TheELAMGroup

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November 22, 2017

Indiana Department of Environmental Management ("IDEM")
Office of Land Quality ("OLQ")
State Cleanup Section, Attn: Kenneth C. McDaniel
100 North Senate Avenue, IGCN, Room 1101
Indianapolis, IN 46204-2251

Re: Initial Site Investigation Work Plan, Revision 1
State Cleanup Program (SCP) No. 7100207
Indiana Transportation Museum
825 Park Drive
Noblesville, IN 46060

Dear Mr. McDaniel:

The Environmental Liability & Asset Management Group (dba The ELAM Group) is responding on behalf of the Indiana Transportation Museum Inc. ("ITM") to IDEM's *Initial Site Investigation Work Plan* ("ISIWP") comment letter, dated 9/27/17. The enclosed revision to the ISIWP ("ISIWPR1") includes a Quality Assurance Project Plan ("QAPP"). Specific comments from the IDEM letter are provided in italics below followed by our responses.

1. *The work plan states that soil samples will be collected from soil borings based on field screening using a photoionization detector (PID) and an X-ray fluorescence analyzer (XRF), and that groundwater samples will be collected from temporary wells at each boring location. The initial site investigation work plan provides no sample collection procedures such as soil collection via SW846 Method 5035A for volatile organic chemicals (VOCs); polychlorinated biphenol (PCB) wipe sampling if determined necessary; groundwater collection via bailers, low-flow, peristaltic pump, etc. There are no analytical methods listed for any of the analytical parameters, sample volumes, container types, holding times, sample labeling information/designation, packing and shipping information. This information absolutely must be provided for evaluation.*

R: The requested information is provided in the attached QAPP.

2. *Soil and groundwater analytical parameters are identified as VOCs, semi-volatile organic chemicals (SVOCs), PCBs, and Resource Conservation and Recovery Act (RCRA) Metals (Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, and Silver), and potential Asbestos. Analysis of Chromium (Cr) is assumed to be Total Chromium. Chromium must be speciated, and both Total Chromium and Hexavalent Chromium analyzed and reported. If only Total Chromium is reported the results will be assumed to be 100% Hexavalent Chromium.*

R: The samples analyzed for total chromium will also be analyzed for hexavalent chromium. The attached QAPP specifies the analyses for total and hexavalent chromium in both soil and groundwater.

3. *The document indicates Task 4 as including Level IV laboratory analysis for soil and groundwater. However, there is no mention of field or laboratory Quality Assurance/Quality Control (QA/QC) samples. Field duplicates, matrix spike/matrix spike duplicates, trip blanks, equipment blanks for non-dedicated equipment, etc., are required. Field QA/QC samples are collected at a rate of one per twenty samples per matrix per analytical parameter. This information is essential in determining precision, accuracy and representativeness of the sampling event and sample data.*

R: The above-referenced QA/QC samples will be collected at a rate of 1 per 20 samples per matrix per analytical parameter as specified in the attached QAPP.

4. *According to Figure 1, there are multiple rail cars identified with material storage; however, there are no proposed sampling efforts in these areas except for at rail car #25011 on Track #9 and one of two rail car maintenance pits. In addition, the rail car maintenance pit noted near storage rail car #47181 on Track #6, and near storage rail cars E005 and #545 on Track #6 are not being investigated. The closest borings to this second maintenance pit are SB-8 and SB-9 in the vicinity of Track #7. Clarification for excluding the rail car storage areas and the western maintenance pit is required.*

R: Three soil boring locations have been added near rail car numbers 9026, 545 and 25023, each of which were used for bulk storage of liquids. The attached QAPP provides additional information regarding products that were stored in the rail cars. Figure 1 of the ISIWPR1 has been updated to include the additional boring locations.

With regard to the west pit, it was excluded from the ISIWP based on analytical results collected from the area on 6/27/17. The ELAM Group collected four soil samples from walls of the temporary pit beneath Track #6, one soil sample from stockpiled soil next to the pit, and one water sample from water in the pit. All of the samples were analyzed for PCBs, SVOCs, RCRA 8 Metals, and VOCs. There were no detections of VOCs or PCBs. The SVOCs benzo(a)pyrene and benzo(a)fluoranthene were detected in two soil samples at concentrations lower than the respective Migration to Groundwater Screening Levels ("MTGSLs") specified Table A-6[1] of IDEM's *Remediation Closure Guide* ("RCG"). No SVOCs were detected in water. Barium, chromium, and lead were detected at concentrations lower than the respective RCG MTGSLs. Barium was detected in water at a concentration below the RCG Tap Water Screening Level ("TWSL"). Based on these sample results, no further investigation near the temporary pit beneath Track #6 is warranted and none is planned. These analytical results are included with the attached QAPP and will be provided to IDEM in the ISI Report.

5. *As a reminder, when final nature and extent is determined or closure is being requested, full QA/QC documentation, including raw data, must be submitted for data validation and verification.*

R: The minimum data documentation requirements ("MDDRs") will be met for each of the laboratory analytical reports containing soil throughout the investigation, and for the laboratory analytical report containing water during the ISI by requesting a "Level IV Data Package" from the laboratory. These laboratory reports along with with the respective Level IV Data Packages will be included with the ISI Report.

[1] IDEM, 2017, *Table A-6: 2017 IDEM OLQ Screening Levels*, IDEM: http://www.in.gov/idem/cleanups/2392.htm (URL last verified 11/21/17).

The ELAM Group will schedule the ISI field activities after IDEM approves the attached ISIWPR1. Should you have any questions, please feel free to contact me at your convenience.

Sincerely,

TheELAMGroup
Digitally signed by James Hogan
Date: 2017.11.22 19:01:27 -05'00'

James P. Hogan, LPG

Enclosures

cc: David Gillay, Esq., Barnes & Thornburg LLP

Attachment A

Initial Site Investigation Work Plan, Revision 1

TheELAMGroup

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November 22, 2017

Indiana Department of Environmental Management ("IDEM")
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100 North Senate Avenue, IGCN, Room 1101
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Re: Initial Site Investigation Work Plan, Revision 1
State Cleanup Program (SCP) No. 7100207
Indiana Transportation Museum
825 Park Drive
Noblesville, IN 46060

Dear Mr. McDaniel:

The Environmental Liability & Asset Management Group (dba The ELAM Group) is responding on behalf of the Indiana Transportation Museum Inc. ("ITM") to provide you with this revised *Initial Site Investigation Work Plan, Revision 1* ("ISIWPR1"). The prior correspondence leading up to this ISIWPR1 is as follows:

1. 6/9/17: *Initial Site Investigation Work Plan* ("ISIWP") requested by IDEM
2. 8/11/17: ISIWP provided by the ITM
3. 9/27/17: IDEM requests revisions to the ISIWP
4. 11/22/17: ITM provides the ISIWPR1

The below narrative has been modified from the original ISIWP. To address the bulk of the comments, The ELAM Group has attached a Quality Assurance Project Plan ("QAPP") to this ISIWPR1.

Qualifications

The ELAM Group is a team of environmental experts led by Mr. James P. Hogan. Mr. Hogan is licensed to practice geology in the State of Indiana under License No. 2166. In addition to expert consulting, The ELAM Group is a fully functional environmental contracting firm designed to conduct the environmental assessment and remediation activities necessary to bring its clients' environmental matters into regulatory compliance. For more information, please feel free to visit http://www.elamusa.com. You may also contact Mr. Hogan directly at (888) 510-3526 x102 or by e-mail at james.hogan@elamusa.com.

General Site Conditions

The subject site investigation area is approximately 6.25 acres in Hamilton County at 825 Park Drive in Noblesville, Indiana. It contains the following features:

- ❏ A rail yard with 11 rows of railroad tracks comprising most of the west side of the premises along with a maintenance pit beneath Track #6
- ❏ A maintenance garage at the center with a parts washer
- ❏ A maintenance and storage yard with ten defined storage areas (Area A through Area J) within the east side of the premises

The site also includes an open ditch within the central portion of the site and an underground stormwater drainage system that together transfer stormwater to the north end of the site into a drainage swale. These features are shown on Figure 1.

The above-referenced areas were noted in the following documents produced by the City of Noblesville ("City"), IDEM, the ITM and The ELAM Group:

1. 5/30/17 City letter[1]

[1] City, 2017, *Hazardous Spills at the Site of the Indiana Transportation Museum, TO:* Craig Presler, Indiana Transportation Museum, Inc., David Wilcox, Indiana Transportation Museum Foundation, LLC, Craig Presler, ITM Railroad Operations, LLC, and Michelle Yerkeson, ITM Assets, LLC, *FROM:* Mayor John Ditslear, City of Noblesville and Scott Noel, President, Noblesville Parks and Recreation Board, 5/30/17.

2. 6/9/17 IDEM OLQ Notice[2]
3. 6/28/17 ITM *Self-Disclosure and Environmental Audit* report to IDEM[3]
4. 6/30/17 ITM *Self-Disclosure and Environmental Audit* report to the USEPA[4]
5. 7/12/17, ELAM's response letter to IDEM's Notice[5]
6. 7/20/17, IDEM OLQ violation letter[6]
7. 8/1/17, IDEM Office of Water Quality ("OWQ") inspection letter[7]

Guidance & Procedures

The activities outlined herein will be conducted with reference to IDEM's *Remediation Closure Guide*, dated 3/22/12, and its accompanying 2017 Screening Level Update. The procedures to inspect, sample and analyze all media for this ISIWPR1 can be found in the attached QAPP.

Rationale

This ISIWP is designed to assess the soil and groundwater beneath each of the above-referenced areas for the following Constituents of Concern ("COCs"):

- ❑ Volatile organic compounds ("VOCs")
- ❑ Semi-volatile organic compounds ("SVOCs")
- ❑ Polychlorinated biphenyls ("PCBs")
- ❑ RCRA 8 metals
- ❑ Hexavalent Chromium

[2] IDEM, 2017a, *Notice of Liability and Information Request, TO:* Mayor John Ditslear, City of Noblesville, Craig Presler, Registered Agent, Indiana Transportation Museum, Inc., *FROM:* Harry Atkinson, IDEM, 6/9/17.
[3] ITM, 2017a, *Self-Disclosure and Environmental Audit*, *TO:* IDEM Self-Disclosure and Environmental Audit Administrator, *FROM:* John McNichols, ITM Chair, 6/28/17.
[4] ITM, 2017b, *Small Business Compliance Policy, Self-Disclosure and Environmental Audit*, *TO:* David Star, USEPA Region 5, *FROM:* John McNichols, ITM Chair, 6/30/17.
[5] ELAM, 2017, *Notice of Liability and Information Request*, *TO:* Ken McDaniel, IDEM, *FROM:* James Hogan, ELAM, 7/12/17.
[6] IDEM, 2017b, *Violation Letter*, *TO:* Les McConnell, ITM, *FROM:* John Naddy, IDEM, 7/20/17.
[7] IDEM, 2017c, *Facility Name: Indiana Transportation Museum, TO:* John McNichols, ITM, *FROM:* Rob Beck, IDEM OWQ, 8/1/17.

The rationale for each soil boring is summarized in Table 1. The soil boring locations in Table 1 are shown on Figure 1.

If any of the above-referenced areas exhibit a concentration of a COC that does not comply with the regulatory requirement, further characterization, remediation and/or eventual environmental management within any such area may be necessary.

Tasks

This ISI is comprised of the following tasks:

- ❑ **Task 1 HASP Preparation** - includes the development of an Occupational Safety & Health Administration ("OSHA") Site-Specific Health & Safety Plan ("HASP")
- ❑ **Task 2 Utility Mapping** - includes subsurface utility mapping of 29 drilling locations
- ❑ **Task 3 Surveying** - includes a legal survey of the site's topography and perimeter
- ❑ **Task 4 Soil Borings & Temporary Well Installation** - the installation of 29 soil borings to an assumed depth of 30 feet below ground surface[8], installation of a temporary well within each soil boring, soil and groundwater sampling, field analysis of soil samples using a photoionization detector ("PID") and an X-ray fluorescence ("XRF") analyzer, Level IV laboratory analysis of soil[9] and groundwater samples for VOCs, SVOCs, PCBs, hexavalent chromium and the RCRA 8 metals suite[10], water level gauging and surveying of the temporary well network, and abandonment of the temporary wells

[8] Each soil boring will be continuously logged and sampled in accordance with IDEM's *Drilling Procedures and Monitoring Well Construction Guidelines*, Policy Number WASTE-053-NPD, Originally Effective 3/17/09 [www.in.gov/idem/ctap/files/nrpd_waste-0053.pdf (URL last verified 8/11/17)]).

[9] The soil samples with the highest and second highest PID and XRF results within 15 feet of the surface will be sent to a fixed laboratory for analysis. If the saturated zone is encountered deeper than 15 feet, then the highest PID and XRF result within 15 feet and the second highest result between the surface and the top of the water table will be submitted for laboratory analysis.

[10] The Resource Conservation & Recovery Act ("RCRA") monitors a list of metals and solid wastes that are considered hazardous because they exhibit characteristics of corrosivity, toxicity, ignitability or reactivity. On this list are eight RCRA-monitored metals, including arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver.

- ❑ **Task 5 Asbestos Containing Material ("ACM") Assessment** - includes inspection, sampling and analysis of suspected ACM in several rail cars, as required
- ❑ **Task 6 Waste Management** - includes the preparation of a "contained-in" determination request of IDEM and associated waste disposal
- ❑ **Task 7 Initial Site Investigation Report** - includes the preparation of an *Initial Site Investigation* ("ISI") report in accordance with IDEM's *Risk Integrated System of Closure (RISC) User's Guide* as requested in the SNL Letter

Implementation Schedule

The findings and analytical results connected to this ISIWPR1 will be reported to IDEM in an ISI Report. If it is necessary to extend the timeframe for reporting due to unforeseen setbacks during implementation, a request for an extension of time to complete this ISIWPR1 will be presented to IDEM in writing no less than 5 business days before the due date of the ISI Report.

Thank you for considering this ISIWPR1. Should you have any questions, please feel free to contact me at your convenience.

