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EPA Project Officer: Diana King
EPA Remedial Project Manager: Leslie McVickar

SOLIDIFICATION/STABILIZATION TREATABILITY STUDY QUALITY ASSURANCE PROJECT PLAN ADDENDUM

Pownal Tannery Superfund Site
Pownal, Vermont

March 2001

Prepared By:

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Quality Assurance Plan for Pownal Tannery Site, North Pownal, Vermont
Document Title

United States Environmental Protection Agency
Lead Organization (Agency, State, Tribe, Federal Facility, PRP, or Grantee)

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Other Approval Signatures: _____
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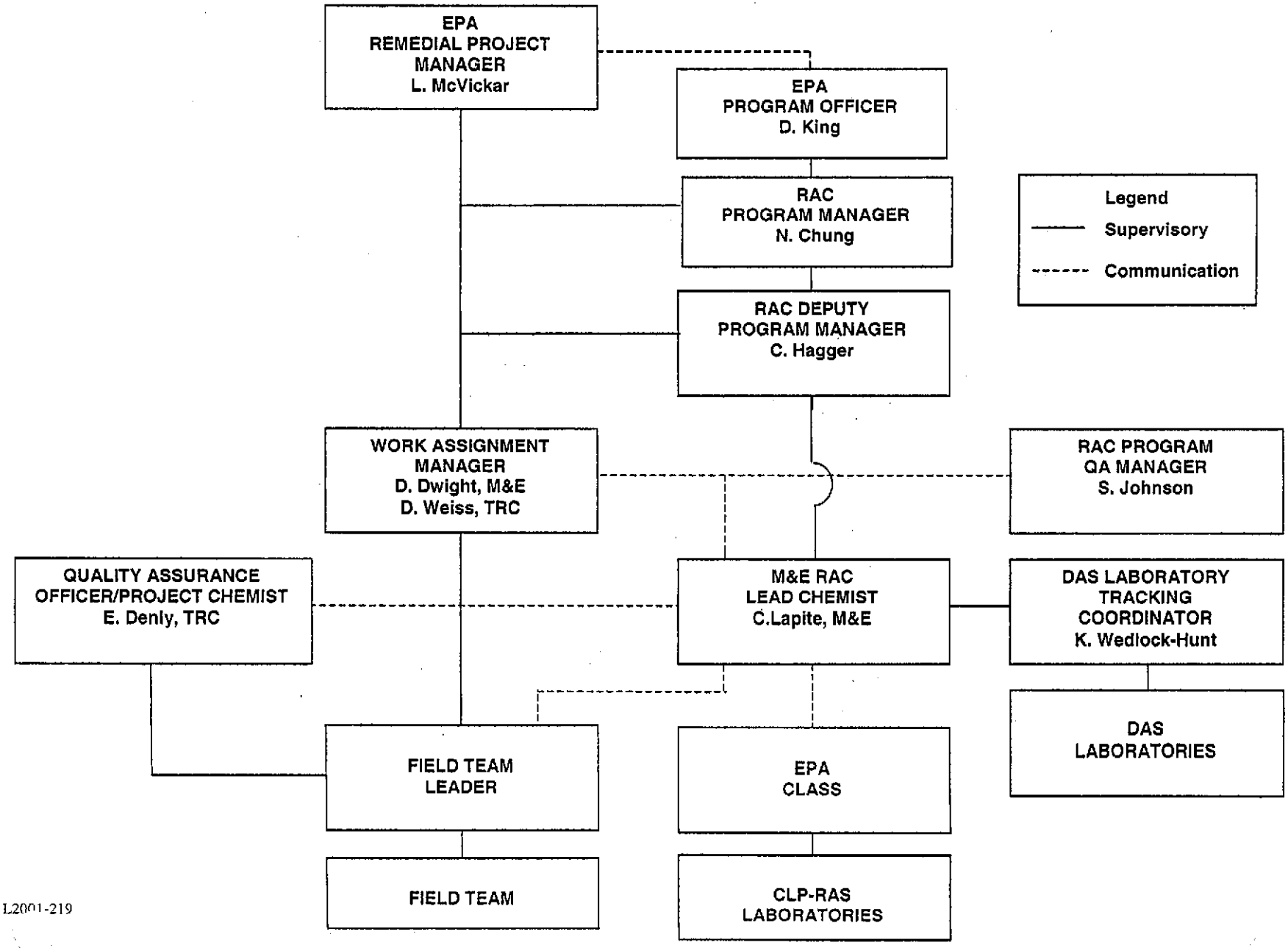
ORGANIZATION CHART AND COMMUNICATION PATHWAYS



Personnel Responsibilities and Qualifications Table

Name	Organizational Affiliation	Responsibilities*	Location of Personnel Resumes, if not included	Education and Experience Qualifications
Dale Weiss	TRC	Project Manager	Appendix A	Appendix A
Elizabeth Denly	TRC	Quality Assurance Officer	Appendix A	Appendix A

*See Section 5 of Site Management Plan for definition of key project staff responsibilities.

Project Description

Sampling Tasks: For a complete discussion, refer to Section 5.0 of the Field Sampling Plan and the Treatability Study Work Plan.

Analysis Tasks: For a complete discussion, refer to Section 5.0 of the Field Sampling Plan and the Treatability Study Work Plan.

Quality Control Tasks: For a complete discussion, refer to Section 5.0 of the Field Sampling Plan and Section 3 0 of the Data Management Plan.

Secondary Data: None anticipated.

Data Management Tasks: For a complete discussion, refer to the Data Management Plan.

Documentation and Records: For a complete discussion, refer to the Data Management Plan.

Data Packages: For a complete discussion, refer to the Field Sampling Plan and the Data Management Plan.

Assessment/Audit Tasks: Audits will be performed as described in this QAPP.

Data Verification and Validation Tasks: See TRC SOP 019 in Field Sampling Plan.

Data Usability Assessment Tasks: See TRC SOP 019 in Field Sampling Plan.

Medium/Matrix: *Solid/waste*
Region I Matrix Code (from EPA-NE DQO Summary Form): *SO, SL, CT*
Analytical Parameter: *TCLP Pesticides*
Concentration Level: *Low/medium*
Field Analytical or Fixed Laboratory Method/SOP: *DAS Method D-048: Analytical Specification for the Analysis of Pesticides in Solid and Aqueous Samples using the Toxicity Characteristic Leaching Procedure (TCLP)*

Contaminants of Concern and Other Target Analytes Table (Reference Limit and Evaluation Table)

Analyte	CAS Number	Project Action Limit µg/L	Project Quantitation Limit µg/L	Analytical Method	Achievable Laboratory Limits		
				MDLs	Method QLs	MDLs	QLs
Gamma-BHC (Lindane)	58-89-9	400	0.5	0.0031	0.5 ug/L	NA	NA
Heptachlor	76-44-8	8	0.5	0.0019	0.5 ug/L	NA	NA
Heptachlor Epoxide	1024-57-3	8	0.5	0.0020	0.5 ug/L	NA	NA
Endrin	72-20-8	20	1.0	0.0020	1.0 ug/L	NA	NA
Methoxychlor	72-43-5	10,000	5	0.0081	5 ug/L	NA	NA
Chlordane	57-74-9	30	20	0.0024*	20 ug/L	NA	NA
Toxaphene	8001-35-2	500	50	0.019	50 ug/L	NA	NA

* Based on average MDL of alpha-chlordane, gamma-chlordane and hetachlor (the three peaks used to quantify chlordane).

Medium/Matrix: *Solid/waste*
Region I Matrix Code (from EPA-NE DQO Summary Form): *SO, SL, CT*
Analytical Parameter: *TCLP Semivolatiles*
Concentration Level: *Low/medium*
Field Analytical or Fixed Laboratory Method/SOP: *DAS Method D-047: Analytical Specification for the Analysis of Semivolatile Organic Compounds in Solid and Aqueous Samples using the Toxicity Characteristic Leaching Procedure (TCLP)*

Contaminants of Concern and Other Target Analytes Table (Reference Limit and Evaluation Table)

Analyte	CAS Number	Project Action Limit µg/L	Project Quantitation Limit µg/L	Analytical Method	Achievable Laboratory Limits		
				MDLs	Method QLs	MDLs	QLs
Hexachloroethane	67-72-1	3000	100	0.70	100 ug/L	NA	NA
Nitrobenzene	98-95-3	2000	100	0.55	100 ug/L	NA	NA
Hexachlorobutadiene	87-68-3	500	100	0.59	100 ug/L	NA	NA
2,4,6-Trichlorophenol	88-06-2	2000	100	0.46	100 ug/L	NA	NA
2,4,5-Trichlorophenol	95-95-4	400,000	100	0.63	100 ug/L	NA	NA
2,4-Dinitrotoluene	121-124-2	130	100	0.46	100 ug/L	NA	NA
Hexachlorobenzene	118-74-1	130	100	0.46	100 ug/L	NA	NA
Pentachlorophenol	87-86-5	100,000	100	0.24	100 ug/L	NA	NA
Pyridine	110-86-1	5000	100	4.78	100 ug/L	NA	NA
2-Methylphenol	95-48-7	200,000	100	0.44	100 ug/L	NA	NA
3-Methylphenol	108-39-4	200,000	100	0.44	100 ug/L	NA	NA
4-Methylphenol	106-44-5	200,000	100	0.44	100 ug/L	NA	NA

Medium/Matrix: *Solid/waste*
Region I Matrix Code (from EPA-NE DQO Summary Form): *SO, SL, CT*
Analytical Parameter: *TCLP Metals*
Concentration Level: *Low/medium*
Field Analytical or Fixed Laboratory Method/SOP: *DAS Method D-045: Analytical Specification for the Analysis of Metals in Solid and Aqueous Samples using the Toxicity Characteristic Leaching Procedure (TCLP) and Hazardous Waste Characteristics (Ignitability, Corrosivity [pH[, Reactive cyanide, and Reactive sulfide)*

Contaminants of Concern and Other Target Analytes Table (Reference Limit and Evaluation Table)

Analyte	CAS Number	Project Action Limit µg/L	Project Quantitation Limit µg/L	Analytical Method	Achievable Laboratory Limits		
				MDLs	Method QLs	MDLs	QLs
Arsenic	7440-38-2	5000	50	2	50 ug/L	NA	NA
Barium	7440-39-3	100,000	1000	1	1000 ug/L	NA	NA
Cadmium	7740-43-9	1000	25	0.4	25 ug/L	NA	NA
Chromium	16065-83-1	5000	50	0.5	50 ug/L	NA	NA
Lead	7439-92-1	5000	15	2	15 ug/L	NA	NA
Mercury	7439-97-6	200	1.0	0.1	1.0 ug/L	NA	NA
Selenium	7782-49-2	1000	25	6	25 ug/L	NA	NA
Silver	7440-22-4	5000	50	1	50 ug/L	NA	NA

Medium/Matrix: *Solid/waste*
Region I Matrix Code (from EPA-NE DQO Summary Form): *SO, SL*
Analytical Parameter: *Reactivity*
Concentration Level: *Low/medium*
Field Analytical or Fixed Laboratory Method/SOP: *DAS Method D-045: Analytical Specification for the Analysis of Metals in Solid and Aqueous Samples using the Toxicity Characteristic Leaching Procedure (TCLP) and Hazardous Waste Characteristics (Ignitability, Corrosivity [pH[, Reactive cyanide, and Reactive sulfide)*

Contaminants of Concern and Other Target Analytes Table (Reference Limit and Evaluation Table)

Analyte	CAS Number	Project Action Limit mg/kg	Project Quantitation Limit mg/kg	Analytical Method	Achievable Laboratory Limits		
				MDLs	Method QLs	MDLs	QLs
Reactive cyanide	N/A	250	250	0.18	250 mg/kg	NA	NA
Reactive sulfide	N/A	500	500	0.15	500 mg/kg	NA	NA

Medium/Matrix: *Solid/waste*
Region I Matrix Code (from EPA-NE DQO Summary Form): *SO, SL*
Analytical Parameter: *Corrosivity and Ignitability*
Concentration Level: *Low/medium*
Field Analytical or Fixed Laboratory Method/SOP: *DAS Method D-045: Analytical Specification for the Analysis of Metals in Solid and Aqueous Samples using the Toxicity Characteristic Leaching Procedure (TCLP) and Hazardous Waste Characteristics (Ignitability, Corrosivity [pH[, Reactive cyanide, and Reactive sulfide)*

Contaminants of Concern and Other Target Analytes Table (Reference Limit and Evaluation Table)

Analyte	CAS Number	Project Action Limit	Project Quantitation Limit	Analytical Method	Achievable Laboratory Limits		
				MDLs	Method QLs	MDLs	QLs
Ignitability	N/A	Flashpoint <60°C	N/A	N/A	N/A	N/A	N/A
Corrosivity	N/A	pH ≤2 or ≥12.5	N/A	N/A	N/A	N/A	N/A

Sampling Matrices, Parameters, SOPs, and Container Requirements[1,2]

Medium/ Matrix	Analytical Parameter	Conc. Level	Sampling SOP	Analytical Method/SOP	Sample Volume	Containers (Number, size and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/ analysis)
Lagoon Sludge	TCLP Metals	Low/ Med	SOP-005, -006, -014, -018	DAS TCLP Metals (D-045)	8 oz.	1 x 8 oz. glass	Ice, <4°C +/-2°C	28 days to TCLP extraction for Hg and 28 days from TCLP extraction to mercury analysis; 6 months to TCLP extraction and 6 months from TCLP extraction to analysis for other metals
Lagoon Sludge	TCLP Pesticides	Low/ Med	SOP-005, -006, -014, -018	DAS TCLP Pesticides (D-048)	8 oz.	1 x 8 oz. glass	Ice, <4°C +/-2°C	14 days to TCLP extraction; 7 days from TCLP extraction to pesticide extraction; 40 days from pesticide extraction to analysis
Lagoon Sludge	TCLP SVOCs	Low/ Med	SOP-005, -006, -014, -018	DAS TCLP SVOCs (D-047)	8 oz.	1 x 8 oz. glass	Ice, <4°C +/-2°C	14 days to TCLP extraction; 7 days from TCLP extraction to SVOC extraction; 40 days from SVOC extraction to analysis
Lagoon Sludge	Reactive cyanide and sulfide	Low/ Med	SOP-005, -006, -014, -018	DAS Reactive Cyanide and Sulfide (D-045)	8 oz.	1 x 8 oz. glass	Ice, <4°C +/-2°C No headspace	48 hours from sample receipt

Sampling Matrices, Parameters, SOPs, and Container Requirements[1,2]

Medium/ Matrix	Analytical Parameter	Conc. Level	Sampling SOP	Analytical Method/SOP	Sample Volume	Containers (Number, size and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/ analysis)
Lagoon Sludge	Ignitability	Low/ Med	SOP-005, -006, -014, -018	DAS Ignitability (D-045)	8 oz.	1 x 8 oz. glass	Ice, <4°C +/-2°C	14 days from sample receipt
Lagoon Sludge	Corrosivity	Low/ Med	SOP-005, -006, -014, -018	DAS Corrosivity (D-045)	8 oz.	1 x 8 oz. glass	Ice, <4°C +/-2°C	14 days from sample receipt
Soil	TCLP Metals	Low/ Med	SOP-005, -006, -014, -018,-110, 111, 112	DAS TCLP Metals (D-045)	8 oz.	1 x 8 oz. glass	Ice, <4°C +/-2°C	28 days to TCLP extraction for Hg and 28 days from TCLP extraction to mercury analysis; 6 months to TCLP extraction and 6 months from TCLP extraction to analysis for other metals
Soil	TCLP Pesticides	Low/ Med	SOP-005, -006, -014, -018,-110, 111, 112	DAS TCLP Pesticides (D-048)	8 oz.	1 x 8 oz. glass	Ice, <4°C +/-2°C	14 days to TCLP extraction; 7 days from TCLP extraction to pesticide extraction; 40 days from pesticide extraction to analysis
Soil	TCLP SVOCs	Low/ Med	SOP-005, -006, -014, -018,-110, 111, 112	DAS TCLP SVOCs (D-047)	8 oz.	1 x 8 oz. glass	Ice, <4°C +/-2°C	14 days to TCLP extraction; 7 days from TCLP extraction to SVOC extraction; 40 days from SVOC extraction to analysis

