completion).
- specify how and where samples are stored.
- specify how and when samples, extracts, and digestates are disposed.
- specify how custody of analytical data are maintained.

- specify how analytical data and custody records are "purged" from the custody of the lab to the final evidence file.

3) Final Evidence Files: This section will specify:

- the contents of the final evidence file.

- the identification of the file custodian.

- the location where the file will be maintained in a secure, limited access area.

- the length of time (as mandated by U.S. EPA) that the file will be maintained. This may be specified in an order, etc. The file must be offered to U.S. EPA prior to disposal.

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Frank Postma
LFR
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SECTION 5

CUSTODY PROCEDURES

Custody is one of several factors which is necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files. Final evidence files, including all originals of laboratory reports and purge files, are maintained under document control in a secure area.

A sample or evidence file is under your custody if:

* the item is in actual possession of a person; or

* the item is in the view of the person after being in actual possession of the person; or

* the item was in actual physical possession but is locked up to prevent tampering; or

* the item is in a designated and identified secure area.

5.1 FIELD CUSTODY PROCEDURES

Field logbooks will provide the means of recording data collecting activities performed. As such, entries will be described in as much detail as possible so that persons going to the facility could reconstruct a particular situation without reliance on memory.

Field logbooks will be bound, field survey books or notebooks. Logbooks will be assigned to field personnel, but will be stored in the document control center when not in use. Each logbook will be identified by the project-specific document number.

The title page of each logbook will contain the following:

* Person to whom the logbook is assigned.

- Logbook number.
- Project name.
- Project start date. and
- End date.

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the site, field sampling or investigation team personnel and the purpose of their visit will also be recorded in the field logbook.

Measurements made and samples collected will be recorded. All entries will be made in ink, signed, and dated and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark which is signed and dated by the sampler. Whenever a sample is collected, or a measurement is made, a detailed description of the location of the station, which includes compass and distance measurements, shall be recorded. The number of the photographs taken of the station, if any, will also be noted. All equipment used to make measurements will be identified, along with the date of calibration.

Samples will be collected following the sampling procedures documented in Section __ of this QAPP. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth at which the sample was collected, volume and number of containers. Sample identification number will be assigned prior to sample collection. Field duplicate samples, which will receive an entirely separate sample identification number, will be noted under sample description.

The sample packaging and shipment procedures summarized below will ensure that the samples will arrive at the laboratory with the chain of custody intact. The protocol for specific sample numbering using case numbers and traffic report numbers if applicable and other sample designations are included in Section ___ of this QAPP. Examples of field custody documents and instructions for completion are presented in [Appendix to this Model QAPP].

a) The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As FEW people as possible should handle the samples.

(b) All bottles will be identified by use of sample tags with sample numbers, sampling locations, date/time of collection, and type of analysis. The sample numbering system is presented in section ___ of this QAPP.

(c) Sample tags are to be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample tag because the ballpoint pen would not function in freezing weather.

d) Samples are accompanied by a properly completed chain of custody form. The sample numbers and locations will be listed on the chain of custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage area.

(e) Samples will be properly packaged on ice at 4°C for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in and secured to the inside top of each sample box or cooler. Shipping containers will be locked and secured with strapping tape and custody seals for shipment to the laboratory. The preferred procedure includes use of a custody seal attached to the front right and back left of the cooler. The custody seals are covered with clear plastic tape. The cooler is strapped shut with strapping tape in at least two locations.

(f) Whenever samples are collocated with a government agency, a separate sample receipt is prepared for those samples and marked to indicate with whom the samples are being collocated. The person relinquishing the samples to the facility or agency should request the representatives signature acknowledging sample receipt. If the representative is unavailable or refuses to sign, this is noted in the "Received By" space.

(g) All shipments will be accompanied by the Chain of Custody Record identifying the contents. The original record will accompany the shipment, and the pink and

yellow copies will be retained by the sampler for returning to the sampling office.

(h) If the samples are sent by common carrier, a bill of lading should be used. Receipts of bills of lading will be retained as part of the permanent documentation. If sent by mail, the package will be registered with return receipt requested. Commercial carriers are not required to sign off on the custody form as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact.

(i) Samples will be transported to the laboratory the same day the samples are collected in the field by overnight carrier.

5.2 LABORATORY CUSTODY PROCEDURES

Laboratory custody procedures for sample receiving and log-in; sample storage and numbering; tracking during sample preparation and analysis; and storage of data are described in the [Laboratory] procedures in the appendix. Examples of laboratory chain of custody traffic reports along with instructions for completion are [included in the Appendix to this Model QAPP]. **[This laboratory information can be attached to the QAPP as an appendix and referenced. Otherwise, please list the procedures here.]**

5.3 FINAL EVIDENCE FILES

The final evidence file will be the central repository for all documents which constitute evidence relevant to sampling and analysis activities as described in this QAPP. [Contractor] is the custodian of the evidence file and maintains the contents of [redacted] files for the RFI, including all relevant records, reports, logs, field notes, [redacted] pictures, subcontractor reports and data reviews in a secured, limited access [redacted] and under custody of the [Contractor] facility manager.

The final evidence file will include at a minimum:

- field logbooks
- field data and data deliverables
- photographs