Sincerely,

James P. Hogan, LPG

Enclosure

cc: David Gillay, Esq., Barnes & Thornburg LLP

Table 1

Rationale for Soil Boring Locations

Table 1. Soil Boring Location Rationale

Indiana Transportation Museum
825 Park Drive, Noblesville, IN 46060
SCP No. 7100207

Location	Area	Description	Rationale for Soil Boring							
			5/30/17 City Letter	6/9/17 IDEM OLQ Notice	6/28/17 ITM Self-Disclosure (IDEM)	6/30/17 ITM Self-Disclosure (USEPA)	7/12/17 ELAM Materials Inventory	7/20/17 IDEM OLQ Violation Letter	8/1/17 IDEM OWQ Inspection Letter	9/27/17 IDEM ISI Work Plan Comment Letter
SB-01	Track 11	Drainage swale		x	x		x		x	
SB-02	Track 5	Staining near Purdue crane		x			x	x		
SB-03	Track 7	Leaking crane		x			x	x		
SB-04	Track 10	North of Rail Car NAD 405, drainage ditch		x	x		x	x	x	
SB-05	Track 10	West of Rail Car NAD 405, staining		x			x	x		
SB-06	Area J	South of Rail Car NAD 405, drainage ditch		x	x		x	x	x	
SB-07	Area J	Former Parts Washer (empty)		x			x	x		
SB-08	Track 7	Tracks near & north of yellow engine, spent sandblasting media		x			x	x		
SB-09	Area I	Tracks near yellow engine, oil staining		x			x	x		
SB-10	Area J	Diesel AST in use; missing secondary containment plug		x			x	x		
SB-11	Area J	Engine oil tote, in use, staining		x			x	x		
SB-12	Area E	Cracked tote, unknown contents		x			x	x		
SB-13	Area E	150-gallon fuel tank from semi-truck, empty		x			x	x		
SB-14	Area D	Leaking 55-gallon hydraulic oil drum with spigot		x			x	x		
SB-15	Area D	Pallets of unsealed batteries		x			x	x		
SB-16	Area C	Black material on floor in Storage Pod 800		x			x	x		
SB-17	Area C	55-gallon open RONEX MP drums	x	x			x	x		
SB-18	Area B	Gun grease buckets	x	x			x	x		
SB-19	Area B	3 blue drums “A2000TT Step 2 Cleaner”	x	x			x	x		
SB-20	Area A	2 blue drums, unknown contents		x			x	x		
SB-21	Area G	Drainage ditch		x	x		x		x	
SB-22	Area G	Equipment donated by Firestone		x		x	x	x		
SB-23	Area F	9 stacked empty 55-gallon drums and empty AST		x			x	x		
SB-24	Area G	Container of metal shavings		x			x	x		
SB-25	Track 9	Maintenance pit		x			x	x		
SB-26	Maintenance Building	Parts Washer (in use)		x			x	x		
SB-27	Rail Car 25023	Degreaser, thermite								x
SB-28	Rail Car 545	Petroleum products								x
SB-29	Rail Car 9026	Diesel fuel tank								x
AB-01	Area B	Suspected ACM in deteriorated passenger car		x				x		
AB-02	Area B	Suspected ACM in deteriorated passenger car		x				x		
AB-03	Caboose	Suspected ACM in caboose		x				x		
AB-04	Track 6	Suspected ACM in boiler on open car		x				x		
AB-05	Track 3	Suspected ACM pipe wrap under rail car		x				x		

Figure 1

Site Map

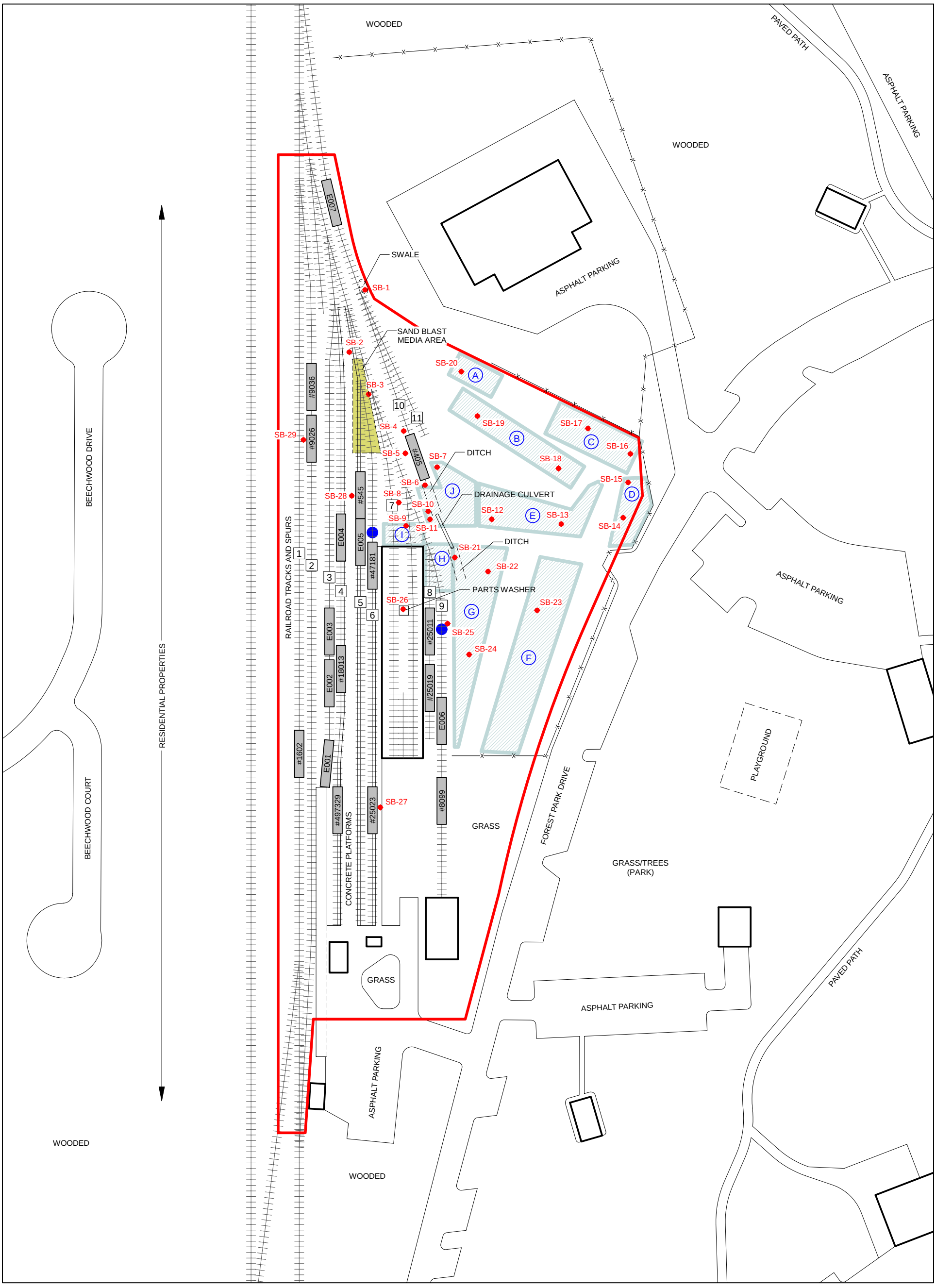

Figure No: 1	
Title: Site Map	
Scale: 1" = 100'	
Project No: INHN825P	
Report: Revised ISI Work Plan	
Drawn by: The ELAM Group	
Date: 11/27/17	

LEGEND

- 1 — Track Number
- A — Storage Area Designation
- Area of Inspection
- Rail Car Maintenance Pit
- #8099 — Location of Rail Cars w/ Material Storage on 7/25/17
- SB-1 — Proposed Soil Boring Location

Notes:

N

0 50 100 feet

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Quality Assurance Project Plan

State Cleanup Site No. 7100207

Indiana Transportation Museum
825 Park Drive
Noblesville, IN 46060

Prepared By

Patricia Likins

Approved By

James P. Hogan, LPG
November 22, 2017

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1 Introduction

This site-specific Quality Assurance Project Plan ("QAPP") and included Sampling and Analysis Plan ("SAP") present the methods, procedures, analyses, and framework for sampling soil, groundwater, and suspected asbestos containing materials ("ACM"), and for addressing the risk posed by selected constituents of concern ("COCs") at the Indiana Transportation Museum("ITM"), 825 Park Drive, Noblesville, Indiana.

The purpose of this document is to:

- ❏ Provide a structure to ensure data collected during site investigation activities meet project objectives and requirements
- ❏ Outline an SAP that adequately characterizes surface soil, subsurface soil, groundwater, and suspected ACM and provides sufficient information with which to accurately characterize the risk associated with the presence of COCs or asbestos

1.1 Site Name

Indiana Transportation Museum
825 Park Drive
Noblesville, IN 46060

1.2 Site Location

The site area occupies approximately 6.25 acres within a municipal park known as Forest Park. The site area is bordered on the north, east and south by Forest Park, and on the west by the Norfolk and Western rail line as shown on Figure 1. The facility consists of a storage and maintenance yard, a maintenance building, and railroad tracks.

1.3 Constituents of Concern

The general list of COCs was developed based on materials present at the site during inspections conducted by The ELAM Group between 6/13/17 and 7/26/17. Materials identified at the site included lubricating oil and greases, paint thinners, paints, industrial cleansers, waste oils, lead acid and nickel electrolyte batteries, sandblasting media, Thermite, herbicides, insecticides, adhesives, caulking, filters, wood and body fillers, and creosote-treated railroad ties. The materials inventory is provided in Appendix A.

List of COCs:

- ❏ Volatile Organic Compounds ("VOCs")
- ❏ Semi-Volatile Organic Compounds ("SVOCs")
- ❏ RCRA 8 Metals[1]
- ❏ Polychlorinated Biphenyls ("PCBs")

Based on inspections of rail car building materials, the presence of ACM is suspected and will be assessed during site investigations.

1.4 Responsible Agencies

The site's potential releases to the environment are regulated by the Indiana Department Environmental Management ("IDEM") under its State Cleanup Program ("SCP") in accordance with IC 13-25-5-7. The site is catalogued as Site No. 7100207. The site also contains industrial equipment that is currently regulated under the Toxic Substances & Control Act ("TSCA") via USEPA's self-disclosure program. Finally, the site's waste and stormwater management are regulated by IDEM's Compliance Response Branch ("CRB") and Office of Water Quality ("OWQ"), respectively. The points of contact with the above-referenced agencies are provided in Section 1.5.

[1] The Resource Conservation & Recovery Act ("RCRA") monitors a list of metals and solid wastes that are considered hazardous because they exhibit characteristics of corrosivity, toxicity, ignitability, or reactivity. On this list are eight RCRA-monitored metals, including arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver. Analysis of chromium will include total chromium and hexavalent chromium.

1.5 Project Organization

The key personnel and their contact information are listed in Table 1-1 below.

Table 1-1. Key Personnel Contact Information and Responsibilities

Title	Name	Phone Number Email Address	Responsibilities
IDEM SCP Project Manager	Ken McDaniel	(317) 691-6370 kmcdanie@idem.IN.gov	SCP Regulatory oversight
IDEM Quality Assurance Officer (QAO)	Ken McDaniel	(317) 691-6370 kmcdanie@idem.IN.gov	Review data for quality assurance
IDEM Office of Water Quality Storm Water Specialist	Rob Beck	(317) 690-8805 rbeck@idem.IN.gov	Storm water regulatory oversight
IDEM Office Office of Land Quality Technical Environmental Specialist, Compliance	John Naddy	(317) 233-0404 jnaddy@idemlINLgov	Hazardous waste regulatory oversight
Facility Representative	John McNichols, ITM	(317) 439-3630	PRP contact
PRP Designated Project Manager	James Hogan, LPG #2166 The ELAM Group	(888) 510-3526 x102 james.hogan@elamusa.com	Oversee all investigation and remediation activities
PRP QAO	James Hogan The ELAM Group	(888) 510-3526 x102 jameshogan@elamusa.com	Review all data for quality assurance and quality control
PRP Field Team Leader	James Hogan The ELAM Group	(888) 510-3526 x102 james.hogan@elamusa.com	Direct all field activities
Laboratory QAO	David Norris ENVision Laboratories, Inc.	(317) 351-8632 dnorris@envisionlaboratories.com	Direct and report all laboratory procedures

2 Background

This section provides a description of the site, an operational history, and a summary of previous inspections and investigations.[2]

2.1 Property Area Descriptions

The site occupies approximately 6.25 fenced acres and includes a maintenance and storage yard, maintenance building, and railroad tracks. The site includes an open ditch within the central portion of the site and an underground stormwater drainage system that together transfer stormwater to the north end of the site into a drainage swale.

For inspection and investigation purposes, the maintenance and storage yard was divided into 10 areas, identified as Areas A through J. These Areas are shown on Figure 2. Materials stored during each of the Areas are provided in Table 2-1.

Table 2-1. Summary of Material and Equipment Storage at Time of Inspection

Area	Materials and Equipment Stored or Used
A	dry transformers, metal components, motors, lights and switches, and two drums of usable cleaning solution
B	grease buckets, three drums of industrial cleanser, dry transformers, metal parts, and machinery
C	four large shipping containers (Conex Boxes) used for chemical and equipment storage; outdoor storage of grease drums, oils, oil-soaked rags, metal parts and debris, and batteries
D	lead acid and nickel electrode batteries, oil drums, drums containing metal parts, surface staining near oil drum, and a crane
E	totes of lubricants, drums of ZEP cleanser, oil drums, an empty fuel tank, machinery, and metal parts
F	drums of diesel fuel, weed killer, fuel oil AST, bricks, empty oil tanks, metal parts, and machinery
G	industrial machinery (presence of PCBs confirmed in paint chip samples), bin with metal filings, buckets, metal parts, equipment, and railroad ties
H	metal parts and equipment, railroad ties, paint containers, bleach, and an empty drum

[2] A comprehensive site history may be reviewed through IDEM's Virtual File Cabinet at http://vfc.idem.in.gov/facility-search.aspx.

Area	Materials and Equipment Stored or Used
I	empty drums, oil drums, propane tanks, buckets, used sandblasting media, metal parts and debris, surface staining along railroad tracks
J	drums, totes and buckets of lubricants, a damaged open storage structure, diesel fuel AST with pump for dispensing fuel, metal components, machinery, and debris; a south to north trending drainage culvert transverses this area
Maintenance Building	locomotives undergoing repairs and restoration, lubricants, cleaning chemicals, paints,, tools, a parts washer, locomotive parts and equipment

In addition to the above Areas, several rail cars are used for materials storage. Railcars that are used for material storage are shown on Figure 2. A complete list of items that were stored in each car is included in the Materials Inventory provided in Appendix A.

2.2 Operational History

The ITM began leasing the property in 1973 for operation and maintenance of the nonprofit heritage railroad.

2.3 Investigation History

In addition to facility inspections and inventories, soil and materials sampling has been completed at the site. A summary of the soil, water, and materials sampling events is provided in Table 2-2. Analytical summaries for the temporary maintenance pit on Track #6 are provided in Appendix B.

Table 2-2. Summary of Sampling Events

Date	Entity	Samples and Analyses	Results
6/22/17	ELAM & IDEM	• 2 oil samples, 2 wipe samples and 1 paint chip sample from surface of industrial equipment in Area G • All samples analyzed for PCBs; paint chip sample also analyzed for lead ("Pb")	• ELAM results: PCBs and Pb detected in the paint chip sample; no PCBs detected in the wipe samples or oil samples • IDEM results: unavailable
6/27/17	ELAM	• 4 soil samples from walls of temporary pit beneath Track #6, 1 soil sample from stockpiled soil next to pit, 1 water sample from water in pit • All samples analyzed for PCBs, SVOCs, RCRA 8 Metals and VOCs	• VOCs and PCBs: no detections • SVOCs: benzo(a)pyrene and benzo(a)fluoranthene detected in 2 soil samples below the RCG MTGSL; no detections in water • Metals: Ba, Cr and Pb detected below the RCG MTGSL in 3 soil samples; barium detected in water below the RCG TWSL
8/29/17 - 8/30/17	ELAM	• 6 waste characterization oil samples analyzed for PCBs	• No PCBs detected
10/4/17	ELAM	• 1 composite sample of used sandblast media along track north of maintenance building • Analyzed for RCRA 8 Metals (total metals and TCLP)	• Ba, Cr and Pb detected below the RCG MTGSL
10/12/17	ELAM	• 9 paint chip samples collected from surface of industrial equipment in Area G • All samples analyzed for PCBs • 6 samples analyzed for Pb	• PCBs detected in all 9 samples • Lead detected in all 6 samples

3 Project Data Quality Objectives

3.1 Project Objectives and Problem Definition

This section discusses the Data Quality Objectives ("DQOs") for the work to be conducted at the site. The focus of the work is to delineate and characterize the nature and extent of COCs in the surface soils, subsurface soils, groundwater and to determine the presence or absence of ACM in building materials. The identified COCs and sampling media were developed based on past site inspections and history. Information and data obtained from the site and surrounding areas are used to quantify potential risks and develop remedial options.