Sampling Matrices, Parameters, SOPs, and Container Requirements[1,2]

Medium/ Matrix	Analytical Parameter	Conc. Level	Sampling SOP	Analytical Method/SOP	Sample Volume	Containers (Number, size and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/ analysis)
Soil	TCLP Metals	Low/ Med	SOP-005, -006, -014, -018	DAS TCLP Metals (D-045)	8 oz.	1 x 8 oz. glass	Ice, <4°C +/-2°C	28 days to TCLP extraction for Hg and 28 days from TCLP extraction to mercury analysis; 6 months to TCLP extraction and 6 months from TCLP extraction to analysis for other metals
Soil	TCLP Pesticides	Low/ Med	SOP-005, -006, -014, -018	DAS TCLP Pesticides (D-048)	8 oz.	1 x 8 oz. glass	Ice, <4°C +/-2°C	14 days to TCLP extraction; 7 days from TCLP extraction to pesticide extraction; 40 days from pesticide extraction to analysis
Soil	TCLP SVOCs	Low/ Med	SOP-005, -006, -014, -018	DAS TCLP SVOCs (D-047)	8 oz.	1 x 8 oz. glass	Ice, <4°C +/-2°C	14 days to TCLP extraction; 7 days from TCLP extraction to SVOC extraction; 40 days from SVOC extraction to analysis
Soil	Reactive cyanide and sulfide	Low/ Med	SOP-005, -006, -014, -018	DAS Reactive Cyanide and Sulfide (D-045)	8 oz.	1 x 8 oz. glass	Ice, <4°C +/-2°C No headspace	48 hours from sample receipt

Sampling Matrices, Parameters, SOPs, and Container Requirements[1,2]

Medium/ Matrix	Analytical Parameter	Conc. Level	Sampling SOP	Analytical Method/SOP	Sample Volume	Containers (Number, size and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/ analysis)
Soil	Ignitability	Low/ Med	SOP-005, -006, -014, -018	DAS Ignitability (D-045)	8 oz.	1 x 8 oz. glass	Ice, <4°C +/-2°C	14 days from sample receipt
Soil	Corrosivity	Low/ Med	SOP-005, -006, -014, -018	DAS Corrosivity (D-045)	8 oz.	1 x 8 oz. glass	Ice, <4°C +/-2°C	14 days from sample receipt
Soil	VOC	Low/ Med	SOP-005, -006, -014, -018	DAS VOCs (D-007)	5 g	4 x 40 ml	Ice, <4°C +/-2°C MeOH, sodium bisulfate	14 days

Fixed Laboratory Analytical Method/SOP Reference Table

Reference Number	Fixed Laboratory Performing Analysis	Title, Revision Date and/or Number	Definitive or Screening Data	Region I NESTS Method Code*	Analytical Parameter	Instrument	Modified for Project Work Y or N
Remedial Investigation and Feasibility Study Chemical Analyses							
All analytical laboratory data will be definitive data. Delivery of Analytical Services (DAS) laboratories and Routine Analytical Services (RAS) laboratories will be determined by Metcalf & Eddy, Inc. and EPA - NE, respectively. RAS analytical methods will follow the U.S. EPA Contract Laboratory Program Statement of Work. DAS analytical specifications will be provided by Metcalf & Eddy, Inc.							
Feasibility Study Physical Analyses							
L-001	TRC	ASTM Method D-3441	Screening	*	Standard Penetration Test	Penetrometer	N
L-002	TRC	ASTM Method D-3882	Screening	*	Freeze/ Thaw Test	N/A	N

* An NESTS Method Code does not exist for these parameters.

Fixed Laboratory Instrument Maintenance and Calibration Table

Instrument	Activity	List Maintenance, Testing and Inspection Activities	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	Method/SOP Reference
Remedial Investigation and Feasibility Study Chemical Analyses Delivery of Analytical Services (DAS) laboratories and Routine Analytical Services (RAS) laboratories will be determined by Metcalf & Eddy, Inc. and EPA-NE, respectively. Analytical data will be evaluated using the EPA-NE data validation guidelines. DAS analytical specifications will be provided by Metcalf & Eddy, Inc. All instruments will be maintained and calibrated in accordance with RAS and DAS Method Specifications.							
Feasibility Study Physical Analyses							
Penetrometer	Calibration		daily/every 20 tests				

Data Validation Summary Table

Medium/ Matrix	Analytical Parameter	Concentration Level	Validation Criteria	Validation Criteria Modified	Data Validation Tier Level	Modified Tier Level Used	Data Validator (Name, title and organizational affiliation)	Responsibility for Data Validations (Name, title and organizational affiliation)
Lagoon Sludge	TCLP Metals	Low/Medium	Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses	Y	Tier I	Y	Lorie MacKinnon, TRC Environmental Corporation	Elizabeth Denly, TRC Environmental Corporation
Lagoon Sludge	TCLP Pesticides	Low/Medium	Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses	Y	Tier I	Y	Lorie MacKinnon, TRC Environmental Corporation	Elizabeth Denly, TRC Environmental Corporation
Lagoon Sludge	TCLP SVOCs	Low/Medium	Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses	Y	Tier I	Y	Lorie MacKinnon, TRC Environmental Corporation	Elizabeth Denly, TRC Environmental Corporation
Lagoon Sludge	Ignitability, Corrosivity, Reactive cyanide, reactive sulfide	Low/Medium	Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses	Y	Tier I	Y	Lorie MacKinnon, TRC Environmental Corporation	Elizabeth Denly, TRC Environmental Corporation
Soil	TCLP Metals	Low/Medium	Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses	Y	Tier I	Y	Lorie MacKinnon, TRC Environmental Corporation	Elizabeth Denly, TRC Environmental Corporation
Soil	TCLP Pesticides	Low/Medium	Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses	Y	Tier I	Y	Lorie MacKinnon, TRC Environmental Corporation	Elizabeth Denly, TRC Environmental Corporation
Soil	TCLP SVOCs	Low/Medium	Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses	Y	Tier I	Y	Lorie MacKinnon, TRC Environmental Corporation	Elizabeth Denly, TRC Environmental Corporation
Soil	Ignitability, Corrosivity, Reactive cyanide, reactive sulfide	Low/Medium	Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses	Y	Tier I	Y	Lorie MacKinnon, TRC Environmental Corporation	Elizabeth Denly, TRC Environmental Corporation

Data Validation Summary Table

Medium/ Matrix	Analytical Parameter	Concentration Level	Validation Criteria	Validation Criteria Modified	Data Validation Tier Level	Modified Tier Level Used	Data Validator (Name, title and organizational affiliation)	Responsibility for Data Validations (Name, title and organizational affiliation)
Soil	VOCs	Low/Medium	Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses	Y	Tier I	Y	Lorie MacKinnon, TRC Environmental Corporation	Elizabeth Denly, TRC Environmental Corporation
Soil	TCLP Metals	Low/Medium	Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses	Y	Tier I	Y	Lorie MacKinnon, TRC Environmental Corporation	Elizabeth Denly, TRC Environmental Corporation
Soil	TCLP Pesticides	Low/Medium	Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses	Y	Tier I	Y	Lorie MacKinnon, TRC Environmental Corporation	Elizabeth Denly, TRC Environmental Corporation
Soil	TCLP SVOCs	Low/Medium	Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses	Y	Tier I	Y	Lorie MacKinnon, TRC Environmental Corporation	Elizabeth Denly, TRC Environmental Corporation

ATTACHMENT B

TRC
STANDARD OPERATING PROCEDURES 110, 111, 112

METCALF & EDDY, INC.
DAS METHODS
D-045, D-047, D-048

STANDARD OPERATING PROCEDURE (SOP) NO. 110
CONDITIONING OF UNTREATED SOIL
BENCH-SCALE TREATABILITY STUDIES
FIXATION (SOLIDIFICATION/STABILIZATION)

1.0 INTRODUCTION

This SOP describes uniform and repetitive procedures to condition soil samples prior to treatment by fixation. The pretreatment includes size reduction of friable particles, removal of oversize particles, moisture conditioning, and sample splitting. Conditioning of untreated soil will enhance the reproducibility of treatability results. The conditioning protocols employed herein will generally result in more thorough and uniform bench-scale mixing than should be expected in the field (during pilot- or full-scale treatment), unless field procedures also employ similar conditioning steps.

It is the purpose of this SOP to specify procedures that will result in a set of replicate subsamples of untreated, conditioned soil suitable for subsequent treatment by a variety of reagents. The uniformity of subsamples is subject to limitations of chemical and physical variability, inherent to soil. Additionally, this SOP employs protocols which promote the volatilization of volatile organic compounds, and unless special measures are taken to control emissions, safety concerns and volatile losses may be expected.

2.0 OVERVIEW

Observations of the as-received sample are recorded and the sample is spread within large mixing pans. Friable materials, such as clay chunks, are then reduced in size by finger pressure and light hammering with a mallet. The broken-down soil is then sieved to remove oversize particles and the relative fraction of oversize material is recorded. The sieved soil is then spread within large mixing pans and split (halved) into replicate subsamples by quartering and recombining diagonally-opposite quarters. The splitting is continued until the requisite number of subsamples or the requisite subsample mass is produced.

Equipment is cleaned before and after conditioning. Work is typically conducted in a vented laboratory workspace. Minimum personal protection is Level D, with an upgrade to Level C upon detection of elevated concentrations of organic vapors (either by odor or by organic vapor monitor). Documentation will typically consist of entries into a laboratory logbook.

3.0 EQUIPMENT

- Approximate 2-foot square mixing pans, steel
- Trowels, stainless steel
- Mallets, wooden or stainless capped wood
- Sieve, brass or stainless, typical sizes include 1/2-inch, 3/8-inch, and #4

- Scale, 50 pound, ± 0.1 pound
- Decontamination brushes

4.0 REAGENTS

- Alquinox, liquinox, or other relatively residue-free organically sterile soap
- Tap water or distilled water

5.0 PROCEDURE

Decontaminate equipment by scrubbing with soap solution and rinsing with tap water. Verify accuracy of scale with selected weights from calibration weight set, as per QA/QC procedures.

Place as-received sample in mixing pan, perform and record visual-manual classification.

As appropriate, manually remove very large, nonfriable particles.

Reduce the particle size of friable particles (such as clay lumps, clay balls, and slightly cemented soil) by crushing with finger pressure as well as lightly pounding with a mallet.

Sieve the material through the specified sieve. If unspecified, use a 3/8-inch sieve. Hand-sieving is typically appropriate; additional particle size reduction may be performed during hand-sieving. After sieving, estimate or weigh and record the relative portion of oversize particles. As desired, adjust the moisture content of the sieved material. Measure and record the original soil weight, as well as the weight of added water. Thoroughly mix the added water with the sieved material. If large adjustments in moisture are made or the soil is relatively plastic (high clay content), the moisture-amended material should be cured prior to further testing. Transfer the material to 1-gallon wide-mouth glass jars and cure for 24 hours at 4 degrees Celsius, protected from sunlight. Record curing times and conditions, if employed.

After desired adjustments in moisture content (and curing), spread the material within the mixing pans and homogenize by mixing with a trowel. Then spread the material to fairly uniform depth and divide into quarters by inscribing a "+" with a trowel. Recombine diagonally-opposite quarters to produce additional, smaller, replicate subsamples, until the desired mass or number of subsamples has been produced.

Store subsamples in clean, closed, labeled, glass containers at 4 degrees Celsius, protected from sunlight.

Decontaminate equipment by scrubbing with soap solution and rinsing with tap water. As appropriate, perform additional cleaning according to the laboratory general decontamination protocols.

6.0 QUALITY CONTROL

Calibration checks should be performed on the scales daily or more frequently. A visual check on homogeneity, thoroughness of mixing, and subsample similarity should be performed routinely during the applicable steps, and deviations recorded. Special attention should be given to coarse granular soils to minimize segregation. Special attention should also be given to plastic soils because the toughness of these soils require more thorough and time-consuming mixing.

7.0 DECONTAMINATION

Initial decontamination of equipment consists of soap wash and tap water rinse.

8.0 TESTING RESIDUALS

Residual oversize material and untreated soil should be collected for disposal as laboratory waste or for return to the generator.

9.0 DOCUMENTATION

Laboratory logbook entries should include the following:

- Project name and number.
- Date and time of activities.
- Names of personnel involved and laboratory location.
- Visual-manual classification of the as-received sample (color, moisture, texture, plasticity, odor).
- Description of particle size reduction techniques employed and type of material that was reduced in size.
- Size designation of the sieve.
- Estimated or measured weight of the oversize and sieved material and calculation of the relative portion of oversize material.
- Weight of added water, curing time and condition, if employed.
- Special notes or deviations associated with and mixing or splitting methods, if any.

10.0 SAFETY

Dermal protection is essential. Several activities may also produce dust, requiring respiratory protection. If the soil contains volatile organic chemicals, volatilization will be promoted by many of the conditioning activities, requiring respiratory protection. Most dust problems may be cured by spritzing the soil with a fine mist of water; do not hesitate to mist the sample for safety reasons. Record any misting in the laboratory logbook.

Soil conditioning should typically be performed within a vented laboratory hood. Contaminant-specific safety hazards include volatile organic, metal Containing dusts, and dioxins.

STANDARD OPERATING PROCEDURE (SOP) NO.111
MIXING OF REAGENTS WITH SOIL/SLUDGE
BENCH-SCALE TREATABILLTY STUDIES
FIXATION (SOLIDIFICATION/STABILIZATION)

1.0 INTRODUCTION

This SOP describes uniform and repetitive procedures to mix both dry (powdered) and/or fluid fixative agents (reagents) with either soil or sludge. Two procedures are specified, hand-mixing and machine-mixing, with a preference for hand-mixing of small batches. Prior to implementing this SOP, it is advisable to have (1) conditioned the soil or sludge by removing oversize particles, (2) homogenized the sample, and (3) progressively split the sample to produce consistent subsamples.

It is the purpose of this SOP to specify procedures that will result in thoroughly documented mixes that may be reproduced, subject to inherent variability of chemical and physical composition. It is also the purpose of this SOP to observe the workability of the freshly treated material and volume change upon treatment, given the mixed proportions. This SOP may produce unusual results for soil/sludge containing volatile chemicals because of limited efforts to control aeration during the mixing process. In general, the mixing produced by this SOP may be considered to be more thorough than that normally produced during pilot and full-scale fixation.

2.0 OVERVIEW

Untreated observation and parameters are initially recorded, with emphasis on simple mass and volume measurements. Proportions of soil/sludge, reagents, and water are then measured. Contents are then added to the mixing container in the following typical order: powdered reagents, water, liquid reagents, and finally soil/sludge. An exception is made for soluble silicates, which are added last. Reagents are typically blended prior to soil/sludge addition. Mixing of reagents with soil typically covers a specified period, usually two to three minutes. Mixing effort is generally moderate to medium. Water additions may be made during mixing to adjust dry mixtures. Mixing observations, workability, and any water additions are recorded. Treated observations and parameters are then recorded, with emphasis on simple mass and volume measurements. The mixed sample is ready for subsequent curing.
Equipment is cleaned before and after mixing. Work is typically conducted in a vented laboratory workspace. Minimum personal protection is Level D, with upgrades to Level C upon visible dust or elevated organic vapor monitor readings in the breathing zone, or possibly upon odor detection. Record keeping will typically consist of standardized mixing form and laboratory logbook.

3.0 EQUIPMENT

- 1 and 2-quart mixing bowls, stainless steel or glass
- Spatulas, stainless steel
- Spoons, stainless steel

- Stirring rods, glass
- Graduated cylinder, glass
- Mixer and blades, Hobart Model
- Scale, 2000 gram, ~0.1 gram
- Molds 2-inch diameter, 4-inch length, height to diameter ratio = 1 to 2, plastic
- pH meter (if desirable)
- Decontamination brushes

4.0 REAGENTS

Alquinox, liquinox, or other relatively residue-free organically sterile soap
Tap water (preferred over distilled water for blending)
Commercial/proprietary fixative agents

5.0 PROCEDURE

1. Decontaminate equipment by scrubbing with soap solution and rinsing with tap water. Verify response of pH meter with buffer solutions. Verify response of scale with selected weights from calibration weight set.