3.2 Data Quality Objectives

DQOs are quantitative and qualitative criteria upon which project decisions are based. DQOs are based on USEPA guidance[3] and generally cover the following items:

- ❏ Describe the problem to be investigated
- ❏ Identify what questions the study will attempt to answer, what actions (decisions) may result, and who the primary decision maker is
- ❏ Identify the information that needs to be obtained and the measurements that need to be taken to resolve the decision statement(s)
- ❏ Define study boundaries, and when and where data should be collected

The qualitative DQOs are as summarized in Table 3-1 below.

Table 3-1. Summary of Data Quality Objectives

[3] USEPA, 2006, *Guidance on Systematic Planning Using the Data Quality Objectives Process,* EPAQA/G-4, EPA/240/B-06/001: https://www.epa.gov/sites/production/files/2015-06/documents/g4-final.pdf (URL last verified 11/22/17).

Step	Description
1 State the Problem	COCs may be present at levels above screening levels in the IDEM *2017 Screening Level Table, Remediation Closure Guide May 22, 2012 With Corrections Through July 9, 2012* ("RCG"). Previous site inspections identified improperly stored chemicals, on-site impacts to surface soils, suspected ACM, and the presence of PCBs in lead in the paint of some industrial equipment in Area G. Subsurface soils and groundwater investigation have not been completed.
2 Identify the Decision	Determine if COCs are present in soil and groundwater at concentrations exceeding applicable RCG Screening Levels and if asbestos is present in building materials.
3 Identify Inputs to the Decision	• Previous site inspection records • Laboratory analysis of inspection and characterization samples • Local hydrogeology • Site and surrounding land use
4 Define the Boundaries	Geographic: This site is comprised of a maintenance yard (divided into 10 geographic areas) and additional facilities within 6.25 fenced acres bounded on the west by a rail line and surrounded on three sides by a municipal park. Access to off-site areas is controlled by Norfolk and Western Railroad and the City of Noblesville. Surface water bodies nearby include an unnamed ditch, Mallory-Granger Ditch and White River. The site is within a wellhead protection area.
5 Develop a Decision Rule	If levels of COCs detected exceed an applicable RCG Screening Level, additional investigation must be performed to define the nature and extent of the COCs.
6 Specify Limits on Decision Errors	Limits on the decision errors are not needed because the COC concentrations for each sample will be compared to the appropriate IDEM regulatory levels.
7 Optimize the Design for Obtaining Data	Initial sampling locations will be completed in areas most likely to be impacted based on visibly stained soils, material storage and use, and known stormwater drainage and collection areas. Samples for laboratory analysis will be biased toward areas and depths where COCs are present at the highest concentrations as identified by PID and XRF screening results. Future sampling locations, if necessary, will be selected to delineate the nature and extent of any COCs detected at concentrations above the applicable RCG Screening Levels.

The quantitative DQOs for soil, water and ACM are summarized in Table 3-2, Table 3-3 and Table 3-4, respectively.

Table 3-2. Chemicals of Concern, Laboratory Limits and Screening Levels for Soil

Analytical Parameter	Laboratory RQL[1] (mg/kg)	IDEM MTGSL[2] (mg/kg)	IDEM RSL[3] (mg/kg)	IDEM ISL[4] (mg/kg)	IDEM ESL[5] (mg/kg)
PCB Arochlor 1016	<0.08	2.7	5.7	51	120
PCB Arochlor 1221	<0.08	0.016	2.8	8.3	520
PCB Arochlor 1232	<0.08	0.016	2.4	7.2	490
PCB Arochlor 1242	<0.08	0.24	3.2	9.5	560
PCB Arochlor 1248	<0.08	0.24	3.2	9.5	560
PCB Arochlor 1254	<0.16	0.41	1.7	9.7	33
PCB Arochlor 1260	<0.16	1.1	3.4	9.9	570
VOCs					
Acetone	< 0.100	57	85000	100000	100000
Acrolein	< 0.00017	0.00017	0.2	0.6	3.4
Acrylonitrile	< 0.002	0.0023	3.5	11	370
Benzene	< 0.005	0.051	17	51	1800
Bromobenzene	< 0.005	0.84	410	680	680
Bromochloromethane	< 0.005	0.41	210	630	3500
Bromodichloromethane	< 0.005	0.43	4.1	13	930
Bromoform	< 0.005	0.42	270	860	920
Bromomethane	< 0.005	0.038	9.5	30	160
n-Butanol	< 0.050	8.3	7600	7600	7600
2-Butanone (MEK)	< 0.010	23	28000	28000	28000
n-Butylbenzene	< 0.005	64	110	110	110
sec-Butylbenzene	< 0.005	120	150	150	150
tert-Butylbenzene	< 0.005	31	180	180	180
Carbon Disulfide	< 0.005	4.8	740	740	740
Carbon Tetrachloride	< 0.005	0.039	9.1	29	460
Chlorobenzene	< 0.005	1.4	390	760	760

Analytical Parameter	Laboratory RQL[1] (mg/kg)	IDEM MTGSL[2] (mg/kg)	IDEM RSL[3] (mg/kg)	IDEM ISL[4] (mg/kg)	IDEM ESL[5] (mg/kg)
Chloroethane	< 0.005	120	2100	2100	2100
2-Chloroethylvinylether	< 0.050	NA	NA	NA	NA
Chloroform	< 0.005	0.44	4.5	14	1900
Chloromethane	< 0.005	0.98	150	460	1300
2-Chlorotoluene	< 0.005	4.7	910	910	910
4-Chlorotoluene	< 0.005	4.8	250	250	250
1,2-Dibromo-3-chloropropane	< 0.0017	0.0017	0.074	0.64	86
Dibromochloromethane	< 0.005	0.43	120	390	800
1,2-Dibromoethane (EDB)	< 0.00028	0.00028	0.5	1.6	180
Dibromomethane	< 0.005	0.041	34	99	550
1,2-Dichlorobenzene	< 0.005	12	380	380	380
1,3-Dichlorobenzene	< 0.005	NA	NA	NA	NA
1,4-Dichlorobenzene	< 0.005	1.4	36	110	16000
trans-1,4-Dichloro-2-butene	< 0.005	0.00012	0.1	0.32	44
Dichlorodifluoromethane	< 0.005	6	120	370	850
1,1-Dichloroethane	< 0.005	0.16	50	160	1700
1,2-Dichloroethane	< 0.005	0.028	6.4	20	730
1,1-Dichloroethene	< 0.005	0.05	320	1000	1200
cis-1,2-Dichloroethene	< 0.005	0.41	220	2300	2400
trans-1,2-Dichloroethene	< 0.005	0.62	1900	1900	1900
1,2-Dichloropropane	< 0.005	0.033	14	44	370
1,3-Dichloropropane	< 0.005	2.6	1500	1500	1500
2,2-Dichloropropane	< 0.005	NA	NA	NA	NA
1,1-Dichloropropene	< 0.005	NA	NA	NA	NA
1,3-Dichloropropene	< 0.005	0.034	25	82	1600
Ethylbenzene	< 0.005	16	81	250	480

Analytical Parameter	Laboratory RQL[1] (mg/kg)	IDEM MTGSL[2] (mg/kg)	IDEM RSL[3] (mg/kg)	IDEM ISL[4] (mg/kg)	IDEM ESL[5] (mg/kg)
Ethyl methacrylate	< 0.100	3	1100	1100	1100
Hexachloro-1,3-butadiene	< 0.005	0.054	17	17	17
n-Hexane	< 0.010	210	140	140	140
2-Hexanone	< 0.010	0.18	280	1300	3300
Iodomethane	< 0.010	NA	NA	NA	NA
Isopropylbenzene (Cumene)	< 0.005	15	270	270	270
p-Isopropyltoluene	< 0.005	NA	NA	NA	NA
Methylene chloride	< 0.020	0.25	490	3200	3300
4-Methyl-2-pentanone (MIBK)	< 0.010	28	3400	3400	3400
Methyl-tert-butyl-ether	< 0.005	0.63	660	2100	8900
1-Methylnaphthalene	< 0.005	1.2	250	390	390
2-Methylnaphthalene	< 0.005	3.7	340	3000	6800 6800
Naphthalene	< 0.005	0.11	53	170	3100
n-Propylbenzene	< 0.005	25	260	260	260
Styrene	< 0.005	2.2	870	870	870
1,1,1,2-Tetrachloroethane	< 0.005	0.043	28	88	680
1,1,2,2-Tetrachloroethane	< 0.005	0.0059	8.4	27	1900
Tetrachloroethene	< 0.005	0.045	110	170	170
Toluene	< 0.005	14	820	820	820
1,2,3-Trichlorobenzene	< 0.005	0.42	88	930	1600
1,2,4-Trichlorobenzene	< 0.005	4.1	81	260	400
1,1,1-Trichloroethane	< 0.005	1.4	640	640	640
1,1,2-Trichloroethane	< 0.005	0.032	2.1	6.3	35
Trichloroethene	< 0.005	0.036	5.7	19	95
Trichlorofluoromethane	< 0.005	66	1200	1200	1200

Analytical Parameter	Laboratory RQL[1] (mg/kg)	IDEM MTGSL[2] (mg/kg)	IDEM RSL[3] (mg/kg)	IDEM ISL[4] (mg/kg)	IDEM ESL[5] (mg/kg)
1,2,3-Trichloropropane	< 0.005	0.000065	0.071	1.1	17
1,2,4-Trimethylbenzene	< 0.005	0.44	81	220	220
1,3,5-Trimethylbenzene	< 0.005	3.4	180	180	180
Vinyl acetate	< 0.010	1.7	1300	2800	43000
Vinyl chloride	< 0.002	0.014	0.83	17	1,300
Xylene, M&P	< 0.005	3.7	390	390	390
Xylene, 0rtho	< 0.005	3.7	430	430	430
Xylene, Total	< 0.010	200	260	260	260
SVOCs					
Acenaphthene	< 0.33	110	5000	45000	100000
Acenaphthylene	< 0.33	NA	NA	NA	NA
Aniline	< 0.33	0.89	620	4000	12000
Anthracene	< 0.33	1200	25000	100000	100000
Benzo(a)anthracene	< 0.33	0.85	2.2	29	1600
Benzo(a)pyrene	< 0.067	4.7	0.22	2.9	160
Benzo(b)fluoranthene	< 0.33	8.2	2.2	29	1600
Benzo(g,h,i)perylene	< 0.33	NA	NA	NA	NA
Benzo(k)fluoranthene	< 0.33	80	22	290	16000
Benzoic Acid	< 1.60	350	100000	100000	100000
Benzyl Alcohol	< 0.66	9.7	8800	82000	100000
4-Bromophenylphenyl ether	< 0.33	NA	NA	NA	NA
Butylbenzylphthalate	< 0.33	46	4100	12000	100000
Carbazole	< 0.66	NA	NA	NA	NA
4-Chloro-3-methylphenol	< 0.66	NA	NA	NA	NA
4-Chloroaniline	< 0.027	0.031	38	110	6000

Analytical Parameter	Laboratory RQL[1] (mg/kg)	IDEM MTGSL[2] (mg/kg)	IDEM RSL[3] (mg/kg)	IDEM ISL[4] (mg/kg)	IDEM ESL[5] (mg/kg)
bis(2-Chloroethoxy)methane	< 0.067	0.27	270	2500	
bis(2-Chloroethyl)ether	< 0.067	0.00074	3.2	10	
bis(2-Chloroisopropyl)ether	< 0.33	NA	NA	NA	NA
2-Chloronaphthalene	< 0.33	77	6700	60000	100000
2-Chlorophenol	< 0.33	1.8	550	5800	9800
4-Chlorophenylphenyl ether	< 0.33	NA	NA	NA	NA
Chrysene	< 0.33	250	220	2900	100000
Dibenzo(a,h)anthracene	< 0.33	2.6	0.22	2.9	160
Dibenzofuran	< 0.33	2.9	100	1000	1900
1,2-Dichlorobenzene	< 0.33	12	380	380	380
1,3-Dichlorobenzene	< 0.33	NA	NA	NA	NA
1,4-Dichlorobenzene	< 0.33	1.4	36	110	16000
3,3-Dichlorobenzidine	< 0.14	0.17	17	51	2700
2,4-Dichlorophenol	< 0.33	0.45	270	2500	5200
Diethylphthalate	< 0.33	120	71000	100000	100000
2,4-Dimethylphenol	< 0.33	8.5	1800	16000	34000
Dimethylphthalate	< 0.33	NA	NA	NA	NA
Di-n-butylphthalate	< 0.33	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	< 0.041	0.051	7.1	66	
2,4-Dinitrophenol	< 0.067	0.87	180	1600	
2,4-Dinitrotoluene	< 0.054	0.065	24	74	3400
2,6-Dinitrotoluene	< 0.33	0.013	5	15	520
Di-n-octylphthalate	< 0.33	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	< 0.33	29	550	1600	34000
Fluoranthene	< 0.33	1800	3400	30000	68000

Analytical Parameter	Laboratory RQL[1] (mg/kg)	IDEM MTGSL[2] (mg/kg)	IDEM RSL[3] (mg/kg)	IDEM ISL[4] (mg/kg)	IDEM ESL[5] (mg/kg)
Fluorene	< 0.33	110	3400	30000	68000
Hexachloro-1,3-butadiene	< 0.067	0.054	17	17	17
Hexachlorobenzene	< 0.067	0.25	2.9	9.6	630
Hexachlorocyclopentadiene	< 0.33	3.1	2.5	7.5	16
Hexachloroethane	< 0.067	0.04	25	80	1100
Indeno(1,2,3-cd)pyrene	< 0.33	27	2.2	29	1600
Isophorone	< 0.33	5.2	8000	24000	100000
1-Methylnaphthalene	< 0.33	1.2	250	390	390
2-Methylnaphthalene	< 0.33	3.7	340	3000	6800
2-Methylphenol (o-Cresol)	< 0.33	15	4500	41000	87000
3&4-Methylphenol	< 0.66	33	8800	82000	100000
Naphthalene	< 0.067	0.11	53	170	3100
2-Nitroaniline	< 1.30	1.6	880	8000	18000
3-Nitroaniline	< 1.60	NA	NA	NA	NA
4-Nitroaniline	< 0.067	0.32	350	1100	7000
Nitrobenzene	< 0.03	0.018	71	220	3100
2-Nitrophenol	< 0.33	NA	NA	NA	NA
4-Nitrophenol	< 1.60	NA	NA	NA	NA
N-Nitroso-di-n-propylamine	< 0.067	0.0017	1.1	3.3	180
N-Nitrosodiphenylamine	< 0.33	13	1500	4700	100000
Pentachlorophenol	< 0.067	0.028	14	40	2600
Phenanthrene	< 0.30	NA	NA	NA	NA
Phenol	< 0.33	67	27000	100000	100000
Pyrene	< 0.33	260	2500	23000	51000

Analytical Parameter	Laboratory RQL[1] (mg/kg)	IDEM MTGSL[2] (mg/kg)	IDEM RSL[3] (mg/kg)	IDEM ISL[4] (mg/kg)	IDEM ESL[5] (mg/kg)
1,2,4-Trichlorobenzene	< 0.33	4.1	81	260	400
2,4,5-Trichlorophenol	< 0.33	81	8800	82000	100000
2,4,6-Trichlorophenol	< 0.33	0.23	88	820	1800
METALS					
Arsenic	< 2	5.9	9.5	30	920
Barium	< 2	1700	21000	100000	100000
Cadmium	< 2	7.5	99	980	1900
Chromium	< 2	1000000	NA	NA	NA
Chromium VI	<0.0888	4.2	0.35	63	2700
Lead	< 2	270	400	800	1000
Selenium	< 2	5.3	550	5800	9800
Silver	< 2	16	550	5800	9800
Mercury	< 1	2.1	3.1	3.1	3.1

1. Reporting Limit
2. Migration To Groundwater Screening Level (IDEM 2017)
3. Residential Direct Contact with Soil Screening Level (IDEM 2017)
4. Industrial Direct Contact with Soil Screening Level (IDEM 2017)
5. Excavation Direct Contact with Soil Screening Level (IDEM 2017)
6. Units are milligrams per kilogram (mg/kg)

Table 3-3. Chemicals of Concern, Laboratory Limits and Screening Levels for Water

Analytical Parameter	Laboratory RQL (ug/L)	IDEM TWSL[1] (ug/L)	IDEM RVIGWSL[2] (ug/L)	IDEM CVIGWSL[3] (ug/L)
PCB Arochlor 1016	<0.04	1.4	NA	NA
PCB Arochlor 1221	<0.04	0.0147	NA	NA
PCB Arochlor 1232	<0.04	0.078	NA	NA
PCB Arochlor 1242	<0.04	0.078	NA	NA

Analytical Parameter	Laboratory RQL (ug/L)	IDEM TWSL[1] (ug/L)	IDEM RVIGWSL[2] (ug/L)	IDEM CVIGWSL[3] (ug/L)
PCB Arochlor 1248	<0.04	0.078	NA	NA
PCB Arochlor 1254	<0.07	0.078	NA	NA
PCB Arochlor 1260	<0.07	0.078	NA	NA
VOCs				
Acetone	< 100	14000	NA	NA
Acrolein	< 1	0.042	NA	NA
Acrylonitrile	< 0.45	0.52	NA	NA
Benzene	< 5	5	28	120
Bromobenzene	< 5	62	NA	NA
Bromochloromethane	< 5	83	NA	NA
Bromodichloromethane	< 5	80	NA	NA
Bromoform	< 5	80	NA	NA
Bromomethane	< 5	7.5	NA	NA
n-Butanol	< 50	2000	NA	NA
2-Butanone (MEK)	< 10	5600	NA	NA
n-Butylbenzene	< 5	1000	NA	NA
sec-Butylbenzene	< 5	2000	NA	NA
tert-Butylbenzene	< 5	690	NA	NA
Carbon Disulfide	< 5	810	NA	NA
Carbon Tetrachloride	< 5	5	6.5	28
Chlorobenzene	< 5	100	NA	NA
Chloroethane	< 5	21000	NA	NA
2-Chloroethylvinylether	< 50	NA	NA	NA
Chloroform	< 5	80	NA	NA
Chloromethane	< 5	190	NA	NA

Analytical Parameter	Laboratory RQL (ug/L)	IDEM TWSL[1] (ug/L)	IDEM RVIGWSL[2] (ug/L)	IDEM CVIGWSL[3] (ug/L)
2-Chlorotoluene	< 5	240	NA	NA
4-Chlorotoluene	< 5	250	NA	NA
1,2-Dibromo-3-chloropropane	< 1	0.2	NA	NA
Dibromochloromethane	< 5	80	NA	NA
1,2-Dibromoethane (EDB)	< 1	0.05	NA	NA
Dibromomethane	< 5	8.3	NA	NA
1,2-Dichlorobenzene	< 5	600	NA	NA
1,3-Dichlorobenzene	< 5	NA	NA	NA
1,4-Dichlorobenzene	< 5	75	NA	NA
trans-1,4-Dichloro-2-butene	< 1	0.013	NA	NA
Dichlorodifluoromethane	< 5	200	NA	NA
1,1-Dichloroethane	< 5	28	130	550
1,2-Dichloroethane	< 5	5	50	210
1,1-Dichloroethene	< 5	7	300	1300
cis-1,2-Dichloroethene	< 5	70	NA	NA
trans-1,2-Dichloroethene	< 5	100	NA	NA
1,2-Dichloropropane	< 5	5	NA	NA
1,3-Dichloropropane	< 5	370	NA	NA
2,2-Dichloropropane	< 5	NA	NA	NA
1,1-Dichloropropene	< 5	NA	NA	NA
1,3-Dichloropropene	< 4.1	4.7	NA	NA
Ethylbenzene	< 5	700	NA	NA
Ethyl methacrylate	< 100	630	NA	NA
Hexachloro-1,3-butadiene	< 2.6	1.4	NA	NA
n-Hexane	< 10	1500	NA	NA

Analytical Parameter	Laboratory RQL (ug/L)	IDEM TWSL[1] (ug/L)	IDEM RVIGWSL[2] (ug/L)	IDEM CVIGWSL[3] (ug/L)
2-Hexanone	< 10	38	NA	NA
Iodomethane	< 10	NA	NA	NA
Isopropylbenzene (Cumene)	< 5	450	NA	NA
p-Isopropyltoluene	< 5	NA	NA	NA
Methylene chloride	< 5	5	NA	NA
4-Methyl-2-pentanone (MIBK)	< 10	6300	NA	NA
Methyl-tert-butyl-ether	< 5	140	NA	NA
1-Methylnaphthalene	< 5	11.0	NA	NA
2-Methylnaphthalene	< 5	36	NA	NA
Naphthalene	< 1.4	1.7	110	460
n-Propylbenzene	< 5	660	NA	NA
Styrene	< 5	100	NA	NA
1,1,1,2-Tetrachloroethane	< 5	5.7	NA	NA
1,1,2,2-Tetrachloroethane	< 0.66	0.76	72	310
Tetrachloroethene	< 5	5	110	470
Toluene	< 5	1000	NA	NA
1,2,3-Trichlorobenzene	< 5	7	NA	NA
1,2,4-Trichlorobenzene	< 5	70	NA	NA
1,1,1-Trichloroethane	< 5	200	13000	54000
1,1,2-Trichloroethane	< 5	5	11	46
Trichloroethene	< 5	5	9.1	38
Trichlorofluoromethane	< 5	5200	NA	NA
1,2,3-Trichloropropane	< 1	0.0075	NA	NA
1,2,4-Trimethylbenzene	< 5	15	NA	NA
1,3,5-Trimethylbenzene	< 5	120	NA	NA

Analytical Parameter	Laboratory RQL (ug/L)	IDEM TWSL[1] (ug/L)	IDEM RVIGWSL[2] (ug/L)	IDEM CVIGWSL[3] (ug/L)
Vinyl acetate	< 10	410	NA	NA
Vinyl chloride	< 2	2	2.1	35
Xylene, M&P	< 5	190	NA	NA
Xylene, 0rtho	< 5	190	NA	NA
Xylene (Total)	< 10	10000	NA	NA
SVOCs				
Aniline	< 10	130	NA	NA
Benzoic Acid	< 50	75000	NA	NA
Benzyl Alcohol	< 20	2000	NA	NA
4-Bromophenylphenyl ether	< 10	NA	NA	NA
Butylbenzylphthalate	< 10	160	NA	NA
Carbazole	< 20	NA	NA	NA
4-Chloro-3-methylphenol	< 20	NA	NA	NA
4-Chloroaniline	< 3.2	3.7	NA	NA
bis(2-Chloroethoxy)methane	< 10	59	NA	NA
bis(2-Chloroethyl)ether	< 0.12	0.14	NA	NA
bis(2-Chloroisopropyl)ether	< 10	NA	NA	NA
2-Chloronaphthalene	< 10	750	NA	NA
2-Chlorophenol	< 10	91	NA	NA
4-Chlorophenylphenyl ether	< 10	NA	NA	NA
Dibenzofuran	< 10	7.9	NA	NA
1,2-Dichlorobenzene	< 10	600	NA	NA
1,3-Dichlorobenzene	< 10	NA	NA	NA
1,4-Dichlorobenzene	< 10	75	NA	NA
3,3-Dichlorobenzidine	< 1.1	1.3	NA	NA

Analytical Parameter	Laboratory RQL (ug/L)	IDEM TWSL[1] (ug/L)	IDEM RVIGWSL[2] (ug/L)	IDEM CVIGWSL[3] (ug/L)
2,4-Dichlorophenol	< 10	46	NA	NA
Diethylphthalate	< 10	15000	NA	NA
2,4-Dimethylphenol	< 10	360	NA	NA
Dimethylphthalate	< 10	NA	NA	NA
Di-n-butylphthalate	< 10	NA	NA	NA
4,6-Dinitro-2-methylphenol	< 1.2	1.5	NA	NA
2,4-Dinitrophenol	< 30	39	NA	NA
2,4-Dinitrotoluene	< 2.0	2.4	NA	NA
2,6-Dinitrotoluene	< 10	0.49	NA	NA
Di-n-octylphthalate	< 10	NA	NA	NA
bis(2-Ethylhexyl)phthalate	< 5	6	NA	NA
Hexachloro-1,3-butadiene	< 2.6	1.4	NA	NA
Hexachlorobenzene	< 1.0	1	NA	NA
Hexachlorocyclopentadiene	< 25	50	NA	NA
Hexachloroethane	< 5.1	33	NA	NA
Isophorone	< 10	780	NA	NA
2-Methylphenol (o-Cresol)	< 10	930	NA	NA
3&4-Methylphenol	< 20	18	NA	NA
2-Nitroaniline	< 50	190	NA	NA
3-Nitroaniline	< 50	NA	NA	NA
4-Nitroaniline	< 33	38	NA	NA
Nitrobenzene	< 1.2	1.4	na	NA
2-Nitrophenol	< 10	NA	NA	NA
4-Nitrophenol	< 50	NA	NA	NA
N-Nitroso-di-n-propylamine	< 0.093	0.11	NA	NA

Analytical Parameter	Laboratory RQL (ug/L)	IDEM TWSL[1] (ug/L)	IDEM RVIGWSL[2] (ug/L)	IDEM CVIGWSL[3] (ug/L)
N-Nitrosodiphenylamine	< 10	120	NA	NA
Pentachlorophenol	< 1.0	1	NA	NA
Phenol	< 10	5800	NA	NA
1,2,4-Trichlorobenzene	< 10	70	NA	NA
2,4,5-Trichlorophenol	< 10	1200	NA	NA
2,4,6-Trichlorophenol	< 9	12	NA	NA
Acenaphthene	< 1.0	530	NA	NA
Acenaphthylene	< 1.0	NA	NA	NA
Anthracene	< 0.10	1800	NA	NA
Benzo(a)anthracene	< 0.10	0.12	NA	NA
Benzo(a)pyrene	< 0.10	0.2	NA	NA
Benzo(b)fluoranthene	< 0.10	3.4	NA	NA
Benzo(g,h,i)perylene	< 0.10	NA	NA	NA
Benzo(k)fluoranthene	< 0.10	3.4	NA	NA
Chrysene	< 0.10	34	NA	NA
Dibenzo(a,h)anthracene	< 0.029	0.034	NA	NA
Fluoranthene	< 1.0	800	NA	NA
Fluorene	< 1.0	29.	NA	NA
Indeno(1,2,3-cd)pyrene	< 0.022	0.34	NA	NA
1-methylnaphthalene	< 1.0	11	NA	NA
2-methylnaphthalene	< 1.0	36	NA	NA
Naphthalene	< 1.0	1.7	110	460
Phenanthrene	< 1.0	NA	NA	NA
Pyrene	< 1.0	120	NA	NA

Analytical Parameter	Laboratory RQL (ug/L)	IDEM TWSL[1] (ug/L)	IDEM RVIGWSL[2] (ug/L)	IDEM CVIGWSL[3] (ug/L)
METALS				
Arsenic	< 10	10	NA	NA
Barium	< 100	2000	NA	NA
Cadmium	< 5	5	NA	NA
Chromium	< 10	100	NA	NA
Chromium VI	<0.20	0.35	NA	NA
Lead	< 10	15	NA	NA
Selenium	< 10	50	NA	NA
Silver	< 50	94	NA	NA
Mercury	< 2	2	NA	NA

1. Tap Water Screening Level (IDEM 2017)
2. Residential Vapor Intrusion Groundwater Screening Level (IDEM 2017)
3. Commercial Vapor Intrusion Groundwater Screening Level (IDEM 2017)
4. Units are micrograms per liter (ug/L)

Table 3.4 Chemicals of Concern, Laboratory Limits and Screening Levels for Building Materials

Analytical Parameter	Laboratory RQL % Asbestos Using PLM[1]	AHERA[2] % Asbestos
Asbestos	1%	>1% Asbestos

1. Polarized Light Microscopy
2. Asbestos Hazard Emergency Response Act

3.3 Data Quality Indicators and Measurement Quality Objectives

The following definitions are used to establish Data Quality Indicators ("DQIs") for the field and laboratory analyses.

- Accuracy is the closeness of agreement between an observed value and an accepted reference value. The difference between the observed value and the

reference value includes components of both systematic error (bias) and random error. Laboratories assess the overall accuracy of their instruments and analysis methods (independent of sample or matrix effects) through the measurement of "standards," which are materials of accepted reference values. Accuracy will vary from analysis to analysis because of individual sample and matrix effects. In an individual analysis, accuracy can be measured and expressed in terms of the recovery of surrogate compounds (organic analyses) or recovery of spiked compounds (inorganic analyses). This gives an indication of expected recovery for analytes tending to behave chemically like the spiked or surrogate compounds.

- ❏ Precision is the agreement among a set of replicate measurements without consideration of the "true" or accurate value, i.e., variability between measurements of the same material for the same analyte. Precision is measured in a variety of ways, including statistically, such as calculating variance or standard deviation.
- ❏ Completeness is defined as the percentage of measurements made that are judged to be valid measurements.
- ❏ Representativeness expresses the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, process condition, or an environmental condition. Representativeness is a qualitative parameter, which is dependent upon the proper design of the sampling program and the laboratory QC protocol.
- ❏ Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. This goal is achieved through using standard techniques to collect and analyze representative samples and reporting analytical results in appropriate units.

3.4 Data Review and Validation

Data review will be conducted in accordance with The ELAM Group's data management procedures.

3.5 Data Management

The following section provides The ELAM Group's data management procedures on document data management, field data management and document preparation and control. This information is provided along with details of The ELAM Group's procedures to be followed during data collection, management and presentation.