2. Measure diameter, height, and empty weight of mold.

3. Place and compact untreated soil/sludge in mold, using three lifts, which have been gently rodded approximately five times to remove large voids. After third lift, add enough untreated soil/sludge to fill mold and level material even with the top of the mold using a spatula.

4. Measure the weight of the mold containing untreated soil/sludge and calculate untreated bulk density.

5. Empty material from mold and break-down or homogenize as needed. If desired, set aside subsample (50 to 100 grams) in covered dish to determine moisture content.

6. Measure tare weight of mixing bowl. Add and measure weights of (a) powdered reagents, (b) water, and (c) liquid reagents. Unless specifically directed, do not add soluble silicate liquid reagents during this step, since these silicates are highly reactive with Portland cement materials.

7. Mix reagents to uniform consistency, with particular attention to remove lumps of powdered material. Record observations of unusual reagent preblending, if any.

8. Observe consistency of preblended reagents and compare to consistency of soil/sludge and; if necessary to provide uniform reagent-soil/sludge mixture; measure, record, add water, and remix the preblended reagent mixture.

Note: In general, the water:cement ratio (including the water contained in the soil/sludge) should exceed 1.5. For purpose of this calculation, cement may be considered as Portland cement, reactive pozzolan, and quicklime. Additional water may be needed if clay reagents are included; in such cases it may be worthwhile to pre-measure the absorptive capacity of the clay since some clays require a water to clay ratio up to 15 to produce a workable slurry.

9. Add soil/slurry to pre-mixed reagents and record weight of added material. Mix by using medium hand-effort or by using medium setting on a mechanical blender for 2-1/2 minutes, ±1/2 minute. If applicable, add and record weight of soluble silicates immediately after adding soil/sludge and employ full mixing time for complete reagent-soil/sludge mixture. Record mixing time and observations of viscosity, uniformity of mixture, and other pertinent parameters. If desirable, measure pH by inserting probe into mixture.

10. Place and compact treated soil/sludge into mold, using three lifts, which have been gently rodded approximately five times to remove large voids. After third lift, add enough treated soil/sludge to fill mold and level material even with the top of the mold using a spatula.

11. Measure weight of the mold containing treated soil/sludge and calculate treated bulk density. If desired, set aside subsample (50 to 100 grams) from the treated material remaining in mixing bowl to determine moisture content. Analyze moisture content sample as soon as possible, recognizing that the moisture content of the treated soil/sludge will irreversibly decrease as hydration proceeds.

12. Decontaminate equipment by scrubbing with soap solution and rinsing with tap water. If appropriate, perform additional cleaning according to the laboratory general decontamination protocols.

6.0 QUALITY CONTROL

Calibration checks should be performed for the pH meter and scales daily or more frequently. Treated samples should be replicated at a minimum frequency ratio of 1 to 10. Since the purpose of the treatability study is a comparative measure of treatment effectiveness, procedure uniformity is important. As such, deviations from the standardized protocols should be noted in the sample preparation logs. Method blanks should be prepared using a uniform sand, such as Ottawa 20-30 sand, at a frequency ratio of 1 to 10.

7.0 DECONTAMINATION

Initial decontamination of equipment consists of a soap wash and tap water rinse. Because untreated samples likely contain elevated chemical concentrations, strict decontamination procedures are not warranted. Additional attention is warranted during preparation of the clean sand blanks.

8.0 TESTING RESIDUALS

Residual untreated sample should be recombined, if possible, with virgin sample for consumption during subsequent trial mixes. Residual treated sample, as well as untreated sample that is not suitable for reuse, should be collected for laboratory waste disposal or be returned to the generator.

9.0 DOCUMENTATION

Formulation notes should consist of the attached standardized form and a laboratory logbook. At a minimum, documentation should be sufficient to reconstruct the mixing proportions, bulk density of the untreated and treated samples, conditions of mixing, and observations of the consistency of the treated sample.

10.0 SAFETY

Premixing of reagents does not typically present special safety hazards. Quicklime can present hazards for heat generation and volatilization, therefore cautious blending of this reagent is necessary, if utilized. Reagent mixtures are typically caustic in nature, requiring glove protection.

Reagent-soil/sludge mixing should typically be performed within a vented laboratory hood. Special care should be exercised in preparation of sample which has been contaminated with volatile organic compounds. The heat of cement or pozzolan hydration, as well as the action of mixing, may cause volatilization of these compounds. Contaminant-specific safety hazards include volatile organics, metal containing dusts, and dioxins.

STANDARD OPERATING PROCEDURE (SOP) NO. 112
CURING OF FIXED (TREATED) SOIL/SLUDGE
BENCH-SCALE TREATABILITY STUDIES
FIXATION (SOLIDIFICATION/STABILIZATION)

1.0 INTRODUCTION

This SOP describes uniform and repetitive procedures to place freshly treated soil/sludge into curing containers in order to cure the treated material. Since bench-scale studies commonly produce comparative results (comparing one reagent mix against another), uniform curing conditions are important. Typically, field curing occurs at temperatures lower than those employed within the laboratory in addition to being typically slower than laboratory curing.

2.0 OVERVIEW

Freshly treated material is placed into molds using light compaction. The molds are then sealed, retained together, and placed in a relatively temperature-constant area within the laboratory. It is efficient to complete the preparatory steps for filling the molds prior to the commencement of mixing the reagents with soil/sludge. As such, mold filling may immediately follow mixing. Delays between mixing and mold filling may result in partial hardening of the treated material which interferes with mold filling (physical parameters such as strength, durability, and permeability are most adversely affected).

Equipment is cleaned before and after conditioning and work is typically conducted in a vented laboratory workspace. Minimum personal protection is Level D, with an upgrade to Level C based on experience during mixing. Documentation will typically consists of logbook entries.

3.0 EQUIPMENT

- Spatulas, stainless steel
- Spoons, stainless steel
- Stirring rods, glass
- Molds, 2-inch diameter, 4-inch length, height to diameter ratio = 1 to 2, plastic
- Mold caps consisting of ±2.5-inch diameter glass plates, or equivalent
- Shallow box or plastic tub

4.0 REAGENTS

Alquinox, liquinox, or other relatively residue-free organically-sterile soap
Tap water

5.0 PROCEDURE

1. Decontaminate equipment by scrubbing with a soap solution and rinsing with tap water.

2. If possible, identify the mold labels with the Project Name, Project No., Sample Designation, Date, Time (typically time corresponding to filling of molds), and Personnel. Attach labels to molds. This step will eliminate the need to place labels on or write on the sample molds after they have been filled, which will ultimately minimize disturbance of the molded sample.

3. Place and compact the freshly treated soil/sludge into a mold, using three lifts that have been gently rodded approximately five times to remove large voids. After third lift, add enough treated soil/sludge to fill mold, and level material even with top of the mold using a spatula. Cover with cap, verify labeling information, and place in box or tub with other molded samples.

4. Place the box or tub which contains the samples in a secure location within the laboratory. Treated samples are to be stored under stable temperatures, darkness and without physical disturbance. Counter cabinets typically provide good storage.

5. Decontaminate equipment by scrubbing with a soap solution and rinsing with tap water. As appropriate, perform additional cleaning according to the laboratory general decontamination protocol.

6.0 QUALITY CONTROL

It is important to provide uniform techniques to place and compact the treated material within the molds; otherwise, erratic physical parameters may be measured on the cured samples. Inconsistencies or deviations in the compaction technique should be observed and noted in the laboratory notebook. Special attention should be given to the placement and compaction of treated materials that are particularly dry, since these materials have less of a tendency to flow into a uniform density (without voids). In addition, quality is provided by minimizing the time between mixing and molding.

7.0 DECONTAMINATION

Initial decontamination of equipment consists of a soap wash and tap water rinse. Attention to decontamination is warranted for the clean sand blanks.

8.0 TESTING RESIDUALS

Residual treated sample should be collected for laboratory waste disposal or be returned to the generator.

9.0 DOCUMENTATION

- Laboratory logbook entries should include the following:
- Project name and number.
- Date and time of activities.
- Names of personnel involved and laboratory location.

- Description of the molding methods including, mold size, number of lifts, number of strokes per lift, and any unusual observations.
- Location of sample storage and time relinquished to storage.

10.0 SAFETY

Filling of molds should typically be performed within a vented laboratory workspace. Special care may be needed for samples containing volatile organic compounds, both during mold filling and during curing. Elevated temperatures caused by the exothermic hydration reactions may accelerate volatilization. Contaminant-specific safety hazards include volatile organics, metal containing dusts, and dioxin.

ANALYTICAL SPECIFICATION FOR THE ANALYSIS OF METALS IN SOLID AND AQUEOUS SAMPLES VIA THE TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP) AND HAZARDOUS WASTE CHARACTERISTICS (IGNITABILITY, CORROSIVITY (pH), REACTIVE CYANIDE, AND REACTIVE SULFIDE)

DAS METHOD D-045

Prepared by:

Metcalf & Eddy Inc.
Wakefield, Massachusetts

June 2000

1. SCOPE

This specification is for determining the mobility of the target analytes (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) in solid and liquid matrices; and for determining the hazardous waste characteristics (ignitability, corrosivity as pH, reactive cyanide, and reactive sulfide) of solid and liquid matrices. The extraction of the samples to be analyzed for the target analytes listed in Attachment A of this specification must be performed using United States Environmental Protection Agency (EPA) SW-846 Method 1311 Toxicity Characteristic Leaching Procedure (TCLP). The analysis for the target analytes must be performed according to the EPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analyses, Multi-media, Multi-concentration, ILM04.0 with the modifications detailed in Section 7.0 of this specification. The hazardous waste characteristics listed in Attachment A of this specification must be determined according to EPA SW-846 methods as specified in Section 5.0 of this specification with the modifications detailed in Section 7.0 of this specification.

2. PURPOSE

Data derived using this specification will be used to: determine the availability and mobility of metals in liquid and/or solid samples; to identify waste that either presents a fire hazard or is capable of severely exacerbating a fire; to identify waste that has the ability to mobilize toxic metals, to corrode storage or transportation equipment; to determine waste that is unstable or tends to react violently or explode; to identify waste that may generate toxic fumes; and/or for other purposes.

3. DEFINITION OF WORK

Liquid and solid matrices will be analyzed for the target analytes and the hazardous waste characteristics presented in Attachment A at the detection limits presented, in order to meet project data quality objectives. All the samples to be analyzed for metals must be first extracted in accordance with the EPA SW-846 Method 1311. The TCLP extracts must be preserved to a pH of 2, and then digested and analyzed in accordance with the EPA CLP SOW ILM04.0 with the modifications described in Section 7 of this specification, Analytical Procedures. The hazardous waste characterization sample analyses must be performed according to the EPA SW-846 methods specified in Section 5.0 of this specification with the modifications detailed in Section 7.0 of this specification.

The number of samples and each matrix will be provided in each individual work order. A shipment of samples will be assigned a unique M&E DAS Case Number. A shipment of samples will be assigned a unique M&E DAS Case Number. Samples will be submitted in sample delivery groups (SDGs). An SDG is defined in EPA CLP SOW ILM04.0, Exhibit A, Section II-G. Samples may be assigned to SDGs by matrix at the discretion of the laboratory, however, the laboratory must

use the matrix assigned on the chain-of-custody records to make this determination. Data for all samples and parameters in an SDG are due concurrently.

Performance Evaluation (PE) samples may be provided at a maximum rate of one per SDG, and must be analyzed along with the field samples. Instructions for preparation and analysis of PE samples will be provided in the sample shipping container.

4. SCHEDULE

Target sampling dates will be provided in each work order. Samples will be shipped, by overnight delivery service, no more than one day after sample collection. Saturday delivery may be required. Contacts for shipping will be provided in each work order. Data delivery inquiries may be made to Linda Cook of Metcalf & Eddy (M&E) at (781) 224-6184 or the project chemist specified in each work order.

Holding Time:

Extraction by TCLP for all analytes, except mercury, and the hazardous waste characteristics (ignitability, corrosivity as pH, reactive cyanide, and reactive sulfide) must be conducted within 180 days from sample collection.

Analysis of the TCLP extract for all analytes, except mercury, and the hazardous waste characteristics (ignitability, corrosivity as pH, reactive cyanide, and reactive sulfide) must be conducted within 180 days from extraction by TCLP.

Extraction by TCLP for mercury must be conducted within 28 days from sample collection.

Analysis of the TCLP extract for mercury must be conducted within 28 days from extraction by TCLP.

Analysis of the samples for reactive cyanide and reactive sulfide must be conducted within 48 hours of sample receipt.

Analysis of the samples for pH must be performed as soon as possible.

Analysis of the sample for ignitability must be conducted within 14 days of sample receipt.

Delivery of Data:

Sample data must be delivered to M&E, or the person specified in the work order, within thirty-five (35) or twenty-one (21) days of laboratory receipt of the last sample per SDG. The turn-around time for the data will be specified in the work order. The results must be delivered under chain-of-

custody. Data delivered to M&E should be sent to: Ms. Linda Cook, Metcalf & Eddy, 30 Harvard Mill Square, Wakefield, MA 01880-5371.

5. ANALYTICAL REFERENCE METHOD

The method references are:

- SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition (and updates), Method 1311, Toxicity Characteristic Leaching Procedure, Revision 0, July 1992.
- EPA CLP SOW for Inorganic Analysis, Multi-media, Multi-concentration, ILM04.0.
- SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition (and updates), Method 1010, Pensky-Martens Closed-Cup Method for Determining Ignitability, Revision 0, September 1986
- SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition (and updates), Volume One, Section C, Part II Characteristics, Chapter Seven, Section 7.3 Reactivity, Revision 2, September 1994
- SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition (and updates), Volume One, Section C, Part II Characteristics, Chapter Seven, Section 7.3.3, Interim Guidance for Reactive Cyanide, Revision 2, September 1994
- SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition (and updates), Volume One, Section C, Part II Characteristics, Chapter Seven, Section 7.3.4, Interim Guidance for Reactive Sulfide, Revision 2, September 1994
- SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition (and updates), Method 9040B, pH Electrometric Measurement, Revision 0, September 1986. (for aqueous samples and TCLP extracts)
- SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition (and updates), Method 9045C, Soil and Waste pH, Revision 0, September 1986. (for solid samples)

Additional requirements and method modifications are provided in Section 7 of this specification.

6. SAMPLE PRESERVATION

Samples will be preserved by cooling and maintaining them at 4°C ± 2°C. EPA cooler temperature indicators will be placed in the sample shipping containers. If the temperature of the cooler is greater than 6°C or less than 2°C upon sample receipt, the laboratory must contact M&E immediately for instructions regarding analysis of the samples. If the initial sample shipments arrive at a temperature above 6°C, M&E will conduct corrective action to include more ice in subsequent shipments to properly chill the samples. If the initial shipments arrive at a temperature below 2°C, the sample storage conditions prior to shipment will be evaluated.

The samples must be protected from light and refrigerated at 4°C ± 2°C from the time of receipt until 60 days after delivery of a complete reconciled sample data package. The samples must be stored in an atmosphere demonstrated to be free of all potential contaminants. After 60 days, disposal of the samples may be performed in accordance with all applicable regulations.

Sample extracts must be protected from light and refrigerated at 4°C ± 2°C until 365 days after delivery of a complete reconciled data package. Sample extracts must be stored in an atmosphere demonstrated to be free of all potential contaminants. After 365 days, disposal of the sample extracts may be performed in accordance with applicable regulations.

The TCLP extracts to be analyzed for metals must be preserved immediately after TCLP extraction to a pH of 2 or less with nitric acid.

Samples, sample extracts, and standards must be stored separately.

7. ANALYTICAL PROCEDURES

All the samples must be extracted in accordance with EPA SW-846 Method 1311 and the TCLP extracts must be analyzed for metals in accordance with EPA CLP SOW ILM04.0 with the modifications listed below. The hazardous waste characteristics samples must be analyzed in accordance with EPA SW-846 methods as specified in Section 5.0 of this specification and with the modifications listed below. When the method states "should", this is to be read as "must", unless otherwise noted.

A. The laboratory must provide with the DAS bid package one of the following proofs of laboratory capability generated during the past year of operation:

- A method detection limit (MDL) study conducted within the last six months in accordance with 40 CFR Part 136 Appendix B which demonstrated that the laboratory can achieve the required detection limits for all the TCLP target analytes presented in Attachment A of this specification.