3.5.1 Data Recording

The ELAM Group has a paperless data storage policy. In this regard, The ELAM Group's official data documentation are secured electronically through an encrypted server. All field data, forms, and analytical reports will thus be provided to The ELAM Group electronically and stored on a secure data server to allow for document preparation, storage, retrieval, and control.

Each data form or document (e.g., boring logs, tables, and figures) will be checked for accuracy after completion by a licensed or certified professional. Analytical data summary tables will contain the sample name, sample location (including depth for soils), sampling date, and analytical results.

3.5.2 Data Reduction

Field data such as groundwater levels or field measured parameters and procedures, will be reduced to determine information such as water elevation, aquifer yield, or the conditions under which field data was obtained. Calculations will be reviewed for accuracy by an independent licensed or certified peer reviewer before submittal of the final report.

The analytical laboratory will perform data reduction and verification for the analysis it performs. Data reduction for field screening and aqueous parameter analysis will be performed in accordance with the analytical procedures or methodologies consistent with the equipment utilized.

3.5.3 Data Transmission

Field samples will be submitted to an accredited analytical laboratory and the result received by The ELAM Group in electronic format. The ELAM Group's data manager will review the data within 1 week of receipt and advise on any necessary actions required to rectify errors.

3.5.4 Data Analysis

Once the data are properly uploaded into the The ELAM Group data management system, the data will be used to interpret site conditions. Multiple data tables may be produced for internal and / or external use to evaluate site conditions and plan additional site activities.

3.6 Assessment Oversight

Three levels of data verification shall be employed for site work. This includes:

- ❏ during sample collection
- ❏ data documentation and data management system entry
- ❏ report generation processes

Data which does not meet the DQO of the project will be flagged or qualified in The ELAM Group's data management system during the data validation process.

4 Sampling and Analysis Plan

For each activity that will involve the screening or collection of samples, the following will be described:

- ❏ sampling locations
- ❏ media to be sampled
- ❏ analytes
- ❏ sampling rationale

4.1 Soil Sampling

4.1.1 Initial Site Investigation

The Initial Site Investigation ("ISI") will include drilling at 29 locations. The soil boring locations are planned in areas most likely to represent releases to the environment based on visibly stained soils, material storage and use, and known stormwater drainage and collection areas. The proposed ISI soil boring locations are displayed on Figure 2.

The soil borings will be advanced into the first saturated zone. If groundwater is not encountered in the upper 30 feet, the boring will be terminated at a maximum depth of 30 feet below ground surface (bgs). Each soil boring will be continuously logged and sampled in accordance with IDEM guidelines.[4]

A minimum of two soil samples per soil boring will be submitted for laboratory analysis. One surface soil sample from the upper 6 inches of soil will be submitted for laboratory analysis from each soil boring. Additional soil samples will be submitted for laboratory analysis using the following general criteria:

- ❏ One sample with the highest PID or XRF result in the upper 15 feet
- ❏ The soil sample with the highest XRF results (for metals) and highest PID results (for all other parameters) within 15 feet of the surface

[4] IDEM, 2009, *Drilling Procedures and Monitoring Well Construction Guidelines*, Policy Number WASTE-053-NPD, Originally Effective 3/17/09, IDEM: www.in.gov/idem/ctap/files/ nrpd_waste-0053.pdf (URL last verified 11/17/17).

- ❏ The soil sample with the highest XRF results (for metals) and highest PID results (for all other parameters) above groundwater saturation

Soil samples for VOC analysis will be collected in accordance with Method 5035A. Additional details regarding field screening and soil sampling procedures are provided in Section 6.2 and 6.3, respectively.

Quality assurance/quality control ("QA/QC") samples will include field duplicates, matrix spike ("MS") and matrix spike duplicate ("MSD") samples collected at a rate of one QA/QC sample per 20 investigative samples. Additionally, a laboratory-supplied trip blank will accompany the samples from time of collection until time of laboratory analysis. The trip blank sample will be analyzed for VOCs only.

Soil samples and associated QA/QC samples will be collected for VOCs via USEPA Method 5035. The samples will be analyzed for VOCs by USEPA Method 8260, SVOCs by USEPA Method 8270, RCRA 8 Metals by USEPA Methods 6010B/7471A/7470, Hexavalent Chromium by USEPA Method 7199 and PCBs by USEPA Method 8082.

4.1.2 Subsequent Investigations

Soil sampling procedures for subsequent investigations will be completed as described in Section 4.1.1 and in accordance with the procedures in Section 6. The COCs for analysis may be modified during subsequent investigations based on detected analytes.

4.2 Groundwater Sampling

4.2.1 Initial Site Investigation

At each soil boring location where groundwater is encountered, a licensed well driller will install a temporary well in the open borehole. Each well will consist of a 1-inch diameter schedule 40 polyvinyl chloride ("PVC") monitoring well with between 2 and 10 feet of 010-slot screen. The screen will be installed to intersect the saturated soil to allow for collection of groundwater samples and groundwater elevation measurements. A laser level and survey rod will be used to survey the top-of-casing ("TOC") elevation and ground elevation to the nearest 0.01 feet at each temporary well location. After installation and prior to groundwater sampling, each temporary well will be developed

with a bailer, peristaltic pump, or tubing and check valve to remove at least 1 well volume of water.

Upon stabilization of water levels after well development, an oil-water interface probe will be used to collect depth-to-water and depth-to-product measurements. Groundwater samples will be collected from the temporary wells after gauging using a bailer, tubing and check valve, or peristaltic pump. To minimize VOC loss due to volatilization during sampling, samples for VOC analysis will be collected with a bailer or tubing and check valve prior to collecting other samples.

QA/QC samples will include field duplicates and MS/MSD samples collected at a rate of one QA/QC sample per 20 investigative samples. Additionally, a laboratory-supplied trip blank will accompany the samples from time of collection until time of laboratory analysis. The trip blank sample will be analyzed for VOCs only.

Groundwater samples and associated QA/QC samples will be analyzed for VOCs by USEPA Method 8260, SVOCs via EPA Method 8270, RCRA 8 Metals by Method 6010B/7471A/7470, Hexavalent Chromium by USEPA Method 218.6 and PCBs by USEPA Method 8082.

4.3 Asbestos Sampling

On 11/7/17, material samples were collected from 10 rail cars in which suspected ACM was observed during previous inspections. The rail cars include the following:

- ❏ Track 11, deteriorated passenger car, various materials
- ❏ Track 2 at 590 feet, rail car #9036, pipe wrap
- ❏ Track 2 at 400 feet, undesignated open car, boiler insulation
- ❏ Rail cars #5354 - 4454, yellow passenger car and three other connected elevated train cars, wall insulation (4 cars of similar construction)
- ❏ Rail car #2785, pipe wrap
- ❏ Rail car #8091, possible pipe wrap, may have cotton jacket
- ❏ Unidentified car with missing front or back wall exposing suspected ACM fabric, photographed and identified by IDEM as “caboose”

Inspection and sampling was performed by a Licensed Asbestos Inspector.

In accordance with USEPA sampling guidelines, three samples were collected for each homogeneous area of thermal system insulation material. One sample was collected from each homogeneous material for miscellaneous material (not thermal or surfacing material). Homogeneous material means an area of surfacing material, thermal system insulation material or miscellaneous material that is uniform in color and texture. Samples were collected from rail car fabric, insulation, pipe wrapping, and from exposed boiler insulation, as observed during site inspections.

The samples will be analyzed using Polarizing Light Microscopy (“PLM”). Material in which ACM is detected at greater than 1% will be considered ACM. Confirmed ACM which is considered to be friable must be removed or encapsulated.

5 Request for Analyses

The following section presents the analytical support for the project, which includes the following:

- ❏ Requested analysis
- ❏ Constituents of concern ("COCs")
- ❏ Laboratory which will conduct the analysis
- ❏ Available resources
- ❏ Turnaround times for analytes

The analytical parameters for laboratory analysis are presented in Table 5-1.

Table 5-1. Requested Laboratory Analytical Parameters

Analytical Parameter	EPA Method Reference
Volatile Organic Compounds (VOCs)	USEPA Methods 8260B
SVOC	USEPA Method 8270
RCRA 8 Metals	USEPA Methods 6010B/7471A/7470
Hexavalent Chromium (soil)	USEPA Method 7199
Hexavalent Chromium (water)	USEPA Method 218.6
PCBs	USEPA Method 8082
Asbestos	USEPA Method 6900R/R-93/116

5.1 Analyses Narrative

Normal sample turnaround times are anticipated for the sample analysis. There are not specific QC requirements or modified sample preparation techniques required under this QAPP. The analysis requested will be the analytical laboratory requirements for the parameters requested. The analytical methods, containers, preservation and holding time requirements for analytes are summarized in Table 5-2.

Table 5-2. Analytical Method, Containers, Preservation, and Holding Times Requirements for Analytes

Analytical Parameter and/or Analytical Method Number	Media	Containers (number, type, size/volume)	Preservation Requirements (chemical, temperature, light protection)	Maximum Holding Times
VOC EPA Method 8260	Groundwater	Three 40-mL glass vials	HCL, 4 degrees C	14 days
VOC EPA Method 8260 (5035)	Soils	Three 40-mL tared vial + jar for % moisture	None, 4 degrees C/freeze within 48 hrs	14 days
SVOCs EPA Method 8270	Groundwater	(2) 1000 ml Amber Glass, Teflon Lined	4° C	7 Days (Extraction)
SVOCs EPA Method 8270	Soils	4 oz Container Amber Glass, Teflon Lined	4° C	7 Days (Extraction)
PCBs EPA Method 8082	Groundwater	(2) 1000 ml Amber Glass, Teflon Lined	4° C	7 Days (Extraction)
PCBs EPA Method 8082	Soils	4 oz Container Amber Glass, Teflon Lined	4° C	7 Days (Extraction)
RCRA 8 Metals EPA Method 7471A/7470	Groundwater	500-ml Plastic	HNO_3, pH<2, 4° C	28 days
RCRA 8 Metals EPA Method 7471A/7470	Soils	4 oz Container Amber Glass	4° C	180 days
Hexavalent Chromium	Soils	4 oz Container Amber Glass	4° C	180 days
Hexavalent Chromium	Water	250 ml plastic	NaOH preservative, 4° C	24 hours unpreserved, 28 days preserved
Asbestos EPA Method 600/R-93/116	Building materials	10- to 50-mL screw-top plastic vials	Tape seal	N/A

5.2 Analytical Laboratory

The analytical laboratory retained for analysis of chemicals in soils and groundwater is Envision Laboratories, Inc. The point of contact at the laboratory is:

David Norris
Envision Laboratories, Inc.
1439 Sadlier Circle West Drive
Indianapolis, IN. 46239
Phone: 317 351-8632
Fax: 317 351-8639
E-mail: dnorris@envisionlaboratories.com

The analytical laboratory retained for analysis of bulk ACM in building materials is STAT Analysis Corporation.

The laboratory quality assurance plan and standard operating procedures are incorporated into this QAPP by reference as summarized in Table 5-3.

Table 5-3. Location of QA and SOP Documents

QA Protocol	Appendix
ENVision Laboratories, Inc Quality Manual	Appendix C
Enviro-Chem Laboratories, Inc. Quality Manual	Appendix D
STAT Analysis Corporation Quality Manual	Appendix E

6 Field Methods and Procedures

6.1 Field Equipment

Below is a list of field equipment and materials needed for sampling of soil, groundwater and building materials.

6.1.1 List of Equipment Needed

Table 6-1. Field and Sampling Equipment

Description of Equipment	Dedicated (Yes/No)	See Section
Personal protective equipment (PPE)	no	See Health and Safety Plan
Decontamination Supplies	yes	7
Soil and Groundwater Sampling Vials/Jar	yes	5.1
Sample Log Sheets	yes	8
Sample labels/tags	yes	8
coolers, ice packs	no	8
sampling bowls and equipment	no	6.0
plastic disposable trowels	yes	6.0
Self-leveling survey equipment (1 day)	no	6.4
Peristaltic pump (1 day)	no	6.4
Interface probe (1 day)	no	6.4
trash bags	no	8.0
Photoionization Detector (PID)	no	6.2, 6.3
X-Ray Fluorescence Analyzer (XRF)	no	6.2, 6.3
8 ounce glass jars	yes	6.6
Spray bottle of tap water amended with a few drops of dishwashing liquid	no	6.6

Description of Equipment	Dedicated (Yes/No)	See Section
Sampling tool (knife, corer, spatula, etc)	no	6.6
Disposable low lint wipes for cleaning tools	yes	6.6
Silicone caulk or appropriate sealant	no	6.6

6.1.2 Calibration of Field Equipment

Field equipment will be calibrated prior to use according to the manufacturer's instructions and recommendations.

6.2 Field Screening

Field screening of soil samples will be performed for the presence of COCs. A PID will be used for assessment of VOCs and SVOCs. An XRF will be used for assessment of metals.

6.2.1 PID

Field soil sampling and screening procedures will involve the following:

1. Half-fill a clean, unused Ziploc baggie with soil immediately upon retrieval
2. Close the Ziploc baggie
3. Squeeze and shake the bag for at least 30 seconds to break up soils and allow for headspace development
4. If ambient temperatures are below freezing, headspace development is to be within a heated vehicle or building
5. Unzip the corner of the bag approximately one to two inches and insert the probe; record the maximum meter response; erratic responses should be discounted as a result of high organic vapor concentrations or conditions of elevated headspace moisture
6. The PID shall be operated and calibrated to yield total organic vapors ("TOVs") in parts per million ("ppm"); PID instruments should be operated with a 10.2 electron-volt ("eV") lamp source

6.2.2 XRF

1. Collect each sample and place it into a sealed zip lock bag (note each sample should avoid larger clasts or pieces of gravel)
2. Perform a repeatability test on the first sample
    a. Shoot sample 3 times and record data in field notebook
3. Take initial XRF measurement for each sample at natural moisture content
    a. Shoot the sample through the bag for 20 seconds and record measurement in field notebook
4. Following each measurement, remove a 20-40 ml volume portion of the sample as well as any large pieces of gravel or clasts
    a. Use scale to confirm correct volume
5. Each sub-sample should be placed in a disposable cup and dried in an oven at 150 degrees F for 30 minutes
6. Transfer sample into a new sealed zip lock bag
7. Take XRF measurement on each of the dried samples
    a. Shoot the sample for 20 seconds through the bag and record measurement in the field notebook
8. Download measurements stored in the Innov-X instrument to Excel for processing

6.3 Soil

6.3.1 Surface Soil Sampling

Surface soil samples will be collected from the upper 6 inches of soil.

Equipment:

1. Laboratory Approved Sample Jars
2. PID
3. XRF
4. Ziploc baggies
5. Hand trowel, hand auger, or split-spoon
6. Sample labels
7. Plastic (disposable) trowels

Procedure:

1. Decontaminate all re-usable equipment before advancing each soil boring
2. Setup soil logging table
3. Don an unused, clean pair of nitrile gloves prior to collecting each soil sample
4. Collect surface soil samples either with a hand trowel or hand auger and field screen in accordance with the procedure defined in Section 6.2
5. Measure TOVs with a PID and metals with an XRF per Section 6.2
6. Make and record lithologic description of the soils in the Field Book
7. Place soils for laboratory analyses in laboratory approved sampling jars as per laboratory specifications; samples to be analyzed for VOCs will be collected prior to other samples, and in accordance with Method 5035A
8. Label sample jars and record time of sampling
9. Record samples on Chain-of-Custody form
10. Place samples in iced sample cooler
11. Transport samples to the laboratory; samples collected via Method 5035A for VOC analysis must be frozen within 48 hours of collection

6.3.2 Subsurface Soil Sampling

Subsurface soil samples, either hand auger samples or samples obtained from a drilling rig via split-spoons or dedicated acetate liners, will be sampled according to the following procedures.

Samples to be analyzed for VOCs will be collected prior to other samples and in accordance with Method 5035A. Subsurface samples will be collected by boring to the desired sample depth using a hand auger or drill rig. Once the desired sample depth is reached, soil samples will be collected as independent, discrete samples. Samples will be placed and sealed in a Ziploc bag and screened in accordance with Section 6.2. A lithologic description of the soil sample will be made in the Field Book.

Procedure:

1. Decontaminate all re-usable equipment before advancing each soil boring
2. Setup soil logging table
3. Don an unused, clean pair of nitrile gloves prior to collecting each soil sample

4. Retrieve soil cores from hand auger, split-spoon sampler, or acetate liner
5. Place a portion of each sample interval into 3 sealable, unused plastic bags (1 bag for field screening, 1 bag for potential laboratory analysis, 1 bag for XRF metals analysis and potential laboratory analysis)
6. Measure TOVs with a PID and metals with an XRF per Section 6.2
7. Make and record lithologic description of the soils in the Field Book
8. Place soils for laboratory analyses in laboratory approved sampling jars as per laboratory specifications; samples to be analyzed for VOCs will be collected prior to other samples, and in accordance with Method 5035A
9. Label sample jars and record time of sampling
10. Record samples on Chain-of-Custody form
11. Place samples in iced sample cooler
12. Transport samples to the laboratory; samples collected via Method 5035A for VOC analysis must be frozen within 48 hours of collection

6.4 Groundwater Sampling

6.4.1 Water-Level Measurements

1. Remove plugs or caps from all wells to allow water level to stabilize before gauging
2. Don an unused, clean pair of nitrile gloves prior to gauging each well
3. Decontaminate water level indicator or oil-water interface probe prior to gauging each well
4. Gauge the depth to water relative to the surveyed TOC in each well using a water level indicator or oil-water interface probe; gauge the depth to product and depth to bottom, as necessary, based on the specific work scope
5. Record all measurements to the nearest 0.01 foot in the field log or field forms

6.4.2 Grab Samples from Temporary Monitoring Wells or Boreholes

1. Temporary wells should be properly developed by purging at least 1 well volume of water and allowing the water level to equilibrate prior to sampling
2. Don clean, disposable gloves while collecting samples; change gloves between sampling locations

3. Label sample jars provided by the laboratory
4. At all wells, collect samples for VOC analysis first, then other parameters
5. Collect water samples using either a bailer, tubing and check valve apparatus, or peristaltic pump; since the negative pressure from a peristaltic pump may lead to VOC loss in water samples, a peristaltic pump should not be used for collecting samples for VOC analysis
    a. Bailer
        i. Attach string to disposable bailer and slowly lower bailer into the water allowing the bailer to fill with water with minimal disturbance
        ii. Bring the bailer to the surface and fill sample containers with water sample. Ensure there is no headspace in VOA containers
    b. Tubing and Check Valve
        i. Connect check valve to clean, unused tubing and lower tubing and check valve into the water column to the desired sample depth
        ii. Use reciprocating motion to bring water up the tubing to the surface and fill sample containers with water; ensure there is no headspace in VOA containers
        iii. Decontaminate re-usable check valve between wells
    c. Peristaltic Pump
        i. Insert decontaminated re-usable flexible tubing into the peristaltic pump
        ii. Connect sample tubing to the intake side of the flexible tubing and place in the monitoring well at the desired sample depth
        iii. Connect a short piece of tubing to the effluent side of the flexible tubing
        iv. Turn on pump and adjust flow to a rate less than 1 L per minute
        v. Collect water into appropriate sample containers
        vi. Decontaminate re-usable flexible tubing between wells
6. Record well location and time of sampling in field book
7. Record samples on Chain-of-Custody form
8. Place samples in iced shipping container
9. Transport samples to the laboratory

6.4.3 Low-Flow Groundwater Sampling

Peristaltic pumps may be used for all samples except those intended for VOC analysis. If a peristaltic pump is used, the peristaltic pump set-up procedures listed in 6.4.2 will be used and low-flow sampling will be completed as described herein. Down-hole bladder pumps may be used for samples intended for all other site COCs.

Equipment:

1. down-hole bladder pump or peristaltic pump
2. dedicated teflon sleeve and sample tubing
3. multiprobe aqueous chemistry meter
4. transparent flow through cell
5. water level indicator

Procedure:

1. Slowly lower bladder pump into well so as not to disturb and fine material which may be in the well
2. The pump intake should be placed in the approximate center of the saturated portion of the well screen, at least two feet off the bottom of the well, if possible to further minimize turbidity
3. The pump should not be raised or lowered while taking samples or purging the well
4. Water level readings should be taken during purging and sampling to insure that the drawdown in the well is less than 0.3 feet
5. Begin purging the well at the lowest flow volume settings, adjustments to higher flow volumes can be made provided total drawdown is no greater than 0.3 feet
6. Turbidity, pH, temperature, specific conductivity, oxygen-reduction potential (redox), and dissolved oxygen (DO) should be monitored during the purging and sampling
7. The frequency of recording aqueous parameters should be every 2 to 5 minutes and recorded in the log book
8. Stability is achieved once three consecutive readings do not vary by more than the following:
    a. - turbidity +- 10%
    b. - DO +- 10%

c. - conductivity & temperature +- 3%
d. - redox +- 10 microvolts
e. - pH +- 0.1

9. If aqueous parameters do not stabilize after 5 casing volumes or 30 minutes, the sample should be taken
10. If a well dewaters during purging and three casing volumes are not purged, then the well will be allowed to recharge up to 80% of the static water column and dewatered once more; after water levels have recharged a second time to 80% of the static water column, groundwater samples will be collected
11. Once the aqueous parameters have stabilized, groundwater samples will be taken by disconnecting the tubing at the influence side of the in-line flow cell
12. Label sample jars and record well location and time of sampling in field book
13. Record samples on Chain-of-custody form
14. Place samples in sample cooler
15. Dispose of all sample tubing and bladder pump sleeves
16. Decontaminate water level meter
17. Samples will be labeled, stored in iced shipping containers with COC documentation, and transported to the contract laboratory

Sample Handling and Preparation:

1. Samplers will don clean, unused disposable gloves while collecting samples; Gloves will be changed between sampling locations
2. Field activities and conditions and sampling data (e.g., sample description) will be recorded in a field notebook; any deviations from the sampling protocol will be noted on field records and will be brought to the attention of the project manager; observations of discoloration, odors, and organic-vapor concentrations will be recorded as well
3. Collected samples will be placed in appropriate laboratory-supplied containers; samples will be labeled, stored in iced shipping containers with chain-of-custody documentation, and transported to the contract laboratory, as appropriate

6.5 Suspected Asbestos-Containing Materials (ACM) Sampling

Sampler will use the method described in 40 CFR Part 763.86, Sampling (for asbestos) for collecting bulk asbestos samples. This method describes sampling for surfacing material, thermal system insulation, and miscellaneous material. 40 CFR Part 763.92(a)(1) and (2), and 40 CFR Part 763, Subpart E. Cross contamination and disruption of ACM is a potential when conducting bulk asbestos sampling. Special attention must be paid to avoid creation of airborne asbestos. This method is intended to provide material to a laboratory where the fibers can be quantified and qualitatively identified as a specific type of asbestos or non-asbestiform fiber.

6.5.1 Apparatus, Materials, and Chemicals

1. Sampling tool (knife, corer, spatula, etc)
2. Spray bottle of tap water amended with a few drops of dishwashing liquid
3. Disposable low lint wipes for cleaning tools
4. 8 ounce glass jars provided by the laboratory
5. Respirator
6. Latex gloves
7. Disposable Tyvek® clothing
8. Silicone caulk or appropriate sealant
9. Camera
10. Project logbook

6.5.2 Procedure

1. Avoid touching the material being sampled with hands
2. Minimally disturb the object or material sampled during the sampling process
3. Identify areas with suspect ACM; materials that might be suspect for asbestos may include, but are not limited to, thermal system insulation, fabric, wall board and wire insulation
4. Sufficiently wet the area being sampled before collecting the sample
5. Use a sampling tool appropriate for each kind of material and collect samples in laboratory-provided airtight containers for subsequent laboratory analysis
6. Clean the sampling tool with amended water after every sample is collected, or use a different clean tool

7. Enclose or encapsulate the space left after sampling to reduce the chance of airborne exposure
8. Record the sample location (GPS), study site, sample description, time, date and project identification number in the logbook, and take pictures of the samples

7 Decontamination Procedures

The objective of decontamination is to reduce the likelihood of sample cross-contamination. It is anticipated that disposable equipment will be used to collect samples for most sampling purposes. However, decontamination procedures are described below in the event that non-dedicated sampling equipment is used, such as with a stainless steel trowel or auger.

Sampling equipment and reusable materials that contact the soil or water will be decontaminated on site and between sampling locations. All drilling equipment will be decontaminated prior to use and between each borehole location. Decontamination will consist of the following:

1. Non Phosphate detergent wash, consisting of a dilute mixture of Liquinox and distilled water (visible soil to be removed by scrubbing)
2. Distilled water rinse

8 Disposal of Residual Materials

Investigation-derived waste ("IDW") generated during the work will be containerized in Indiana Department of Transportation ("INDOT")-approved 55-gallon steel drums and staged on-site pending proper characterization and disposal. Each drum will be disposed per an IDEM "Contained-In" Determination if necessary, in accordance with the IDEM Nonrule Policy Document *"Contained-In Determination" Policy*, 4/10/15.

Disposal of residual materials and/or sampling supplies that cannot be returned to the point of collection will be disposed of according to state requirements. Used PPE and disposable equipment will be double bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. Any PPE and disposable equipment that is to be disposed of which can still be reused will be rendered inoperable before disposal in the refuse dumpster.

9 Sample Documentation and Shipment

9.1 Field Notes

Field notes will be captured in the field logbooks.

9.1.1 Field Logbooks

Field logbooks will be maintained throughout the entire sampling and remedial program. General entries made in the field logbook will include the following information:

- ❏ Date
- ❏ Location of Site
- ❏ Weather Conditions (i.e., Clear, Overcast, Windy, Sunny, etc.), Wind Direction and Velocity (i.e., SE @ 10 mph) and Temperature (Fº)
- ❏ Name(s) of Field Personnel and visitors (Print)
- ❏ Field Procedures and work plan references
- ❏ Field Objectives for the day
- ❏ Time Log and Description of Observed Site Conditions throughout day
- ❏ Signature

Specific entries will be made for each day of sampling and will record the following information in the field logbook:

- ❏ Team members participating in the sampling
- ❏ Time of arrival/entry on site and time of site departure
- ❏ Other personnel on site
- ❏ Summary of any meetings or discussions with tribal, contractor, or states/federal agency personnel
- ❏ Field objectives for the day
- ❏ Deviations from sampling plans, site safety plans, and SAP procedures
- ❏ Changes in personnel and responsibilities with reasons for the changes
- ❏ Levels of safety protection

- ❏ Calibration readings for equipment

9.1.2 Photographs

Any photographs will be taken of the field activities, as necessary, to photodocument sampling, soil consolidation, and other field conditions. Photographs will also be taken at the sampling locations and at other areas of interest on site or sampling area. They will serve to verify information entered in the field logbook. For each photograph taken, the following information will be written in the logbook or recorded in a separate field photography log:

- ❏ Time, date, location, and weather conditions
- ❏ Description of the subject photographed
- ❏ Name of person taking the photograph

9.2 Labeling

Samples will be labeled to properly cross-reference them to a site plan followed by an abbreviation for sample media (i.e., “S” for soil, “G” for groundwater); and then either the sample depth in 10th of a foot for soil or date for groundwater and asbestos. Examples are provided below.

- ❏ Soil: SB10:S100106 represents a soil sample collected from SB-10 with a depth interval of 10.0’ to 10.6’
- ❏ Groundwater: MW10:G091517 represents a groundwater sample collected from MW-10 on 9/15/17
- ❏ Asbestos: E001:AS091517 represents a sample collected from suspected ACM in rail car E001 on 9/15/17

9.3 Sample Chain-Of-Custody Forms and Custody Seals

All sample shipments for analyses will be accompanied by a Chain-of-Custody record. A copy of the form is included in Appendix F. Form(s) will be completed and sent with the samples for each laboratory and each shipment. If multiple coolers are sent to a single laboratory on a single day, form(s) will be completed and sent with the samples

for each cooler. The Chain-of-Custody form will identify the contents of each shipment and maintain the custodial integrity of the samples. Generally, a sample is considered to be in someone's custody if it is either in someone's physical possession, in someone's view, locked up, or kept in a secured area that is restricted to authorized personnel. Until the samples are shipped, the custody of the samples will be the responsibility of the The ELAM Group or the entity conducting the sampling. The sampling designee will sign the chain-of-custody form in the "relinquished by" box and note date, time, and air bill number, if applicable. The sample numbers for all field samples, field QC samples, and duplicates will be documented on the form. A self-adhesive custody seal will be placed across the lid of each sample if shipped. The shipping containers in which samples are stored (usually a sturdy picnic cooler or ice chest) will be sealed with self-adhesive custody seals any time they are not in someone's possession or view before shipping.

9.4 Package and Shipment

All sample containers will be placed in a strong-outside cooler. The sample packaging procedures that will be followed for the soil samples are described below.

1. When ice is used, pack it in zip-locked, double plastic bags; seal the drain plug of the cooler with fiberglass tape to prevent melting ice from leaking out of the cooler
2. The bottom of the cooler should be lined with bubble wrap to prevent breakage during shipment
3. Check screw caps for tightness and, if not full, mark the sample volume level of liquid samples on the outside of the sample bottles with indelible ink
4. Secure bottle/container tops with clear tape and custody seal all container tops
5. Affix sample labels onto the containers with clear tape
6. Wrap all glass sample containers in bubble wrap to prevent breakage
7. Seal all sample containers in heavy duty plastic zip-lock bags; write the sample numbers on the outside of the plastic bags with indelible ink
8. Place samples in a sturdy cooler(s) lined with a large plastic trash bag; enclose the appropriate chain-of-custody forms in a zip-lock plastic bag affixed to the underside of the cooler lid

9. Fill empty space in the cooler with ice bags, bubble wrap or Styrofoam peanuts to prevent movement and breakage during shipment
10. Ice used to cool samples will be double sealed in two zip lock plastic bags and placed on top and around the samples to chill them to the correct temperature
11. Each ice chest will be securely taped shut with fiberglass strapping tape, and custody seals will be affixed to the front, right and back of each cooler if shipped

10 Quality Control

10.1 Field Quality Control Samples

Field quality control samples are intended to help evaluate conditions resulting from field activities and are intended to accomplish two primary goals, assessment of field contamination and assessment of sampling variability. The former looks for substances introduced in the field due to environmental or sampling equipment and are assessed using blanks of different types. The latter includes variability due to sampling technique and instrument performance as well as variability possibly caused by the heterogeneity of the matrix being sampled and is assessed using replicate sample collection. The following subsections cover field QC.