- Laboratory fortified blank (LFB) results, consisting of a contaminant-free solid matrix, spiked with all the analytes presented in Attachment A at concentrations

equal to the required detection limits, that demonstrates that the laboratory can detect these analytes at the requested detection limits.

Should one of these proofs of capability not be available for delivery with the DAS bid, it may be submitted after the DAS bid. However, one of these proofs of capability must be submitted and accepted by Metcalf & Eddy prior to the analysis of any samples.

B. Laboratory Fortified Blank

One laboratory fortified blank (LFB) meeting the criteria presented in Section 8, of this specification, must be analyzed daily prior to sample analysis on each instrument used for sample analysis. The LFBs will consist of reagent water spiked with all of the target analytes at concentrations equal to the detection limits listed in Attachment A of this specification. The stock solution must be from a source other than the initial calibration standard and continuing calibration standard.

C. TCLP Method Blank

Method blanks (MBs) must be extracted and analyzed with each batch of samples undergoing TCLP extraction. The same extraction fluid type used for the samples must be used for the method blanks. Method blanks are required for analytical method EPA CLP SOW ILM04.0.

D. Matrix Spike

A matrix spike (MS) sample must be extracted and analyzed with each analytical batch per matrix per extraction fluid type. The matrix spike compounds must be added after filtration of the TCLP extract and prior to preservation. All the analytes listed in Attachment A of this specification are to be spiked into the MS/MD. Refer to EPA CLP SOW ILM04.0 for specific information on MS/MD spiking concentrations.

E. Matrix Duplicate

A matrix duplicate (MD) sample must be extracted and analyzed with each analytical batch per matrix per extraction fluid type.

F. Performance Evaluation Sample

PE samples may be provided at a maximum rate of one per SDG, and must be analyzed along with the field samples. Instructions for preparation and analysis of PE samples will be provided in the sample shipping container.

G. All requirements described in Exhibit E, Section V, Part 5 of EPA CLP SOW ILM04.0 regarding interference check sample analysis must be conducted and reported on Form IV in the final data package. The ICSA and ICSAB solutions should be analyzed at the frequency stated in EPA CLP SOW ILM04.0.

H. The use of Inductively Coupled Plasma (ICP) trace analysis is allowed as long as interference check sample analysis is performed and documented.

I. A contract required detection limit (CRDL) standard spiked for all analytes at two times the required detection limits (specified in Attachment A of this specification) or lower must be analyzed with each SDG to demonstrate that the laboratory is able to meet the required detection limits.

K. The use of internal calibration quantitation methods must be employed for TCLP target analytes if: 1) Recovery of the analyte from the TCLP MS extract is not at least 50% and the concentration does not exceed the regulatory level, or 2) The concentration of the analyte measured in the extract is within 20% of the appropriate regulatory level. In both of these instances, the method of standard additions must be employed as the internal calibration quantitation method for each analyte. See SW-846 Method 1311, Section 8.4 for specific details regarding the method of standard additions.

8. QUALITY CONTROL REQUIREMENTS

The laboratory must perform all of the QC elements specified in EPA SW-846 Method 1311, in and EPA CLP SOW ILM04.0, and in the EPA SW-846 Methods specified in Section 5.0 of this specification in addition to the QC checks listed below. Required analytes and hazardous waste characteristics, and their detection limits are listed in Attachment A of this specification.

QC Checks Required	Frequency of QC Checks	Acceptance Limits	Corrective Action
TCLP Method Blanks (MB)	As specified in EPA SW-846 Method 1311, Section 8.1	As specified in EPA CLP SOW ILM04.0, Exhibit E, Part 4 using the analyte/detection limits list presented in Attachment A of this specification	QC criteria for the method blank must be met prior to sample analysis. Determine the source of the contamination, attempt to eliminate the contamination, then reanalyze. Should it become apparent that contamination is present in the extract and is not at the instrument/analysis level, contact M&E for a decision on sample analysis or re-extraction.
Laboratory Fortified Blank (LFB)	Once per analytical batch	Percent recovery 70-130% for all analytes	The laboratory will determine the cause of the problem and make every effort to correct the problem prior to the analysis of samples from subsequent extraction batches. Corrective actions taken must be dependent upon which compounds are outside of criteria. Documentation of the corrective actions taken must be submitted with the data.
Contract Required Detection Limit Standard (CRDL)	As specified in EPA CLP SOW ILM04.0, Exhibit E, Part 3	50-150% recovery	QC criteria for the method blank must be met prior to sample analysis. Determine the source of the contamination, attempt to eliminate the contamination, then reanalyze. Should it become apparent that contamination is present in the extract and is not at the instrument/analysis level, contact M&E for a decision on sample re-extraction and reanalyses.
Matrix Spike (MS)	Once per analytical batch per matrix per fluid type	75-125% recovery	If limits are exceeded note in the narrative and qualify the analyte per EPA CLP ILM04.0 reporting requirements.
Matrix Duplicate (MD)	Once per analytical batch per matrix per fluid type	As specified in EPA CLP SOW ILM04.0, Exhibit E, Part 7	If limits are exceeded note in the narrative and qualify the analyte per EPA CLP ILM04.0 reporting requirements.

QC Checks Required	Frequency of QC Checks	Acceptance Limits	Corrective Action
Performance Evaluation Samples (PEs)	1 per SDG	Not relinquished	Actions must be applied on a case by case basis.

9. ANALYTICAL DELIVERABLES

The data package deliverables must resemble as closely as possible the EPA CLP SOW ILM04.0 format. The forms provided in EPA CLP SOW ILM04.0 must be used, but modified for the compounds presented in Attachment A. The appropriate concentrations and quantitation limits must be indicated on the Forms. The data qualifiers provided in EPA CLP SOW ILM04.0 must be applied to the data generated. The general deliverables described in ILM04.0, Exhibit B, Section II must be provided. Modify the appropriate forms as necessary. The data package must be of good readable copy quality and paginated.

All analytical data and all tabulated raw or supporting data must be delivered under custody seal for each SDG. The CSF Completeness Evidence Audit Forms, which are included in Attachment C, must be completed by the laboratory for the data package deliverables submitted for each SDG. Using those audit forms, the laboratory must demonstrate that all tabulated and raw data for all field samples, standards, blanks and QC samples as well as any other documents required by ILM04.0 and this analytical specification are contained in the data package deliverable for each SDG. The forms included in Attachment C are for all types of data packages. For this analytical specification, the laboratory shall use the inventory sheets for all applicable deliverable items, adapting the sheets where necessary.

Resubmittals for missing, inaccurate, and/or questionable data from the laboratory will be requested by facsimile followed by a telephone call. The resubmittals must be provided under custody seal within 48 hours of the date of facsimile request at no additional cost and the resubmittals must be accompanied by additional completed CSF Completeness Evidence Audit Forms.

In addition to all the data package deliverables required to be submitted for each SDG as specified in Exhibit B of EPA CLP SOW ILM04.0 the following must be included:

A. Complete Sample Delivery Group File (CSF) Audit

EPA Region I requires that all analytical data, quality control data, and tabulated or raw supporting data be delivered with each SDG. With each SDG an EPA Region I Complete SDG File (CSF) Inventory Sheet must be completed. The CSF Inventory Sheets are

included in Attachment C and must accompany each SDG. The laboratory using these audit forms, must demonstrate that all sample data, raw data, calibration data, and any other requirements of the statement of work or analytical specification are included in the data package.

The forms included in Attachment C are for all types of data packages. For this analytical specification, the laboratory shall use the inventory sheets for all applicable deliverable items, adapting the sheets where necessary.

B. A case narrative must be provided that contains a detailed description of the sample preparation and analysis methodology employed, any deviations from the requirements of this analytical specification, problems encountered and their resolution, and any anomalies in the reported data. The laboratory sample identification numbers and the EPA assigned sample numbers must be cross-referenced in the Case Narrative.

An example calculation for one target analyte must also be provided in the case narrative. If there are no detected compounds in the field samples, then the laboratory must use matrix spike results for the example calculation.

C. The data package must be paginated and of good copy quality.

D. A copy of this analytical specification must be provided.

E. The SOW-required header information must be supplied on all Forms.

F. The laboratory will use the case number provided and the field sample numbers when reporting sample results.

G. Results for all samples, blanks, MS/MDs, and PE samples must be reported on Form 1s that have been modified to present the appropriate analyte list and detection limits. EPA CLP SOW ILM04.0 sample result qualifiers must be used on all Form 1s. Additional sample result qualifiers may be utilized by the laboratory, however, they must be completely defined in the Case Narrative.

H. The results of the LFB submitted with the DAS bid and in the data packages must be reported in a tabular format, which includes the concentrations spiked, the concentrations detected, and the percent recoveries for each target compound. The instrument identification, the date and time of analysis, and the source of the spike must be included on the form. All raw data must be submitted including the quantitated results. Deliverables must include documentation of any necessary corrective actions. The percent recoveries for all compounds in the LFBs must be calculated and presented on a summary form.

I. The results of the MDL study must be reported in a tabular format, which includes the results of the analyses, the standard deviation, and the calculated MDL for all of the analytes. The instrument identification, and the date and time of analysis must be included on the form. All raw data must be submitted for at least one of the seven analyses.

J. The raw data must be provided for all blanks, LFBs, spikes, standards, PE samples and field samples as per ILM04.0.

K. The initial percent solids determination for all samples must be provided, in tabular format, with copies of the laboratory logbook pages.

L. Provide copies of records (telecons) of communication with field personnel, the work order designated project chemist or the M&E lead chemist.

M. Report the instrument detection limit (IDL) for each analyte on Form X of EPA CLP SOW ILM04.0 to indicate that the detection limits required in Attachment A have been achieved.

10. ELECTRONIC DATA DELIVERABLES

All data must be submitted to M&E electronically with each hard copy data report. The electronic data deliverables (EDD) must be submitted on a MS-DOS compatible 3½" diskette. A list of the samples and analyses contained on the diskette must accompany each diskette. Each diskette must be clearly labeled with the laboratory name, Case number, SDG number, date created, initials of person who created the diskette, and EDD filename. Any abbreviations used in the EDD, and not defined in this specification, must be defined by the laboratory on the documentation submitted with the diskette. The complete EDD must be delivered at the same time as the hard copy data report unless previously approved by the M&E Project Chemist.

The EDD format must be adhered to for all submitted samples and all analytical parameters. Tentatively Identified Compounds (TIC) should be included in the EDD, when applicable. The EDD must be formatted as an ASCII, comma delimited, file. That is, each field, for each record, must be separated by a comma (,) even if no data is contained within the field or the field is not applicable. If the contents of any field contains a comma, the entire contents of the field should be enclosed in quotes, *e.g.*, "arsenic". The first record of each file must contain the field names, all subsequent records must contain the chemical results. Each record must end with a carriage return/line feed code. Each file must contain all of the fields in the order presented in the EDD specification table presented as Attachment B. Any deviations from the EDD field format must be previously approved by the M&E Project Chemist. Any EDD inquiries may be made to Ms. Linda Cook, Metcalf & Eddy, (781)224-6184.

11. EXCEPTIONS

If QC requirements are not met or QC acceptance limits are exceeded; or if analytical samples are compromised, destroyed or lost; or if matrix interference is suspected; or there are any other problems immediately contact:

Linda Cook
Metcalf & Eddy, Inc.
30 Harvard Mill Square
Wakefield, MA 01880-5371
Phone (781) 224-6184
Fax (781) 245-6293

ATTACHMENT A

TCLP Target Analytes and Hazardous Waste Characteristics and Required Detection Limits

TCLP Target Analyte	Required Detection Limit (μg/L)
arsenic	50
barium	1000
cadmium	25
chromium	50
lead	15
mercury	1.0
selenium	25
silver	50

Hazardous Waste Characteristic	Required Detection Limit (units)
Ignitability	not applicable
Corrosivity (pH)	not applicable
Reactive cyanide	250 mg/kg
Reactive sulfide	500 mg/kg

Attachment B - Electronic Data Deliverable Specifications

Field Name	Format	Comments
CaseNo	Character	The M&E assigned Case Number.
SDGNo	Character	The M&E assigned SDG Number.
SampID	Character	The M&E assigned Sample ID Number as recorded on the COC. This ID must not be truncated or altered in any way. Do not append additional characters to this Number to indicate reanalyses (RE) or dilutions (DL).
LabID	Character	The laboratory assigned sample identifier.
Matrix	Character	The matrix of the sample, e.g., soil (SO), aqueous (AQ), sediment (SD), ground water (GW), surface water (SW), product (PR). For lab QC samples, use the matrix of the parent sample, where applicable (e.g., matrix spikes), and "NA" where not applicable (e.g., method blanks). Report soil or aqueous if exact matrix type is not known by laboratory.
SampType	Character	Indicate the type of sample such as environmental, matrix spike, preparation blank, *etc.* Valid values include: NX - environmental sample, MS - matrix spike, SD - matrix spike duplicate, LD - lab duplicate, MD - matrix duplicate, MB - matrix blank, LC - lab control sample, CD - lab control duplicate, PE - performance evaluation sample.
DateSamp	MM/DD/YYYY	Date of sample collection.
DateRecd	MM/DD/YYYY	Date sample was received at the laboratory.
DateExt	MM/DD/YYYY	Date sample was extracted.
DateAnal	MM/DD/YYYY	Date sample was analyzed.
CASNo	Character	The Chemical Abstract Services (CAS) Number assigned to the compound/analyte. Do not include leading zeros. Do include dashes.
ChemName	Character	The chemical or analyte name. If the chemical name contains commas, the entire name must be enclosed in quotes, e.g., "1,2-dichloroethene".
Result	Character	Compound/Analyte final result reported to the correct number of significant figures. The EDD result must match the result reported on the Form I exactly. If the sample is a laboratory QC sample, report the analytical result in this field, not the percent recovery. If the result is not detected, report the sample specific quantitation limit in this field.
LabQual	Character	All laboratory qualifiers applied to the result, e.g., U, J, B.
ResUnits	Character	The measurement units for the analytical result, e.g., ug/L, ug/Kg, %.
DryWet	Character	Indicate whether the reported concentration based on wet or dry weight for solid samples. Valid values are: "Wet", "Dry", or null for non-solid samples.
ExpVal	Character	The expected value for QC compounds, e.g., the expected value for a method blank compound would be "0". This field should not contain QC limits.
DetLimit	Character	Report the sample specific quantitation limit, which is, the laboratory's method specific quantitation limit adjusted for all of the sample preparation factors.
MDL	Character	Report the method detection limit.
Solids	Character	Report the percent solids in decimal format, e.g., 85% should be recorded as 0.85
DilFact	Character	Indicate the sample analysis dilution factor; if not diluted enter "1".
Filtered	Character	Indicate whether an aqueous inorganic sample was filtered prior to analysis, i.e., "Yes", "No". The default response should be "No".
MassVol	Character	Report the mass or volume of the sample extracted/analyzed.
MassUnits	Character	Report the units of the sample mass or volume extracted/analyzed, e.g., g, L.
SampRun	Character	This field indicates whether the result is from the original analysis (NX), reanalysis (RE), or dilution analysis (DL). For multiple dilutions or reanalyses, append a number to the sample run code, e.g., RE1, RE2.
AnalMeth	Character	The DAS Method Reference number listed on the cover page of the method specification.
TIC	Character	This field should indicate whether the report compound is a TIC, i.e., "Yes" or "No". If TICs are reported in the data package, they should also be included on the EDD.
TICRT	Character	The TIC retention time, scan number, or elution order number.

ATTACHMENT C

CSF COMPLETENESS EVIDENCE AUDIT FORM

ANALYTICAL SPECIFICATION FOR THE ANALYSIS OF SEMIVOLATILE ORGANIC COMPOUNDS IN SOLID AND AQUEOUS SAMPLES USING THE TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP)

DAS METHOD D-047

Prepared by:

Metcalf & Eddy, Inc.
Wakefield, Massachusetts

June 2000

1. SCOPE

This specification is for determining the mobility of semivolatile organic compounds (SVOCs) in liquid and solid matrices. The target SVOCs and required quantitation limits are specified in Attachment A of this specification. The extraction of the samples must be performed using United States Environmental Protection Agency (EPA) SW-846 Method 1311 Toxicity Characteristic Leaching Procedure (TCLP). Further extraction of the semivolatile compounds from the TCLP extract must be performed using EPA SW-846 Method 3510C, and the analyses must be performed according to the EPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Organic Analyses, Multi-media, Multi-concentration, OLM04.2 with the modifications outlined in this specification.

2. PURPOSE

Data derived using this specification will be used to: determine the availability and mobility of semivolatile organic contaminants in liquid and/or solid samples, provide a measure of the quality of data generated by another consultant, and/or for other purposes.

3. DEFINITION OF WORK

Liquid and solid matrices will be analyzed for the target SVOCs presented in Attachment A at the quantitation limits presented, in order to meet project data quality objectives. All the samples must be extracted in accordance with the EPA SW-846 Method 1311 and the extracts must be analyzed in accordance with the EPA CLP SOW OLM04.2 with the modifications described in Section 7 of this specification, Analytical Procedures.

The number of samples and each matrix will be provided in each individual work order. A shipment of samples will be assigned a unique M&E DAS Case Number. Samples will be submitted in sample delivery groups (SDGs). An SDG is defined in EPA CLP SOW OLM04.2, Exhibit A, Section 4.2.2.1.1. Samples may be assigned to SDGs by matrix at the discretion of the laboratory, however, the laboratory must use the matrix assigned on the chain-of-custody records to make this determination. Data for all samples in an SDG are due concurrently.

Performance Evaluation (PE) samples may be provided at a maximum rate of one per SDG, and must be analyzed along with the field samples. Instructions for preparation and analysis of PE samples will be provided in the sample shipping container.

4. SCHEDULE

Target sampling dates will be provided in each work order. Samples will be shipped, by overnight delivery service, no more than one day after sample collection. Saturday delivery may be required. Contacts for shipping will be provided in each work order. Data delivery inquiries may be made to Ms. Linda Cook of Metcalf & Eddy at (781)-224-6184, or the project chemist specified in each work order.

Holding Time: Samples are required to undergo TCLP extraction within fourteen (14) days of sample collection. The TCLP extracts are required to undergo SVOC extraction according to EPA CLP SOW OLM04.2 within seven (7) days of TCLP extraction, and SVOC extracts must be analyzed within forty (40) days after extraction.

Delivery of Data: Sample data must be delivered to M&E or the person specified in the work order within thirty-five (35) or twenty-one (21) days of laboratory receipt of the last sample per SDG. The turn-around time for the data will be specified in the work order. Results must be delivered under chain-of-custody. Data submitted to M&E should be sent to: Linda Cook, Metcalf & Eddy, 30 Harvard Mill Square, Wakefield, MA 01880-5371.

Sample extracts must be protected from light and refrigerated at 4°C ± 2°C until 365 days after delivery of a complete reconciled data package. Sample extracts must be stored in an atmosphere demonstrated to be free of all potential contaminants. After 365 days, disposal of the sample extracts may be performed in accordance with applicable regulations.

Samples, sample extracts, and standards must be stored separately.

5. ANALYTICAL REFERENCES

The method references are:

- SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition (and updates) Method 1311, Toxicity Characteristic Leaching Procedure, Revision 0, July 1992.
- SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition (and updates) Method 3510C, Separatory Funnel Liquid-Liquid Extraction, Revision 0, July 1992.
- EPA CLP SOW for Organic Analysis, Multi-media, Multi-concentration, OLM04.2.

Additional requirements and method modifications are provided in Section 7 of this specification.

6. SAMPLE PRESERVATION

Samples will be preserved by cooling and maintaining them at 4°C ± 2°C. EPA cooler temperature indicators will be placed in the sample shipping containers. If the temperature of the cooler is greater than 6°C or less than 2°C upon sample receipt, the laboratory must contact M&E immediately for instructions regarding analysis of the samples. If the initial sample shipments arrive at a temperature above 6°C, M&E will conduct corrective action to include more ice in subsequent shipments to properly chill the samples. If the initial shipments arrive at a temperature below 2°C, the sample storage conditions prior to shipment will be evaluated.

The samples must be protected from light and refrigerated at 4°C ± 2°C from the time of receipt until 60 days after delivery of a complete reconciled sample data package. The samples must be stored in an atmosphere demonstrated to be free of all potential contaminants. After 60 days, disposal of the samples may be performed in accordance with all applicable regulations.

Sample extracts must be protected from light and refrigerated at 4°C ± 2°C until 365 days after delivery of a complete reconciled data package. Sample extracts must be stored in an atmosphere demonstrated to be free of all potential contaminants. After 365 days, disposal of the sample extracts may be performed in accordance with applicable regulations.

7. ANALYTICAL PROCEDURE

All the samples must first be extracted in accordance with EPA SW-846 Method 1311, then the TCLP extracts must be extracted and analyzed in accordance with EPA CLP SOW OLM04.2 with the modifications listed below. When the method states "should", this is to be read as "must", unless otherwise noted.

A. The laboratory must provide with the DAS bid package one of the following proofs of laboratory capability generated during the past year of operation:

- A method detection limit (MDL) study conducted within the last six months in accordance with 40 CFR Part 136 Appendix B which demonstrated that the laboratory can achieve the required quantitation limits for all compounds presented in Attachment A of this specification.

- Laboratory fortified blank (LFB) results, consisting of an organic-free solid matrix, spiked with all the compounds presented in Attachment A at concentrations equal to the required quantitation limits, that demonstrates that the laboratory can detect these compounds at the requested quantitation limits.

Should one of these proofs of capability not be available for delivery with the DAS bid, it may be submitted after the DAS bid. However, one of these proofs of capability must be submitted and accepted by Metcalf & Eddy prior to the analysis of any samples.

B. Laboratory Fortified Blank

One laboratory fortified blank (LFB) meeting the criteria presented in Section 8, of this specification, must be prepared with each sample extraction batch. The LFBs will consist of reagent water spiked with surrogates and all of the target SVOCs at concentrations equal to the quantitation limits listed in Attachment A. The stock solution must be from a source other than the initial calibration standard and continuing calibration standard. All surrogates and internal standards in the LFB are required to meet the recovery criteria presented in EPA CLP SOW OLM04.2. The frequency and QC requirements will be as specified in Section 8.

C. TCLP Method Blank

Method blanks (MBs) associated with TCLP must be extracted and analyzed with each batch of samples undergoing TCLP. The same extraction fluid as used for the samples must be used for the method blanks.

D. Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) samples must be extracted and analyzed with each batch of samples per matrix per TCLP extraction fluid type. The matrix spike compounds are to be added after filtration of the TCLP extract. All the compounds listed in Attachment A of this specification are to be spiked into the MS/MSD. Refer to EPA CLP SOW, Semivolatile, Exhibit D, Section 12.1 for specific information on MS/MSD spiking concentrations.

E. Performance Evaluation Sample

PE samples may be provided at a maximum rate of one per SDG, and must be analyzed along with the field samples. Instructions for preparation and analysis of PE samples will be provided in the sample shipping container.

F. Each instrument used for sample analysis must be calibrated for all compounds listed in Attachment A. The lowest level initial calibration standard must be at a concentration equal to or less than the required quantitation limits listed in Attachment A.

8. QUALITY CONTROL REQUIREMENTS

The laboratory must perform all of the QC elements specified in EPA SW-846 Method 1311 and EPA CLP SOW OLM04.2 in addition to the QC checks listed below. Required quantitation limits are listed in Attachment A.

QC Checks Required	Frequency of QC Checks	Acceptance Limits	Corrective Action
TCLP Method Blanks (MB)	As specified in EPA SW-846 Method 1311, Section 8.1	As specified in EPA CLP SOW OLM04.2, Semivolatiles, Exhibit D, Section 12.1.4 using the compound/quantitation limits list presented in Attachment A of this specification	QC criteria for the method blank must be met prior to sample analysis. Determine the source of the contamination, attempt to eliminate the contamination, then reanalyze. Should it become apparent that contamination is present in the extract and is not at the instrument/analysis level, contact M&E for a decision on sample re-extraction or re-analysis.
Laboratory Fortified Blank (LFB)	Once per sample extraction batch	Percent recovery 70-130% for all SVOCs	The laboratory will determine the cause of the problem and make every effort to correct the problem prior to the analysis of samples from subsequent extraction batches. Corrective actions taken must be dependent upon which compounds are outside of criteria. Documentation of the corrective actions taken must be submitted with the data.
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	Once per sample extraction batch per matrix per fluid type	As specified in EPA CLP SOW OLM04.2, Semivolatiles, Exhibit D, Section 12.2.6 for 2,4-dinitrotoluene, and pentachlorophenol. For the remaining compounds RPD $\pm$ 30% and percent recovery 60-140%.	If limits are exceeded note in the narrative and flag the matrix spike and unspiked sample data

QC Checks Required	Frequency of QC Checks	Acceptance Limits	Corrective Action
Performance Evaluation Samples (PEs)	1 per SDG	Not relinquished	Actions must be applied on a case by case basis.

9. ANALYTICAL DELIVERABLES

The data package deliverables must resemble as closely as possible the EPA CLP SOW OLM04.2 format. The forms provided in EPA CLP SOW OLM04.2 must be used, but modified for the compounds presented in Attachment A. The appropriate concentrations and quantitation limits must be indicated on the Forms. The data qualifiers provided in EPA CLP SOW OLM04.2 must be applied to the data generated. The general deliverables described in Exhibit B -- Section 2 and the specific data described in Exhibit B-- Section 2, part 2.6.4 must be provided. Modify the appropriate forms as necessary. The data package must be of good readable copy quality and paginated.

All analytical data and all tabulated raw or supporting data must be delivered under custody seal for each SDG. The CSF Completeness Evidence Audit Forms, which are included in Attachment C, must be completed by the laboratory for the data package deliverables submitted for each SDG. Using those audit forms, the laboratory must demonstrate that all tabulated and raw data for all field samples, standards, blanks and QC samples as well as any other documents required by OLM04.2 and this analytical specification are contained in the data package deliverable for each SDG. The forms included in Attachment C are for all types of data packages. For this analytical specification, the laboratory shall use the inventory sheets for all applicable deliverable items, adapting the sheets where necessary.

Resubmittals for missing, inaccurate, and/or questionable data from the laboratory will be requested by facsimile followed by a telephone call. The resubmittals must be provided under custody seal within 48 hours of the date of facsimile request at no additional cost and the resubmittals must be accompanied by additional completed CSF Completeness Evidence Audit Forms.

In addition to all the data package deliverables required to be submitted for each SDG as specified in Exhibit B of EPA CLP SOW OLM04.2, the following must be included:

A. Complete Sample Delivery Group File (CSF) Audit

EPA Region I requires that all analytical data, quality control data, and tabulated or raw supporting data be delivered with each SDG. With each SDG an EPA Region I Complete

SDG File (CSF) Inventory Sheet must be completed. The CSF Inventory Sheets are included in Attachment C and must accompany each SDG. The laboratory using these audit forms, must demonstrate that all sample data, raw data, calibration data, and any other requirements of the statement of work or analytical specification are included in the data package.

The forms included in Attachment C are for all types of data packages. For this analytical specification, the laboratory shall use the inventory sheets for all applicable deliverable items, adapting the sheets where necessary.

B. A case narrative must be provided that contains a detailed description of the sample preparation and analysis methodology employed, any deviations from the requirements of this analytical specification, problems encountered and their resolution, and any anomalies in the reported data. The laboratory sample identification numbers and the EPA assigned sample numbers must be cross-referenced in the Case Narrative.

An example calculation for one semivolatile target compound must also be provided in the case narrative. If there are no detected compounds in the field samples, then the laboratory must use matrix spike results for the example calculation.

C. The data package must be paginated and of good copy quality.

D. A copy of this analytical specification must be provided.

E. The SOW-required header information must be supplied on all Forms.

F. The laboratory will use the case number provided and the field sample numbers when reporting sample results.

G. Results for all samples, blanks, MS/MSDs, and PE samples must be reported on Form 1s that have been modified to present the appropriate compound list and quantitation limits. OLM04.2 sample result qualifiers must be used on all Form 1s. Additional sample result qualifiers may be utilized by the laboratory, however, they must be completely defined in the Case Narrative.

H. The initial calibration standard results must be reported in tabular format on a modified Form 6, indicating the concentrations for each of the calibration standards analyzed. The relative response factors and the percent relative standard deviation must be calculated for all analytes and surrogates. The concentration and source of the standards analyzed must be provided. Raw data consisting of the gas chromatograms and compound quantitation reports must be included for all standards analyzed. In addition, for the midpoint standard, an extended report including the mass spectra, the peak integration, and the reference spectra for the instrument must be provided for each target compound.

I. The continuing calibration standard results must be reported in a tabular format on modified Form 7, indicating the concentration of the calibration standard. All raw data must be included. The percent differences and daily response factors must be reported for all compounds and surrogates.

J. The laboratory must provide the internal standards results on a modified Form 8. The retention time and area counts of the quantitation ion for the internal standards in all blanks, samples and QC samples must be reported on this form.

K. The results of the LFB submitted with the DAS bid and in the data packages must be reported in a tabular format, which includes the concentrations spiked, the concentrations detected, and the percent recoveries for each target compound. The instrument identification, the date and time of analysis, and the source of the spike must be included on the form. All raw data must be submitted including the quantitated results, mass spectra, peak integration, and reference spectra for each target compound and surrogate. Deliverables must include documentation of any necessary corrective actions. The percent recoveries for all compounds in the LFBs must be calculated and presented on forms similar to Form 4.

L. The results of the MDL study must be reported in a tabular format, which includes the results of the analyses, the standard deviation, and the calculated MDL for all of the SVOCs. The instrument identification, and the date and time of analysis must be included on the form. All raw data must be submitted for at least one of the seven analyses. This must include the quantitated results, the gas chromatogram, and the mass spectra and peak integration for each target compound and surrogate, along with the reference spectra from the individual instrument used for the analysis. Deliverables for the remaining analyses must be the same, however, the mass spectra and peak integration may be omitted.

M. The raw data must be provided for all blanks, LFBs, spikes, standards, PE samples, and field samples as per OLM04.2.

N. The initial percent solids determination for all samples must be provided, in tabular format, with copies of the laboratory logbook pages.

O. Provide copies of records (telecons) of communication with field personnel, the work order designated project chemist or the M&E lead chemist.

10. ELECTRONIC DATA DELIVERABLES

All data must be submitted to M&E electronically with each hard copy data report. The electronic data deliverables (EDD) must be submitted on a MS-DOS compatible 3½" diskette. A list of the samples and analyses contained on the diskette must accompany each diskette. Each diskette must be clearly labeled with the laboratory name, Case number, SDG number, date created, initials of person who created the diskette, and EDD filename. Any abbreviations used in the EDD, and not defined in this specification, must be defined by the laboratory on the documentation submitted with the diskette. The complete EDD must be delivered at the same time as the hard copy data report unless previously approved by the M&E Project Chemist.

The EDD format must be adhered to for all submitted samples and all analytical parameters. Tentatively Identified Compounds (TIC) should be included in the EDD, when applicable. The EDD must be formatted as an ASCII, comma delimited, file. That is, each field, for each record, must be separated by a comma (,) even if no data is contained within the field or the field is not applicable. If the contents of any field contains a comma, the entire contents of the field should be enclosed in quotes, *e.g.,* "2,4-dinitrotoluene". The first record of each file must contain the field names, all subsequent records must contain the chemical results. Each record must end with a carriage return/line feed code. Each file must contain all of the fields in the order presented in the EDD specification table presented as Attachment B. Any deviations from the EDD field format must be previously approved by the M&E Project Chemist. Any EDD inquiries may be made to Ms. Linda Cook, Metcalf & Eddy, (781)224-6184.