10.1.1 Assessment of Field Contamination (Blanks)

Field contamination will be assessed through the collection of different types of blanks and include:

- ❏ equipment blanks
- ❏ field blanks
- ❏ trip blanks
- ❏ temperature blanks

Equipment blanks will be obtained by passing distilled or deionized water, as appropriate, over or through the decontaminated equipment used for sampling. They provide the best overall means of assessing contamination arising from the equipment, ambient conditions, sample containers, transit, and the laboratory. Field blanks are sample containers filled in the field to help assess contamination from ambient conditions, sample containers, transit, and the laboratory. Trip blanks are prepared by the laboratory and shipped to and from the field. They help assess contamination during shipping and the laboratory and are for VOCs only.

A maximum of one blank sample per matrix per day should be collected, but at a rate not to exceed one blank per 10 samples. If equipment rinsate blanks are collected, field blanks and trip blanks are not required under normal circumstances.

10.1.1.1 Equipment Blanks

In general, equipment (rinsate) blanks will be collected when reusable, non-disposable sampling equipment (e.g., trowels, hand augers, and non-dedicated groundwater sampling pumps) are being used for the sampling event. Equipment blanks will be collected for soil and groundwater samples, where applicable. A minimum of one equipment blank is prepared each day for each matrix when equipment is decontaminated in the field. These blanks are submitted "blind" to the laboratory, packaged like other samples and assigned their own unique identification number.

Equipment rinsate blanks will be collected to evaluate field sampling and decontamination procedures by pouring distilled water over the decontaminated sampling equipment. One equipment rinsate blank will be collected per matrix each day that sampling equipment is decontaminated in the field.

10.1.1.2 Field Blanks

Field blanks will be collected if contamination from ambient conditions in the sample area are suspected. A minimum of one field blank will be prepared each day sampling occurs in the field. These blanks are submitted "blind" to the laboratory, packaged like other samples and each with its own unique identification number. Field blank samples will be obtained by pouring distilled water into a sampling container at the sampling point.

10.1.1.3 Trip Blanks

Trip blanks are only relevant to VOC sampling efforts. One trip blank will be submitted to the laboratory for analysis with every shipment of samples for VOC analysis. Trip blanks will be prepared to evaluate if the shipping and handling procedures are introducing contaminants into the samples, and if cross contamination in the form of VOC migration has occurred between the collected samples.

10.1.1.4 Temperature Blanks

For each cooler that is transported to the laboratory a sample container filled with distilled water will be included. This blank will be used by the sample custodian to check the temperature of samples upon receipt.

10.1.2 Field Duplicate or Co-located Samples

Duplicate samples are collected simultaneously with a standard sample from the same source under identical conditions but are placed into separate sample containers. Field duplicates will consist of a homogenized sample divided in two or else a co-located sample. Each duplicate portion will be assigned its own sample number so that it will be blind to the laboratory. A duplicate sample is treated independently of its counterpart to enable assessment of field sampling procedures through comparison of the results.

In accordance with the RCG, at least one field duplicate will be collected per parameter for every 20 samples. Every group of analytes for which a standard sample is analyzed will also include the analyses of one or more duplicate samples. Duplicate samples should be collected from areas of known or suspected contamination. Since the objective is to assess variability due to sampling technique and possible sample heterogeneity, source variability is a good reason to collect co-located samples, not to avoid their collection.

Duplicate samples will be preserved, packaged, and sealed in the same manner as other samples of the same matrix. A separate sample number and station number will be assigned to each duplicate, and it will be submitted blind to the laboratory.

10.2 Laboratory Quality Control Samples

Laboratory QA procedures and the use of Quality Control Samples is presented in Appendices A thru D.

11 Field Variances

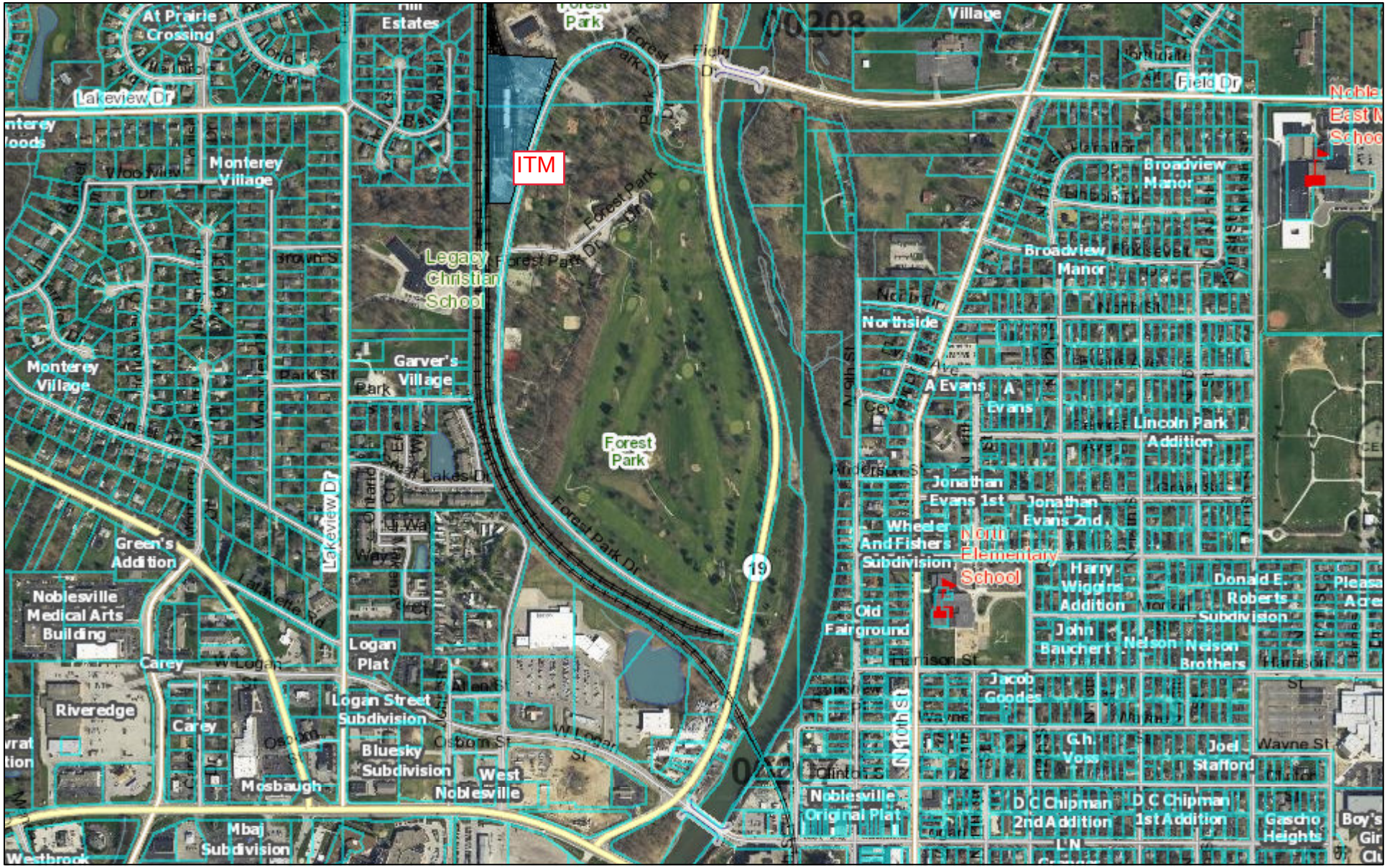
Changes in field conditions on the actual day of sampling or conditions different from that expected will be documented in the field logbook along with digital photographs, when appropriate, to document the noted field variances. If conditions render it necessary to modify the QAPP or SAP, The ELAM Group Project Manager will be notified of the proposed changes and approve such changes prior to implementation in the field.

12 Field Health and Safety Procedures

A Health and Safety Plan (“HASP”) has been prepared for the site as required and will be followed during the conduct of the planned sampling activities.

Figures

Figure 1 Site Location



November 1, 2017

Parcels

Bridges

N

1:9,600

0 0.075 0.15 0.3 mi

0 0.125 0.25 0.5 km

Basemap information here

The ELAM Group

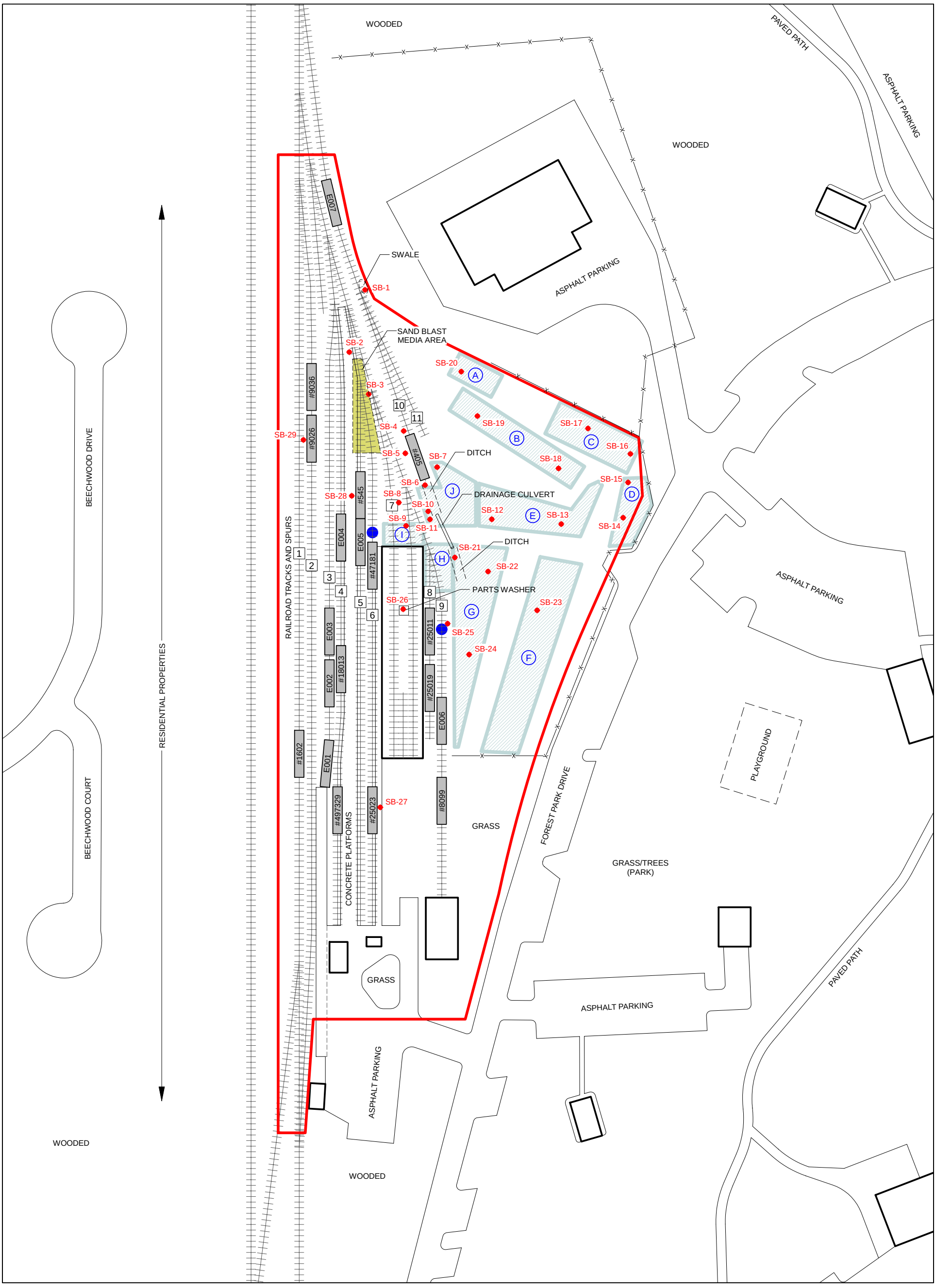


Figure No: 2	
Title: Site Map	
Scale: 1" = 100'	
Project No: INHN825P	
Report: QAPP	
Drawn by: The ELAM Group	
Date: 11/27/17	

LEGEND

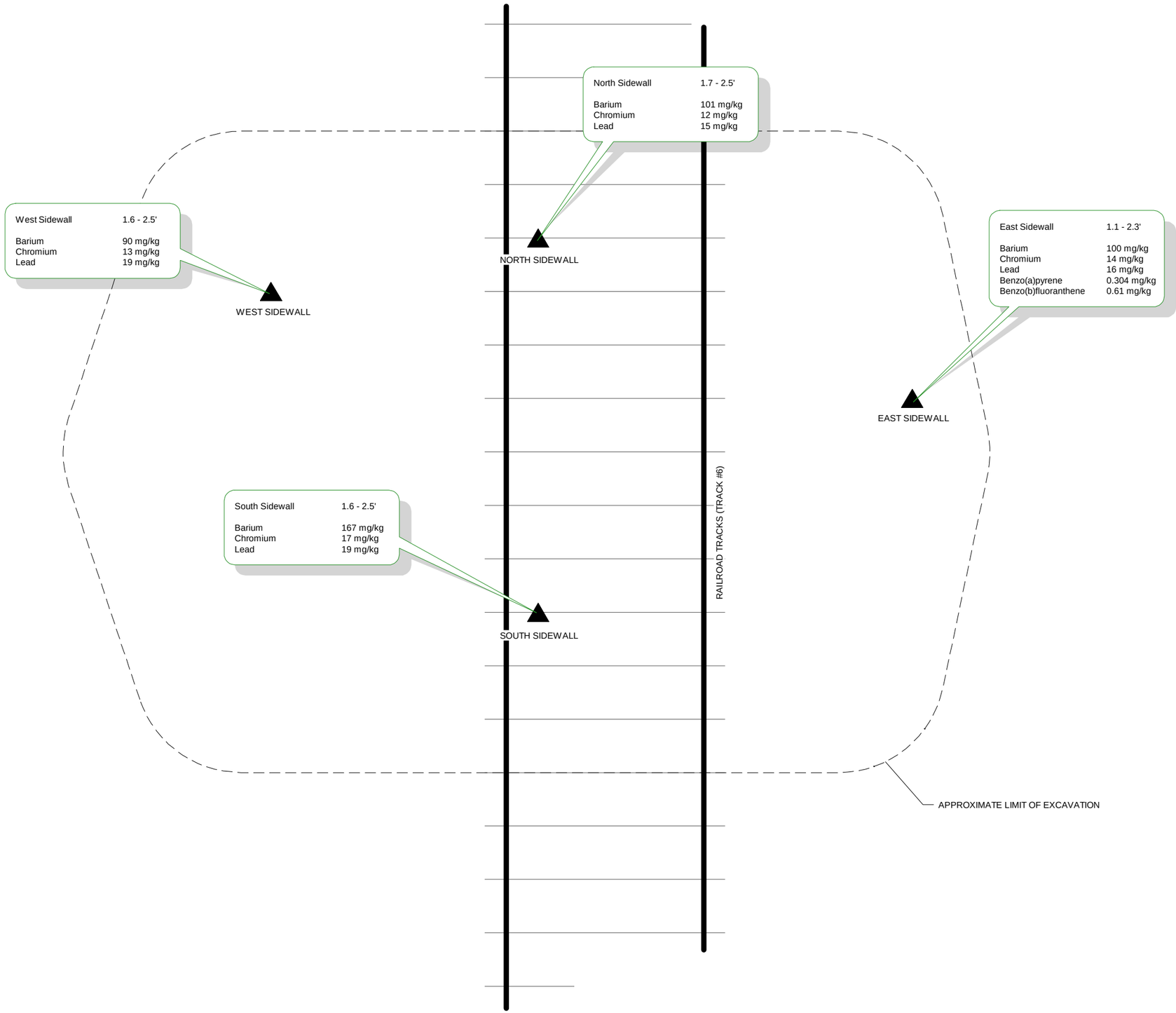
- 1 — Track Number
- A — Storage Area Designation
- Area of Inspection
- Rail Car Maintenance Pit
- #8099 — Location of Rail Cars w/ Material Storage on 7/25/17
- SB-1 — Proposed Soil Boring Location