11. EXCEPTIONS

If QC requirements are not met or QC acceptance limits are exceeded; or if field samples are compromised, destroyed or lost; or if matrix interference is suspected; or there are any other technical problems, immediately contact:

Linda Cook
Metcalf & Eddy, Inc.
30 Harvard Mill Square
Wakefield, MA 01880-5371
Phone (781) 224-6184
FAX (617) 245-6293

ATTACHMENT A

Target Compound and Quantitation Limit Requirements

Parameter	CAS Number	Quantitation Limit (μg/L)*
hexachloroethane	67-72-1	100
nitrobenzene	98-95-3	100
hexachlorobutadiene	87-68-3	100
2,4,6-trichlorophenol	88-06-2	100
2,4,5-trichlorophenol	95-95-4	100
2,4-dinitrotoluene	121-124-2	100
hexachlorobenzene	118-74-1	100
pentachlorophenol	87-86-5	100
pyridine	110-86-1	100
2-methylphenol	95-48-7	100
3-methylphenol**	108-39-4	100
4-methylphenol**	106-44-5	100

* When target SVOCs are detected below the quantitation limits, those compounds must be quantitated and reported, provided the spectra meet the identification criteria presented in EPA CLP SOW OLM04.2.

** 3-Methylphenol and 4-methylphenol may coelute. If so, report a single combined result for these two compounds.

Attachment B - Electronic Data Deliverable Specifications

Field Name	Format	Comments
CaseNo	Character	The M&E assigned Case Number.
SDGNo	Character	The M&E assigned SDG Number.
SampID	Character	The M&E assigned Sample ID Number as recorded on the COC. This ID must not be truncated or altered in any way. Do not append additional characters to this Number to indicate reanalyses (RE) or dilutions (DL).
LabID	Character	The laboratory assigned sample identifier.
Matrix	Character	The matrix of the sample, e.g., soil (SO), aqueous (AQ), sediment (SD), ground water (GW), surface water (SW), product (PR). For lab QC samples, use the matrix of the parent sample, where applicable (e.g., matrix spikes), and "NA" where not applicable (e.g., method blanks). Report soil or aqueous if exact matrix type is not known by laboratory.
SampType	Character	Indicate the type of sample such as environmental, matrix spike, preparation blank, *etc.* Valid values include: NX - environmental sample, MS - matrix spike, SD - matrix spike duplicate, LD - lab duplicate, MD - matrix duplicate, MB - matrix blank, LC - lab control sample, CD - lab control duplicate, PE - performance evaluation sample.
DateSamp	MM/DD/YYYY	Date of sample collection.
DateRecd	MM/DD/YYYY	Date sample was received at the laboratory.
DateExt	MM/DD/YYYY	Date sample was extracted.
DateAnal	MM/DD/YYYY	Date sample was analyzed.
CASNo	Character	The Chemical Abstract Services (CAS) Number assigned to the compound/analyte. Do not include leading zeros. Do include dashes.
ChemName	Character	The chemical or analyte name. If the chemical name contains commas, the entire name must be enclosed in quotes, e.g., "1,2-dichloroethene".
Result	Character	Compound/Analyte final result reported to the correct number of significant figures. The EDD result must match the result reported on the Form I exactly. If the sample is a laboratory QC sample, report the analytical result in this field, not the percent recovery. If the result is not detected, report the sample specific quantitation limit in this field.
LabQual	Character	All laboratory qualifiers applied to the result, e.g., U, J, B.
ResUnits	Character	The measurement units for the analytical result, e.g., ug/L, ug/Kg, %.
DryWet	Character	Indicate whether the reported concentration based on wet or dry weight for solid samples. Valid values are: "Wet", "Dry", or null for non-solid samples.
ExpVal	Character	The expected value for QC compounds, e.g., the expected value for a method blank compound would be "0". This field should not contain QC limits.
DetLimit	Character	Report the sample specific quantitation limit, which is, the laboratory's method specific quantitation limit adjusted for all of the sample preparation factors.
MDL	Character	Report the method detection limit.
Solids	Character	Report the percent solids in decimal format, e.g., 85% should be recorded as 0.85
DilFact	Character	Indicate the sample analysis dilution factor; if not diluted enter "1".
Filtered	Character	Indicate whether an aqueous inorganic sample was filtered prior to analysis, i.e., "Yes", "No". The default response should be "No".
MassVol	Character	Report the mass or volume of the sample extracted/analyzed.
MassUnits	Character	Report the units of the sample mass or volume extracted/analyzed, e.g., g, L.
SampRun	Character	This field indicates whether the result is from the original analysis (NX), reanalysis (RE), or dilution analysis (DL). For multiple dilutions or reanalyses, append a number to the sample run code, e.g., RE1, RE2.
AnalMeth	Character	The DAS Method Reference number listed on the cover page of the method specification.
TIC	Character	This field should indicate whether the report compound is a TIC, i.e., "Yes" or "No". If TICs are reported in the data package, they should also be included on the EDD.
TICRT	Character	The TIC retention time, scan number, or elution order number.

ATTACHMENT C

CSF AUDIT FORMS

ANALYTICAL SPECIFICATION FOR THE ANALYSIS OF PESTICIDES IN SOLID AND AQUEOUS SAMPLES USING THE TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP)

DAS METHOD D-048

Prepared by:

Metcalf & Eddy Inc.
Wakefield, Massachusetts

June 2000

1. SCOPE

This specification is for the analysis of pesticides in liquid and solid matrices. The target pesticides and the required quantitation limits are specified in Attachment A of this specification. The extraction of the samples must be performed using United States Environmental Protection Agency (EPA) SW-846 Method 1311 Toxicity Characteristic Leaching Procedure (TCLP) and the analyses must be performed according to the EPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Organic Analyses, Multi-media, Multi-concentration, OLM04.2 with the modifications outlined in this specification.

2. PURPOSE

Data derived using this specification will be used to: determine the availability and mobility of pesticide contaminants in liquid and/or solid samples, provide a measure of the quality of data generated by another consultant, and/or for other purposes.

3. DEFINITION OF WORK

Liquid and solid matrices will be analyzed for the target pesticide presented in Attachment A at the quantitation limits presented, in order to meet project data quality objectives. All the samples must be extracted in accordance with the EPA SW-846 Method 1311 and the extracts must be analyzed in accordance with the EPA CLP SOW OLM04.2 with the modifications described in Section 7 of this specification, Analytical Procedures.

The number of samples and each matrix will be provided in each individual work order. A shipment of samples will be assigned a unique M&E DAS Case Number. Samples will be submitted in sample delivery groups (SDGs). An SDG is defined in EPA CLP SOW OLM04.2, Exhibit A, Section 4.2.2.1.1. Samples may be assigned to SDGs by matrix at the discretion of the laboratory, however, the laboratory must use the matrix assigned on the chain-of-custody records to make this determination. Data for all samples in an SDG are due concurrently.

Performance Evaluation (PE) samples may be provided at a maximum rate of one per SDG, and must be analyzed along with the field samples. Instructions for preparation and analysis of PE samples will be provided in the sample shipping container.

4. SCHEDULE

Target sampling dates will be provided in each work order. Samples will be shipped, by overnight delivery service, no more than one day after sample collection. Saturday delivery may be required. Contacts for shipping will be provided in each work order. Data delivery inquiries may be made to Ms. Linda Cook of Metcalf and Eddy at (781)-224-6184, or the project chemist specified in each work order.

Holding Time: Samples are required to undergo TCLP extraction within fourteen (14) days of sample collection. The TCLP extracts are required to undergo pesticide extraction according to EPA CLP SOW OLM04.2 within seven (7) days of TCLP extraction, and pesticide extracts must be analyzed within forty (40) days after extraction.

Delivery of Data: Sample data must be delivered to M&E or the person specified in the work order within thirty-five (35) or twenty-one (21) days of laboratory receipt of the last sample per SDG. The turn-around time for the data will be specified in the work order. Results must be delivered under chain-of-custody. Data submitted to M&E should be sent to: Ms. Linda Cook, Metcalf & Eddy, 30 Harvard Mill Square, Wakefield, MA 01880-5371.

Sample extracts must be protected from light and refrigerated at 4°C ± 2°C until 365 days after delivery of a complete reconciled data package. Sample extracts must be stored in an atmosphere demonstrated to be free of all potential contaminants. After 365 days, disposal of the sample extracts may be performed in accordance with applicable regulations.

Samples, sample extracts, and standards must be stored separately.

5. ANALYTICAL REFERENCES

The analytical method references are:

- SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition (and updates) Method 1311, Toxicity Characteristic Leaching Procedure, Revision 0, July 1992.

- EPA CLP SOW for Organic Analysis, Multi-media, Multi-concentration, OLM04.2.

Additional requirements and method modifications are provided in Section 7 of this specification.

6. SAMPLE PRESERVATION

Samples will be preserved by cooling and maintaining them at 4 °C ±2 °C. EPA cooler temperature indicators will be placed in the sample shipping containers. If the temperature of the cooler is greater than 6 °C or less than 2 °C upon sample receipt, the laboratory must contact M&E immediately for instructions regarding analysis of the samples. If the initial sample shipments arrive at a temperature above 6°C, M&E will conduct corrective action to include more ice in subsequent shipments to properly chill the samples. If the initial shipments arrive at a temperature below 2°C, the sample storage conditions prior to shipment will be evaluated.

The samples must be protected from light and refrigerated at 4°C ± 2°C from the time of receipt until 60 days after delivery of a complete reconciled sample data package. The samples must be stored in an atmosphere demonstrated to be free of all potential contaminants. After 60 days, disposal of the samples may be performed in accordance with all applicable regulations.

Sample extracts must be protected from light and refrigerated at 4°C ± 2°C until 365 days after delivery of a complete reconciled data package. Sample extracts must be stored in an atmosphere demonstrated to be free of all potential contaminants. After 365 days, disposal of the sample extracts may be performed in accordance with applicable regulations.

Samples, sample extracts, and standards must be stored separately.

7. ANALYTICAL PROCEDURES

All the samples must first be extracted in accordance with EPA SW-846 Method 1311, then the TCLP extracts must be extracted and analyzed in accordance with EPA CLP SOW OLM04.2 with the modifications listed below. When the method states "should", this is to be read as "must", unless otherwise noted.

A. The laboratory must provide with the DAS bid package one of the following proofs of laboratory capability generated during the past year of operation:

- A method detection limit (MDL) study conducted within the last six months in accordance with 40 CFR Part 136 Appendix B which demonstrated that the laboratory can achieve the required quantitation limits for all compounds presented in Attachment A of this specification.

- Laboratory fortified blank (LFB) results, consisting of an organic-free solid matrix, spiked with all the compounds presented in Attachment A at concentrations equal to the required quantitation limits, that demonstrates that the laboratory can detect these compounds at the requested quantitation limits.

Should one of these proofs of capability not be available for delivery with the DAS bid, it may be submitted after the DAS bid. However, one of these proofs of capability must be submitted and accepted by Metcalf & Eddy prior to the analysis of any samples.

B. Laboratory Fortified Blank

One laboratory fortified blank (LFB) meeting the criteria presented in Section 8, of this specification, must be prepared with each sample extraction batch. The LFBs will consist of reagent water spiked with surrogates and all of the target pesticides (with the exception of toxaphene and chlordane) at concentrations equal to the quantitation limits listed in Attachment A. The stock solution must be from a source other than the initial calibration standard and continuing calibration standard. All surrogates and internal standards in the LFB are required to meet the recovery criteria presented in EPA CLP SOW OLM04.2. The frequency and QC requirements will be as specified in Section 8.

C. TCLP Method Blank

Method blanks (MBs) associated with TCLP must be extracted and analyzed with each batch of samples undergoing TCLP. The same extraction fluid as used for the samples must be used for the method blanks.

D. Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) samples must be extracted and analyzed with each batch of samples per matrix per TCLP extraction fluid type. The matrix spike compounds are to be added after filtration of the TCLP extract. All the compounds listed in Attachment A of this specification (with the exception of toxaphene and chlordane) are to be spiked into the MS/MSD. Refer to EPA CLP SOW, Semivolatile, Exhibit D, Section 12.1 for specific information on MS/MSD spiking concentrations.

E. Performance Evaluation Sample

PE samples may be provided at a maximum rate of one per SDG, and must be analyzed along with the field samples. Instructions for preparation and analysis of PE samples will be provided in the sample shipping container.

F. Each instrument used for sample analysis must be calibrated for all compounds listed in Attachment A. The lowest level initial calibration standard must be at a concentration equal to or less than the required quantitation limits listed in Attachment A. If toxaphene or chlordane are detected in any of the samples, a three-level initial calibration must be performed, otherwise, a single point initial calibration will be adequate for identification purposes and to demonstrate sensitivity at a concentration equal to the required detection limit.

8. QUALITY CONTROL REQUIREMENTS

The laboratory must perform all of the QC elements specified in EPA SW-846 Method 1311 and EPA CLP SOW OLM04.2 in addition to the QC checks listed below. Required quantitation limits are listed in Attachment A.

QC Checks Required	Frequency of QC Checks	Acceptance Limits	Corrective Action
TCLP Method Blanks (MB)	As specified in EPA SW-846 Method 1311, Section 8.1	As specified in EPA CLP SOW OLM04.2, Pesticide, Exhibit D, Section 12.1.2 using the compound/quantitation limits list presented in Attachment A of this specification	QC criteria for the method blank must be met prior to sample analysis. Determine the source of the contamination, attempt to eliminate the contamination, then reanalyze. Should it become apparent that contamination is present in the extract and is not at the instrument/analysis level, contact M&E for a decision on sample re-extraction or re-analysis.
Laboratory Fortified Blank (LFB)	Once per sample extraction batch	Percent recovery 70-130% for all target pesticides	The laboratory will determine the cause of the problem and make every effort to correct the problem prior to the analysis of samples from subsequent extraction batches. Corrective actions taken must be dependent upon which compounds are outside of criteria. Documentation of the corrective actions taken must be submitted with the data.
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	Once per analytical batch per matrix per fluid type	As specified in EPA CLP SOW OLM04.2, Pesticides, Exhibit D, Section 12.2.5 for endrin, heptachlor, and lindane. For the remaining compounds RPD $\pm$ 30% and percent recovery 60-140%.	If limits are exceeded note in the narrative and flag the matrix spike and unspiked sample data

QC Checks Required	Frequency of QC Checks	Acceptance Limits	Corrective Action
Performance Evaluation Samples (PEs)	1 per SDG	Not relinquished	Actions must be applied on a case by case basis.

9. DATA PACKAGE DELIVERABLES

The data package deliverables must resemble as closely as possible the EPA CLP SOW OLM04.2 format. The forms provided in EPA CLP SOW OLM04.2 must be used, but modified for the compounds presented in Attachment A. The appropriate concentrations and quantitation limits must be indicated on the Forms. The data qualifiers provided in EPA CLP SOW OLM04.2 must be applied to the data generated. The general deliverables described in Exhibit B -- Section 2 and the specific data described in Exhibit B-- Section 2, part 2.6.4 must be provided. Modify the appropriate forms as necessary. The data package must be of good readable copy quality and paginated.

All analytical data and all tabulated raw or supporting data must be delivered under custody seal for each SDG. The CSF Completeness Evidence Audit Forms, which are included in Attachment C, must be completed by the laboratory for the data package deliverables submitted for each SDG. Using those audit forms, the laboratory must demonstrate that all tabulated and raw data for all field samples, standards, blanks and QC samples as well as any other documents required by OLM04.2 and this analytical specification are contained in the data package deliverable for each SDG. The forms included in Attachment C are for all types of data packages. For this analytical specification, the laboratory shall use the inventory sheets for all applicable deliverable items, adapting the sheets where necessary.

Resubmittals for missing, inaccurate, and/or questionable data from the laboratory will be requested by facsimile followed by a telephone call. The resubmittals must be provided under custody seal within 48 hours of the date of facsimile request at no additional cost and the resubmittals must be accompanied by additional completed CSF Completeness Evidence Audit Forms.

In addition to all the data package deliverables required to be submitted for each SDG as specified in Exhibit B of EPA CLP SOW OLM04.2, the following must be included:

A. Complete Sample Delivery Group File (CSF) Audit

EPA Region I requires that all analytical data, quality control data, and tabulated or raw supporting data be delivered with each SDG. With each SDG an EPA Region I Complete SDG File (CSF) Inventory Sheet must be completed. The CSF Inventory Sheets are included in Attachment B and must accompany each SDG. The laboratory using these audit forms, must demonstrate that all sample data, raw data, calibration data, and any other requirements of the statement of work or analytical specification are included in the data package.

The forms included in Attachment B are for all types of data packages. For this analytical specification, the laboratory shall use the inventory sheets for all applicable deliverable items, adapting the sheets where necessary.

B. A case narrative must be provided that contains a detailed description of the sample preparation and analysis methodology employed, any deviations from the requirements of this analytical specification, problems encountered and their resolution, and any anomalies in the reported data. The laboratory sample identification numbers and the EPA assigned sample numbers must be cross-referenced in the Case Narrative.

An example calculation for one pesticide target compound must also be provided in the case narrative. If there are no detected compounds in the field samples, then the laboratory must use matrix spike results for the example calculation.

C. The data package must be paginated and of good copy quality.

D. A copy of this analytical specification must be provided.

E. The SOW-required header information must be supplied on all Forms.

F. The laboratory will use the case number provided and the field sample numbers when reporting sample results.

G. Results for all samples, blanks, MS/MSDs, and PE samples must be reported on Form 1s that have been modified to present the appropriate compound list and quantitation limits. OLM04.2 sample result qualifiers must be used on all Form 1s. Additional sample result qualifiers may be utilized by the laboratory, however, they must be completely defined in the Case Narrative.

H. The initial calibration standard results must be reported in tabular format on a modified Form 6, indicating the concentrations for each of the calibration standards analyzed. The relative response factors and the percent relative standard deviations must be calculated for all analytes and surrogates. The concentration and source of the standards analyzed must be provided. Raw data consisting of the gas chromatograms and compound quantitation reports must be included for all standards analyzed.

I. The continuing calibration standard results must be reported in a tabular format on modified Form 7, indicating the concentration of the calibration standard. All raw data must be included. The percent differences and daily response factors must be reported for all compounds and surrogates.

J. The results of the LFB submitted with the DAS bid and in the data packages must be reported in a tabular format, which includes the concentrations spiked, the concentrations detected, and the percent recoveries for each target compound. The instrument identification, the date and time of analysis, and the source of the spike must be included on the form. All

raw data must be submitted including the quantitated results and peak integration for each target compound and surrogate. Deliverables must include documentation of any necessary corrective actions. The percent recoveries for all compounds in the LFBs must be calculated and presented on forms similar to Form 4.

L. The results of the MDL study must be reported in a tabular format, which includes the results of the analyses, the standard deviation, and the calculated MDL for all of the target pesticides. The instrument identification, and the date and time of analysis must be included on the form. All raw data must be submitted for at least one of the seven analyses. This must include the quantitated results, the gas chromatogram and peak integration for each target compound and surrogate. Deliverables for the remaining analyses must be the same.

M. The raw data must be provided for all blanks, LFBs, spikes, standards, PE samples and field samples as per OLM04.2.

N. The initial percent solids determination for all samples must be provided, in tabular format, with copies of the laboratory logbook pages.

O. Provide copies of records (telecons) of communication with field personnel, the work order designated project chemist or the M&E lead chemist.

10. ELECTRONIC DATA DELIVERABLES

All data must be submitted to M&E electronically with each hard copy data report. The electronic data deliverable (EDD) must be submitted on a MS-DOS compatible 3½" diskette. A list of the samples and analyses contained on the diskette must accompany each diskette. Each diskette must be clearly labeled with the laboratory name, Case number, SDG number, date created, initials of person who created the diskette, and EDD filename. Any abbreviations used in the EDD, and not defined in this specification, must be defined by the laboratory on the documentation submitted with the diskette. The complete EDD must be delivered at the same time as the hard copy data report unless previously approved by the M&E Project Chemist.

The EDD format must be adhered to for all submitted samples and all analytical parameters. Tentatively Identified Compounds (TIC) should be included in the EDD, when applicable. The EDD must be formatted as an ASCII, comma delimited, file. That is, each field, for each record, must be separated by a comma (,) even if no data is contained within the field or the field is not applicable. If the contents of any field contains a comma, the entire contents of the field should be enclosed in quotes (*e.g.*, "endrin"). The first record of each file must contain the field names, all subsequent records must contain the chemical results. Each record must end with a carriage return/line feed code. Each file must contain all of the fields in the order presented in the EDD specification table presented as Attachment B. Any deviations from the EDD field format must be previously approved by the M&E Project Chemist. Any EDD inquiries may be made to Ms. Linda Cook, Metcalf & Eddy, (781)224-6184.

11. EXCEPTIONS

If QC requirements are not met or QC acceptance limits are exceeded; or if analytical samples are compromised, destroyed or lost; or if matrix interference is suspected; or there are any other problems immediately contact:

Linda L. Cook
Metcalf & Eddy Inc.
30 Harvard Mill Square
Wakefield, MA 01880-5371
Phone (781) 224-6184
FAX (781) 245-6293

ATTACHMENT A

Target Compound and Quantitation Limit Requirements

Target Compound	CAS Number	Quantitation Limits (μg/L)
gamma-BHC (Lindane)	58-89-9	0.5
heptachlor	76-44-8	0.5
heptachlor epoxide	1024-57-3	0.5
endrin	72-20-8	1.0
methoxychlor	72-43-5	5
chlordane	57-74-9	20
toxaphene	8001-35-2	50

Attachment B - Electronic Data Deliverable Specifications

Field Name	Format	Comments
CaseNo	Character	The M&E assigned Case Number.
SDGNo	Character	The M&E assigned SDG Number.
SampID	Character	The M&E assigned Sample ID Number as recorded on the COC. This ID must not be truncated or altered in any way. Do not append additional characters to this Number to indicate reanalyses (RE) or dilutions (DL).
LabID	Character	The laboratory assigned sample identifier.
Matrix	Character	The matrix of the sample, e.g., soil (SO), aqueous (AQ), sediment (SD), ground water (GW), surface water (SW), product (PR). For lab QC samples, use the matrix of the parent sample, where applicable (e.g., matrix spikes), and "NA" where not applicable (e.g., method blanks). Report soil or aqueous if exact matrix type is not known by laboratory.
SampType	Character	Indicate the type of sample such as environmental, matrix spike, preparation blank, *etc.* Valid values include: NX - environmental sample, MS - matrix spike, SD - matrix spike duplicate, LD - lab duplicate, MD - matrix duplicate, MB - matrix blank, LC - lab control sample, CD - lab control duplicate, PE - performance evaluation sample.
DateSamp	MM/DD/YYYY	Date of sample collection.
DateRecd	MM/DD/YYYY	Date sample was received at the laboratory.
DateExt	MM/DD/YYYY	Date sample was extracted.
DateAnal	MM/DD/YYYY	Date sample was analyzed.
CASNo	Character	The Chemical Abstract Services (CAS) Number assigned to the compound/analyte. Do not include leading zeros. Do include dashes.
ChemName	Character	The chemical or analyte name. If the chemical name contains commas, the entire name must be enclosed in quotes, e.g., "1,2-dichloroethene".
Result	Character	Compound/Analyte final result reported to the correct number of significant figures. The EDD result must match the result reported on the Form I exactly. If the sample is a laboratory QC sample, report the analytical result in this field, not the percent recovery. If the result is not detected, report the sample specific quantitation limit in this field.
LabQual	Character	All laboratory qualifiers applied to the result, e.g., U, J, B.
ResUnits	Character	The measurement units for the analytical result, e.g., ug/L, ug/Kg, %.
DryWet	Character	Indicate whether the reported concentration based on wet or dry weight for solid samples. Valid values are: "Wet", "Dry", or null for non-solid samples.
ExpVal	Character	The expected value for QC compounds, e.g., the expected value for a method blank compound would be "0". This field should not contain QC limits.
DetLimit	Character	Report the sample specific quantitation limit, which is, the laboratory's method specific quantitation limit adjusted for all of the sample preparation factors.
MDL	Character	Report the method detection limit.
Solids	Character	Report the percent solids in decimal format, e.g., 85% should be recorded as 0.85
DilFact	Character	Indicate the sample analysis dilution factor; if not diluted enter "1".
Filtered	Character	Indicate whether an aqueous inorganic sample was filtered prior to analysis, i.e., "Yes", "No". The default response should be "No".
MassVol	Character	Report the mass or volume of the sample extracted/analyzed.
MassUnits	Character	Report the units of the sample mass or volume extracted/analyzed, e.g., g, L.
SampRun	Character	This field indicates whether the result is from the original analysis (NX), reanalysis (RE), or dilution analysis (DL). For multiple dilutions or reanalyses, append a number to the sample run code, e.g., RE1, RE2.
AnalMeth	Character	The DAS Method Reference number listed on the cover page of the method specification.
TIC	Character	This field should indicate whether the report compound is a TIC, i.e., "Yes" or "No". If TICs are reported in the data package, they should also be included on the EDD.
TICRT	Character	The TIC retention time, scan number, or elution order number.

APPENDIX D ATTACHMENTS

Table 3.3-3: Summary Of Freeze Thaw Data											
SAMPLE NO.	INITIAL WT.	DATE							TOTAL WT. LOSS (g)	% WT. LOSS	COMMENTS
		4/10/01	4/11/01	4/12/01	4/18/01	4/19/01	4/24/01	4/25/01			
S-1-5C	482.79	482.71	482.72	482.65	482.24	481.93	481.94	481.83	0.96	3.1	No cracking or other signs of wear observed.
S10-5C-10F	458.83	458.72	458.72	458.72	458.15	457.77	457.77	457.64	1.19	9.3	No cracking or other signs of wear observed.
S-11-5C20FA	481.27	481.13	481.16	481.12	480.72	480.44	480.45	480.37	0.90	16.6	No cracking or other signs of wear observed.
S-15-5C-10FA-05FES04	437.81	437.71	437.70	437.63	437.23	436.90	436.91	436.82	0.99	9.2	No cracking or other signs of wear observed.
S-6-L3-5C	496.00	495.95	495.95	495.93	495.71	495.55	495.33	495.46	0.54	3.4	No cracking or other signs of wear observed.

Table 3.3-4: Summary Of Wet Dry Data											
SAMPLE NO.	INITIAL WT.	DATE							TOTAL WT. LOSS (g)	% WT. LOSS	COMMENTS
		4/10/01	4/11/01	4/12/01	4/18/01	4/19/01	4/24/01	4/25/01			
S-1-5C	469.2	469.4	469.1	469.1	469.2	469.0	468.7	468.5	0.7	0.15	No cracking or other signs of wear observed.
S10-5C-10F	481.3	480.7	480.5	480.0	480.2	479.7	479.5	479.5	1.8	0.37	No cracking or other signs of wear observed.
S-11-5C20FA	474.6	474.0	473.2	473.5	472.6	471.3	470.7	470.6	4.0	0.85	No cracking or other signs of wear observed.
S-15-5C-10FA-05FES04	464.3	464.0	462.9	463.3	461.9	460.7	458.3	459.5	4.8	1.05	No cracking or other signs of wear observed.
S-6-L3-5C	473.3	473.6	472.5	471.6	471.8	470.1	469.2	469.9	3.4	0.72	No cracking or other signs of wear observed.

MIXING DATA FORM

SAMPLE DESIGNATION: S-2-10C
MIXED BY: A.Q.
LABORATORY: TRC-Irvine
PROJECT NAME: Pownal
PROJECT NO.: 02136
DATE MIXED: 2/28/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): medium grey, wet, silty clay

UNTREATED BULK DENSITY

COMPACTION: Number Lifts 3 Strokes/Lift 5
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 787.5

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon #1 Soil	787.5	1012.90	225.40
2	Type I Cement	1012.9	1038.25	25.35
3	H2O	1038.25	1050.41	12.21

Comments on Reagent Pre-blending:

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-2-10C
PROJECT NAME: _____
MIXED BY: _____
PROJECT NO.: _____
LABORATORY: _____
DATE MIXED: 2/28/01

MIXING (Continued)

MIXER: Manual _____ Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity):

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature):

pH (su) 12.23 @7days Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

GENERAL COMMENTS

Penetrometer >5.0 @24hrs
>5

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-3-15C
PROJECT NAME: Pound
MIXED BY: H.Q
PROJECT NO.: 02136
LABORATORY: TRC-Irvine
DATE MIXED: 2/28/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): medium gray, wet silty sand.

UNTREATED BULK DENSITY

COMPACTION: Number Lifts 3 Strokes/Lift 5
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 787.7

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon #1 Soil	787.7	1000.47	212.77
2	Type V Cement	1000.47	1038.08	37.61
3	H2O	1038.08	1052.70	14.62

Comments on Reagent Pre-blending:

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-3-15C PROJECT NAME: _____
MIXED BY: _____ PROJECT NO.: _____
LABORATORY: _____ DATE MIXED: 2/28/01

MIXING (Continued)

MIXER: Manual X Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity): _____

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature): _____

pH (su) _____ Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments: _____

GENERAL COMMENTS

Penetrometer >5.0 @ 24hrs
>5.0

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-1-5C
MIXED BY: YQ
LABORATORY: TRC-Irvine
PROJECT NAME: Pownal
PROJECT NO.: 02136
DATE MIXED: 2/28/01 0940

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): medium gray, wet, silty clay

UNTREATED BULK DENSITY

COMPACTION: Number Lifts 3 Strokes/Lift 5
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 787.5

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon #1 Soil	787.5	1025.0	237.5
2	Type V Cement	1025.0	1037.5	12.5
3	H2O	1037.5	1046.0	8.5

Comments on Reagent Pre-blending:

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-1-SC PROJECT NAME: _____
MIXED BY: _____ PROJECT NO.: _____
LABORATORY: _____ DATE MIXED: 2/28/01

MIXING (Continued)

MIXER: Manual X Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity):

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature):

pH (su) _____ Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

GENERAL COMMENTS

Penetrometer >5.0 @24hrs
>5.0

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-10-5C-10F
PROJECT NAME: Pownal
MIXED BY: H.A
PROJECT NO.: 02136
LABORATORY: TRC-Irvine
DATE MIXED: 2/28/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): medium gray, wet silty sand

UNTREATED BULK DENSITY

COMPACTION: Number Lifts 3 Strokes/Lift 5
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 787.5

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon #1 Soil	787.5	1000.0	212.5
2	Type II cement	1000.0	1012.5	12.5
3	Hondo Fly Ash	1012.5	1037.6	25.1
4	H2O	1037.6	1067.8	30.2

Comments on Reagent Pre-blending:

TRC
Customer Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-10 - SC -10F
MIXED BY: _____
LABORATORY: _____
PROJECT NAME: _____
PROJECT NO.: _____
DATE MIXED: 2/28/01

MIXING (Continued)

MIXER: Manual X Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity): _____

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature): _____

pH (su) _____ Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments: _____

GENERAL COMMENTS

Penetrometer @ 2.75 @ 24hrs
>5.0 @ 3 Days

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-7-43-10C
PROJECT NAME: Pownal
MIXED BY: N.A
PROJECT NO.: 02316
LABORATORY: TRC-Irvine
DATE MIXED: 2/28/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): medium grey, wet, silty sand

UNTREATED BULK DENSITY

COMPACTION: Number Lifts 3 Strokes/Lift 5
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 787.4

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon #3 - Soil	787.4	1012.4	225.0
2	Type 5 Cement	1012.4	1037.5	25.1
3	H_2O	1032.5	1052.6	20.1

Comments on Reagent Pre-blending:

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-7-L3-10C PROJECT NAME: _____
MIXED BY: _____ PROJECT NO.: _____
LABORATORY: _____ DATE MIXED: 2/28/01

MIXING (Continued)

MIXER: Manual X Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity):

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature):

pH (su) 12.54 @7dwd Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

GENERAL COMMENTS

Penetrometer >5.0 @24hrs
>5.0

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-11-SC-20FA
MIXED BY: N.A
LABORATORY: TRC-Laurel
PROJECT NAME: Pownal
PROJECT NO.: 02136
DATE MIXED: 2/28/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading):

UNTREATED BULK DENSITY

COMPACTION: Number Lifts 3 Strokes/Lift 5
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 789.7

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon #1 Soil	787.6	975.3	187.6
2	Type V Cement	975.3	987.8	12.5
3	Hondo Fly Ash	987.8	1037.8	50.0
4	H_2O	1037.8	1077.9	40.1

Comments on Reagent Pre-blending:

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-11-SC-20FA
PROJECT NAME: _____
MIXED BY: _____
PROJECT NO.: _____
LABORATORY: _____
DATE MIXED: 2/28/01

MIXING (Continued)

MIXER: Manual _____ Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity):

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature):

pH (su) _____ Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

GENERAL COMMENTS

Penetrometer 3.25 @ 24 hrs
> 5.0 @ 3 days

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-12-SC-20FA-05FeSO4 PROJECT NAME: Pownal
MIXED BY: J.Q PROJECT NO.: 62134
LABORATORY: TRC-Irvine DATE MIXED: 2/28/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): medium gray, wet silty sand

UNTREATED BULK DENSITY

COMPACTION: Number Lifts 3 Strokes/Lift 5
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 787.5

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon #1 Soil	787.5	974.0	186.5
2	Type II cement	974.0	986.5	12.5
3	Hinds Fly Ash	986.5	1036.5	50.0
4	FeSO4	1036.5	1038.0	1.5
5	H2O	1038	1078.2	40.2

Comments on Reagent Pre-blending: Dissolved 1.5g FeSO4 in the H2O before addition

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: _____ PROJECT NAME: _____
MIXED BY: _____ PROJECT NO.: _____
LABORATORY: _____ DATE MIXED: _____

MIXING (Continued)

MIXER: Manual _____ Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity): _____

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature): _____

pH (su) _____ Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments: _____

GENERAL COMMENTS

Penetrometer 3.0 @ 24 hrs
>5.0 @ 3 days

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-8-L4-SC
MIXED BY: J.A
LABORATORY: TRC-Irvine
PROJECT NAME: Pownal
PROJECT NO.: 02136
DATE MIXED: 2/28/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): medium gray, wet silty sand

UNTREATED BULK DENSITY

COMPACTION: Number Lifts 3 Strokes/Lift 5
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 787.5

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon #4 Soil	787.5	1025.9	238.4
2	Type II cement	1025.9	1038.4	12.5
3	H_2O	1038.4	1048.5	10.1

Comments on Reagent Pre-blending:

TRC
Customer-focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-8-L4-5C
PROJECT NAME: _____
MIXED BY: _____
PROJECT NO.: _____
LABORATORY: _____
DATE MIXED: 2/28/01

MIXING (Continued)

MIXER: Manual X Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity):

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature):

pH (su) _____ Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

GENERAL COMMENTS

Penetrometer >5.0 @ 24 hrs
>5.0

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S6-L3-5C
MIXED BY: A.a.
LABORATORY: TRC - Irvine.
PROJECT NAME: Pownal
PROJECT NO.: 02316
DATE MIXED: 2/28/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): medium gray, wet silty sand

UNTREATED BULK DENSITY

COMPACTION: Number Lifts 3 Strokes/Lift 5
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 787.5

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon #3 Soil	787.5	1026.10	238.6
2	Type 5 cement	1026.10	1038.6	12.5
3	H2O	1038.6	1048.5	9.9

Comments on Reagent Pre-blending:

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S6-L3-5C PROJECT NAME: _____
MIXED BY: _____ PROJECT NO.: _____
LABORATORY: _____ DATE MIXED: 2/28/01

MIXING (Continued)

MIXER: Manual X Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity): _____

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature): _____

pH (su) _____ Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments: _____

GENERAL COMMENTS

Penetrometer >5.0 @24hrs
>5.0

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-9 L-4 10C
MIXED BY: J.Q
LABORATORY: TRC-Irvine
PROJECT NAME: Pownal
PROJECT NO.: 02136
DATE MIXED: 2/28/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading):

UNTREATED BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 787.5

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon #4 soil	787.5	1012.5	225.0
2	Type I cement	1012.5	1037.6	25.1
3	H_2O	1037.6	1058.3	20.7

Comments on Reagent Pre-blending:

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-9-L-4-10C PROJECT NAME: _____
MIXED BY: _____ PROJECT NO.: _____
LABORATORY: _____ DATE MIXED: 2/28/01

MIXING (Continued)

MIXER: Manual X Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity):

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature):

pH (su) 12.24 @ 70°F Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

GENERAL COMMENTS

Penetrometer >5.0 @ 24hrs
>5.0

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-5 - 10C - 10F
PROJECT NAME: Pownal
MIXED BY: MD
PROJECT NO.: 02136
LABORATORY: TRC - Irvine
DATE MIXED: 2/28/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): gray, wet, silty clay

UNTREATED BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 787.5

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon #1 Soil	787.5	1012.9	225.4
2	Type V Cement	1012.9	1025.4	12.5
3	Hondo Fly Ash	1025.4	1037.9	12.5
4	H_2O	1037.9	1059.9	22.0

Comments on Reagent Pre-blending:

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-5-10C-10F
MIXED BY: _____
LABORATORY: _____
PROJECT NAME: _____
PROJECT NO.: _____
DATE MIXED: 2/28/01

MIXING (Continued)

MIXER: Manual X Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity): _____

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature): _____

pH (su) 11.98 @ 7 days Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments: _____

GENERAL COMMENTS

Penetrometer
1 Day 2.0
30 Days 75.0
75.0

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-14-SC-20F-05BaSO4 PROJECT NAME: Pownal
MIXED BY: H.Q PROJECT NO.: 02136
LABORATORY: TRC Irvine DATE MIXED: 2/28/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): medium grey

UNTREATED BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 787.5

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon #1 Soil	787.5	973.8	186.3
2	Cement	973.8	986.3	12.5
3	Hondo Fly Ash	986.3	1036.2	49.9
4	$BaCl_2$	1036.2	1086.1	1.5
5	H_2O	1086.1	1126.5	40.4

Comments on Reagent Pre-blending: Dissolved 1.5g $BaCl_2$ in H_2O before addition

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-14-SC-20F-05 B&SO₄ PROJECT NAME: _____
MIXED BY: _____ PROJECT NO.: _____
LABORATORY: _____ DATE MIXED: 2/28/01

MIXING (Continued)

MIXER: Manual X Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity):

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature):

pH (su) _____ Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

GENERAL COMMENTS

Penetrometer 4.0 @ 24 hrs
7.5.0 @ 3 days

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-13-5C-10F-1NAY4 PROJECT NAME: Pound

MIXED BY: DO PROJECT NO.: 02136

LABORATORY: TRC-Irvine DATE MIXED: 2/28/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): medium gray, wet silty sand

UNTREATED BULK DENSITY

COMPACTION: Number Lifts 3 Strokes/Lift 5

DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____

WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____

Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 787.5

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon #1 Soil	787.5	997.9	210.4
2	Type V cement	997.9	1010.40	12.5
3	Hondo Fly Ash	1010.4	1035.4	25.0
4	Na_2SO_4	1035.4	1037.9	2.5
5	H_2O	1037.9	1068.1	30.2

Comments on Reagent Pre-blending: Dissolved 2.5g NaOH in H_2O before addition

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-13-SC-10F- PROJECT NAME: _____
MIXED BY: _____ PROJECT NO.: _____
LABORATORY: _____ DATE MIXED: _____

MIXING (Continued)

MIXER: Manual _____ Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity):

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature):

pH (su) _____ Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

GENERAL COMMENTS

Penetrometer 1.5 @ 24 hrs
4.5 @ 3 days

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S4-25F
MIXED BY: HA
LABORATORY: TRC-Irvine
PROJECT NAME: Pownal
PROJECT NO.: 02136
DATE MIXED: 2/28/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): medium grey, wet silty sand

UNTREATED BULK DENSITY

COMPACTION: Number Lifts 3 Strokes/Lift 5
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 789.5

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon #1 Soil	789.5	950.2	162.7
2	Hondo Fly Ash	950.2	1037.7	87.5
3	H_2O	1037.7	1091.5	53.8

Comments on Reagent Pre-blending:

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: S-4-25C PROJECT NAME: _____
MIXED BY: _____ PROJECT NO.: _____
LABORATORY: _____ DATE MIXED: 2/28/01

MIXING (Continued)

MIXER: Manual X Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity): _____

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature): _____

pH (su) _____ Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments: _____

GENERAL COMMENTS

Penetrometer
1 Day 2.75
3 Days 4.50
7 Days 25.

TRC
Customer-Focused Solutions

MIXING DATA FORM Phase II

SAMPLE DESIGNATION: S-1-SC
MIXED BY: G.A.
LABORATORY: TRC Irvine
PROJECT NAME: Powell
PROJECT NO.: 02136
DATE MIXED: 3/2/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): mod gray, wet, silty clay

UNTREATED BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 411.0

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon #1 Sed	411.0	4211.4	3800.4
2	Type II Cmt	4211.4	4412.0	200.6
3	H_2O	4412.0	4548	136.0

Comments on Reagent Pre-blending:

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: _____ PROJECT NAME: _____
MIXED BY: _____ PROJECT NO.: _____
LABORATORY: _____ DATE MIXED: _____

MIXING (Continued)

MIXER: Manual _____ Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity): _____

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature): 115°& F

pH (su) _____ Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts 3 Strokes/Lift —
DIMENSIONS: Mold Diameter 2" Mold Length 4" Mold Volume 308.7 cm
WEIGHTS: Mold Tare 158.5 Sample & Mold 664.2 Sample Only 507
Calculated Bulk Density 1.64 Moisture Content Sample? ☐ Yes ☒ No

Comments: _____

GENERAL COMMENTS

pH 7 day 11.70
14 day 11.50

UCS >5 day 7
75 day 14
75 day 28

TRC
Customer-Focused Solutions

MIXING DATA FORM Phase II

SAMPLE DESIGNATION: S-10-SC-10FA
MIXED BY: G.P.
LABORATORY: TRC - Irvine
PROJECT NAME: Pownal
PROJECT NO.: 02136
DATE MIXED: 3/2/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): Med. Gray, wet, Silty Clay

UNTREATED BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 411.4

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon 1 Soil	411.4	3811.6	3400.2
2	Type II Cement	3811.6	4012.0	200.4
3	Fly Ash C	4012.0	4413.8	401.8
4	H2O	4413.8	4893.8	480.0

Comments on Reagent Pre-blending:

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: _____ PROJECT NAME: _____
MIXED BY: _____ PROJECT NO.: _____
LABORATORY: _____ DATE MIXED: _____

MIXING (Continued)

MIXER: Manual _____ Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity): _____

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature): 122 °F

pH (su) _____ Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts 3 Strokes/Lift _____
DIMENSIONS: Mold Diameter 2" Mold Length 6" Mold Volume 308.7 cm^3
WEIGHTS: Mold Tare 157.0 Sample & Mold 667.5 Sample Only 510.5
Calculated Bulk Density 1.65 g/cm^3 Moisture Content Sample? ☐ Yes ☒ No

Comments: _____

GENERAL COMMENTS

pH 7 11.81
14 11.60

UCS 2.0 Day 7
>5 Day 14
>5 Day 28

TRC
CustomerFocused Solutions

MIXING DATA FORM Dupe II

SAMPLE DESIGNATION: S-11-SC-20FB
MIXED BY: G.D.
LABORATORY: TRC Irvine
PROJECT NAME: Pownal
PROJECT NO.: 02136
DATE MIXED: 3/2/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): med. gray, wet, Silty Clay

UNTREATED BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 412.2

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon 1 Soil	412.2	3412.4	3000.2
2	Type II Cement	3412.4	3613.4	200.1
3	Fly Ash C	3613.4	4414.0	800.6
4	H_2O	4414.0	5054	640.0

Comments on Reagent Pre-blending:

TRC
Customer-Focused Solutions

MIXING DATA FORM

SAMPLE DESIGNATION: _____ PROJECT NAME: _____
MIXED BY: _____ PROJECT NO.: _____
LABORATORY: _____ DATE MIXED: _____

MIXING (Continued)

MIXER: Manual _____ Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity): WET TO much water

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature): 115°F

pH (su) _____ Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts 3 Strokes/Lift -
DIMENSIONS: Mold Diameter 2" Mold Length 6" Mold Volume 308.7 cm³
WEIGHTS: Mold Tare 160.2 Sample & Mold 690.3 Sample Only 529.8
Calculated Bulk Density 1.72 g/cm³ Moisture Content Sample? ☐ Yes ☒ No

Comments:

GENERAL COMMENTS

pH 7 day 11.47
14 day 11.49

UCS Day 7 1.5
Day 14 > 5
Day 28 > 5

TRC
Customer-Focused Solutions

MIXING DATA FORM Phase II

SAMPLE DESIGNATION: SG-C3-5C
MIXED BY: G.A.
LABORATORY: The Inn

PROJECT NAME: Powell
PROJECT NO.: 02136
DATE MIXED: 3/05/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): med grey, wet, silty clay

UNTREATED BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____
DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____
WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____
Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 411.5

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Cajoon 3 Soil	411.5	4227.1	3817.6
2	Type II Cmt	4229.1	4429.3	200.2
3	H_2O	4429.2	4629.3	200.1

Comments on Reagent Pre-blending:

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MIXING DATA FORM

SAMPLE DESIGNATION: _____ PROJECT NAME: _____
MIXED BY: _____ PROJECT NO.: _____
LABORATORY: _____ DATE MIXED: _____

MIXING (Continued)

MIXER: Manual _____ Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity): Slightly wet

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature): 124 °F

pH (su) _____ Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts 3 Strokes/Lift —
DIMENSIONS: Mold Diameter 5.08 cm Mold Length 15.24 Mold Volume 308.7 cm^3
WEIGHTS: Mold Tare 157.3 Sample & Mold 682.3 Sample Only 525.0
Calculated Bulk Density 1.70 g/cm^3 Moisture Content Sample? ☐ Yes ☒ No

Comments:

GENERAL COMMENTS

pH 7 day 11.82
14 day 11.43

Yes 7 day > 5
14 day > 5
28 day > 5

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MIXING DATA FORM Phase II

SAMPLE DESIGNATION: S-15-SC-10FA-05 FESO4 PROJECT NAME: Powam

MIXED BY: G.D. PROJECT NO.: 02134

LABORATORY: TRC-Irvine DATE MIXED: 3/5/01

UNTREATED SAMPLE

Visual – Manual Classification of Untreated Material (color, moisture, viscosity, texture, plasticity, Odor, organic vapor monitoring reading): Med gray, wet Silty Clay

UNTREATED BULK DENSITY

COMPACTION: Number Lifts _____ Strokes/Lift _____

DIMENSIONS: Mold Diameter _____ Mold Length _____ Mold Volume _____

WEIGHTS: Mold Tare _____ Sample & Mold _____ Sample Only _____

Calculated Bulk Density _____ Moisture Content Sample? ☐ Yes ☐ No

Comments:

MIXING

WEIGHT: Mixing Bowl Tare 411.1

Order of Addition	Material	Weight: Mixing Bowl & Materials		Weight of Material Only
		Before Addition	After Addition	
1	Lagoon 1 Soil	411.1	3801.1	3390
2	Type II Cement	4001.1	3801.1	200.0
3	Fly Ash C	4001.1	4401.1	400.0
4	FeSO4	4401.1	4425.1	24.0
5	H2O	4425.1	5065.1	640.0

Comments on Reagent Pre-blending: Dissolved FeSO4 in water prior to addition to mix bowl.

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MIXING DATA FORM

SAMPLE DESIGNATION: _____ PROJECT NAME: _____
MIXED BY: _____ PROJECT NO.: _____
LABORATORY: _____ DATE MIXED: _____

MIXING (Continued)

MIXER: Manual _____ Mechanical _____
SPEED: _____
MIXING TIMES: Start _____ Stop _____ Duration _____

Comments on Mixing (uniformity): _____

Visual-Manual Classification of Treated Material (color, moisture, viscosity, texture, plasticity, Order, organic vapor monitor reading, temperature): 118°F.

pH (su) _____ Specific Conductivity _____ Paint Filter Test _____

TREATED (AND UNCURED) BULK DENSITY

COMPACTION: Number Lifts 3 Strokes/Lift _____
DIMENSIONS: Mold Diameter 2" Mold Length 4" Mold Volume 308.7 cm^3
WEIGHTS: Mold Tare 155.81 Sample & Mold 679.1 Sample Only 515.29
Calculated Bulk Density 1.68 g/cm^3 Moisture Content Sample? ☐ Yes ☒ No

Comments: _____

GENERAL COMMENTS

pH Day 7 11.98
Day 14 11.66

UCS Day 7 0.5
Day 14 4.5
Day 28 75.0

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