Notes:

N

0 50 100 feet

TheELAMGroup



TheELAMGroup

LEGEND

▲ Soil Sample Location

Notes:

1) Only detections of COCs are shown

N

0 1 2 feet

Figure No: 3
Title: West Maintenance Pit
Scale: 1 inch = 2 feet
Project No: 825P3.4
Report: QAPP
Drawn by: The ELAM Group
Date: 11/22/17

Appendix A

Materials Inventory

Table 1. Materials Inventory

Indiana Transportation Museum
825 Park Drive, Noblesville, IN 46060
SCP No. 7100207

Item No.	Storage Location	Material	Container type/size	No. of Containers
1	Area C - Storage Pod 1	Spray Staining	16-oz aerosol	8
2	Area C - Storage Pod 1	Steel Blue Layout Fluid	12-oz aerosol	8
3	Area C - Storage Pod 1	Steel Blue Layout Fluid	2-oz	8
4	Area C - Storage Pod 1	Remover, Cleaner & Thinner	31.5-oz	4
5	Area C - Storage Pod 1	Cutting & Tapping Fluid	1-gal	2
6	Area C - Storage Pod 1	Degreaser	1-gal	1
7	Area C - Storage Pod 1	Rust Preventative	12-oz aerosol	9
8	Area C - Storage Pod 1	Layout Fluid Remover	12.75-oz aerosol	4
9	Area C - Storage Pod 1	Drilling & Tapping Fluid	16-oz plastic	3
10	Area C - Storage Pod 1	Bactericide & Fungicide	1-gal	1
11	Area C - Storage Pod 1	Enamel Spray Paint	12-oz aerosol	1
12	Area C - Storage Pod 1	Furniture Cleaner	15-oz aerosol	1
13	Area C - Storage Pod 1	Spray Paint	18-oz aerosol	1
14	Area C - Storage Pod 1	Glass Cleaner	19-oz aerosol	1
15	Area C - Storage Pod 1	Spray Paint	15-oz aerosol	1
16	Area C - Storage Pod 2	Transformer		1
17	Area C - Storage Pod 2	Single Use Sand Crucible	2-gal pail	2
18	Area C - Storage Pod 3	Electrical Ballast		1
19	Area C - Storage Pod 3	Windex	2-qt	1
20	Area C - Storage Pod 3	WD-40	12-oz aerosol	2
21	Area C - Storage Pod 3	Armorall	16-oz plastic	1
22	Area C - Storage Pod 3	Lps-3 Rust Inhibitor	11-oz aerosol	1
23	Area C - Storage Pod 3	Belt Dressing	6-oz aerosol	1
24	Area C - Storage Pod 3	PB-Blast	13-oz aerosol	3
25	Area C - Storage Pod 3	Starting Fluid	11-oz aerosol	1
26	Area C - Storage Pod 3	Liquid Wrench	11-oz aerosol	2
27	Area C - Storage Pod 3	Chain & Cable Lube	12.25-oz aerosol	1
28	Area C - Storage Pod 3	Macs Belt Dressing	11.50-oz aerosol	1
29	Area C - Storage Pod 3	Glass Cleaner	19-oz aerosol	1
30	Area C - Storage Pod 3	Dry Film Lube	14-oz aerosol	5
31	Area C - Storage Pod 3	Antifreeze & Rust Guard	32-oz	1
32	Area C - Storage Pod 3	Napa Glass Cleaner	18-oz aerosol	1
33	Area C - Storage Pod 3	Chain & Bar Lube	32-oz	1
34	Area C - Storage Pod 3	Oil Marvel Myglass	32-oz	1
35	Area C - Storage Pod 3	Turtle Wax	14-oz plastic	1

Table 1. Materials Inventory

Indiana Transportation Museum
825 Park Drive, Noblesville, IN 46060
SCP No. 7100207

Item No.	Storage Location	Material	Container type/size	No. of Containers
36	Area C - Storage Pod 3	Napa Thread Sealant	4-oz bottle	1
37	Area C - Storage Pod 3	Electron.2 Cleaner	11-oz aerosol	1
38	Area C - Storage Pod 3	Thread Locker	1.22-oz	3
39	Area C - Storage Pod 3	Anti Sieze Lube	8-oz	3
40	Area C - Storage Pod 3	Ball Paint Marker	2-oz	1
41	Area C - Storage Pod 3	Hydraulic Sealant	6-oz	1
42	Area C - Storage Pod 3	Airtool Lube	4-oz plastic	1
43	Area C - Storage Pod 3	Penetrant	4-oz metal	1
44	Area C - Storage Pod 3	Silicone Gasket	3.35-oz metal	1
45	Area C - Storage Pod 3	50/50 Antifreeze	1-gal plastic	2
46	Area C - Storage Pod 3	Stp Coolant/Antifreeze	1-gal	1
47	Area C - Storage Pod 3	Antifreeze/Coolant	1-gal	1
48	Area C - Storage Pod 3	Worm Gear Oil Iso #460	5-gal	1
49	Area C - Storage Pod 3	Bluemax Multipurpose Grease #316	5-gal	1
50	Area C - Storage Pod 3	Sanded Oil Base	100-lbs	1
51	Area C - Storage Pod 3	Napa Oil Absorbent	25-lbs	1
52	Area C - Storage Pod 3	Hydraulic Oil, Premium Av46	55-gal drum	1
53	Area C - Storage Pod 3	Battery	-	1
54	Area C - Storage Pod 3	Napa Carb Cleaner	5-gal	1
55	Area C - Storage Pod 4	Fire Extinguisher	20-lb	16
56	Area C - Storage Pod 4	*1 Paint	.78-gal	47
57	Area C - Storage Pod 4	*1 Paint	.40-pint	10
58	Area C - Storage Pod 4	*1 Paint, Part B	1-qt	12
59	Area C - Storage Pod 4	Liquid Antifreeze	5-gal metal	2
60	Area C - Storage Pod 4	Rones Extra Duty 2 Oil	5-gal pl.	1
61	Area C - Storage Pod 4	5Th Wheel Grease	5-gal	1
62	Area C - Storage Pod 4	Compressor Lube Xl 740 Ht	5-gal	3
63	Area C - Storage Pod 4	Texaco Rustproof Comp L	35-lbs metal	17
64	Area C - Storage Pod 4	Paint *1	5-gal	16
65	Area C - Storage Pod 4	Synthetic Engine Oil	50-gal pail	1
66	Area C - Storage Pod 4	All Temp Oil #2	5-gal pail	2
67	Area C - Storage Pod 4	Single Use Crucible W Sand Mp	2-gal pail	2
68	Area A	Blue Drum (West)	55-gal	1
69	Area A	Blue Drum (East)	55-gal	1
70	Area A	Traffic Lights/Signals		16

Table 1. Materials Inventory

Indiana Transportation Museum
825 Park Drive, Noblesville, IN 46060
SCP No. 7100207

Item No.	Storage Location	Material	Container type/size	No. of Containers
71	Area B	Traffic Lights/Signals		9
72	Area B	Railroad Ties		12
73	Area B	Junk Engine W/ Compressor		1
74	Area B	Oil Waste	55-gal	1
75	Area B	Blue Drum Unknown Contents	55-gal	1
76	Area B	Oil Waste	33-gal	1
77	Area C	Transformer		1
78	Area C	Car Wash Motors		4
79	Area C	Grease Boxes (Flange Lube Boxes)		11
80	Area C	Old Engine		1
81	Area C	Transformer		1
82	Area C	Grease Vat		1
83	Area C	Lg Electrical Box		1
84	Area C	Fans/Motor		2
85	Area C	Old Motor	on pallet	1
86	Area C	Cam 2 Hydraulic Oil	5-gal plastic	1
87	Area B	Unk Grease	3 5-gal metal	3
88	Area B	Unk Grease	5-gal plastic	1
89	Area B	Unk Grease	6 25-gal metal	6
90	Area C	Open Top Drum (Grease)	3 55-gal	3
91	Area C	Empty Drum	55-gal	1
92	Area C	Hydraulic Fluid Aw32	55-gal	3
93	Area C Under 083	Battery Eo-120		2
94	Area D	Blk. Metal Pails (Metal Parts)	5-gal metal	19
95	Area D	Water (?) Blue Drum	55-gal	1
96	Area D	AW-32 Hydraulic Oil	2 55-gal	2
97	Area D	Quikrete	50-lbs	5
98	Area D	Batteries, Covered	ed-120/240	4
99	Area D	Batteries, Blue Top	ironclad	18
100	Area D	Batteries, Metal		17
101	Area D	Traffic Lights/Signals		8
102	Area D	Priority Wr32 Hydraulic Oil	55-gal drum	1
103	Area E	35 Gal White Plastic Drum	35-gal	1
104	Area E	35-Gal White Plastic Drum	4 ft tall	1
105	Area E	Pressure Washer, Disrepair		1

Table 1. Materials Inventory

Indiana Transportation Museum
825 Park Drive, Noblesville, IN 46060
SCP No. 7100207

Item No.	Storage Location	Material	Container type/size	No. of Containers
106	Area E	AW-32 Hydraulic Oil	55-gal	1
107	Area E	Fuel Tank, Tank	150-gal	1
108	Area E	Unknown Equipment		1
109	Area E	Box Of Oily Trash		1
110	Area E	Air Brake Air Compressors		3
111	Area E	Tote	275-gal	1
112	Area E	Brake Lube Boxes		4
113	Area E	Unk Equipment		4
114	Area E	AW-32 Hydraulic Oil	55 -al	1
115	Area E	Unknown Content	55-gal	1
116	Area E	Unknown Content	35-gal	1
117	Area E	Heavy Engine Oil	55-gal	1
118	Area E	Empty Drum	35-gal	1
119	Area E	Hydraulic Fluid	5-gal	1
120	Area E	Tote, 710 Le 20W40	500-gal	1
121	Area E	Yellow Box, Unknown Contents	6-gal	1
122	Area E	Tote, Sae 40 Oil	275-gal	1
123	Area E	Cracked Tote, Unknown Contents	275-gal	1
124	Area E	Red/Brn Fluid	1-gal jug	1
125	Area E	Journal Oil RR 62	55-gal drum	1
126	Area J	D/E Starting Battery		2
127	Area J	Blue Welder Box		1
128	Area J	Tote Soap	300-gal	1
129	Area J	Oil Waste	35-gal	1
130	Area J	Oil Waste	5-gal	1
131	Area J	Gas Cylinder Lpg	100-lbs	1
132	Area J	Tote Soap	300-gal	1
133	Area J	Parts Washer		
134	Area J	Unknown Equipment		
135	Area J	Tote Lso 9Tbn Engine Oil	275-gal	1
136	Area J	Diesel Tank W. Secondary Containment	500-gal ast	1
137	Area F	Round-Up	35-gal plastic	1
138	Area F	Round-Up	35-gal plastic	1
139	Area F	Round-Up	35-gal plastic	1
140	Area F	Rusted Drum, Unknown Contents	55-gal metal	1

Table 1. Materials Inventory

Indiana Transportation Museum
825 Park Drive, Noblesville, IN 46060
SCP No. 7100207

Item No.	Storage Location	Material	Container type/size	No. of Containers
141	Area F	Blue Drum, Unknown Contents	55-gal plastic	1
142	Area F	Red Ast Fuel Oil	300-gal	1
143	Area F	AW-32 Hydraulic Oil	10 55-gal metal	11
144	Area F	Unknown Equipment		10
145	Area F	Unknown Equipment		1
146	Area F	Grease Boxes		15
147	Area F	Rr Ties		21
148	Area F	Drum Of Bricks		2
149	Area F	Traffic Signals		3
150	Area F	Fuel Tank	~50 gal	
151	Area F	Tube Lights	4 ft	6
152	Area F	Work Truck, Yellow		
153	Area F	Rr Ties		6
154	Area F	Small Push Mower		1
155	Area F	Motor		1
156	Area G	Unknown Equipment		1
157	Area G	Unknown Equipment		1
158	Area G	Fan Assembly		1
159	Area G	Parts Washer ?		1
160	Area G	Welder		1
161	Area G	Radiator		1
162	Area G	Unknown Equipment		1
163	Area G	Fuel Tank	100-gal	1
164	Area G	Pressure Tank?	100-gal	1
165	Area G	Tote, Empty	275-gal	1
166	Area G	Tub Of Drill Cuttings		1
167	Area G	Radiators		2
168	Area G	Rr Ties		450
169	Area G	Unknown Tank	~75 gal	1
170	Area G	Unknown Tank	~25 gal	1
171	Area G	Unk Machine		1
172	Area G	Unknown Machine		1
173	Area G	Unknown Tank	~5 gal	1
174	Area G	Unknown Machine		1
175	Area G	Unknown Machine		1

Table 1. Materials Inventory

Indiana Transportation Museum
825 Park Drive, Noblesville, IN 46060
SCP No. 7100207

Item No.	Storage Location	Material	Container type/size	No. of Containers
176	Area G	Radiators		3
177	Area G	Unknown Equipment		1
178	Area G	Large Fan Assembly		1
179	Area G	Oily Trash	32-oz	2
180	Area G	Unknown Equipment		1
181	Area G	Large Band Saw		1
182	Area G	Quikrete		3
183	Area G	Rust Inhibitor	11-oz aerosol	1
184	Area G	Milling Machine		1
185	Area G	Unknown Machine		1
186	Area G	Air Blaster Tank		1
187	Area G	Fan Assembly		1
188	Area G	Propane Tank	3 ft tall, 1.5 ft	1
189	Area H	White Barrel, Unknown Contents	35-gal	1
190	Area H	Rr Ties		45
191	Area H	Paint (?)	5-gal metal	1
192	Area H	Bleach (?) Bottle	1-gal	1
193	Area I	Green Drum	55-gal	1
194	Area I	Green Drum	55-gal	1
195	Area I	Blue/White Drum Used As Trash Can	55-gal	1
196	Area I	Green Drum	55-gal	1
197	Area I	Green Drum	55-gal	1
198	Area I	Propane Tank	47.7 lbs	3
199	Area I	AW-32 Hydraulic Oil	55-gal drum	1
200	Area I	Power Washer		1
201	Maintenance Garage	T3 Hd SAE15W40	55-gal drum	1
202	Maintenance Garage	Orange 5-Gal Bucket	5-gal	2
203	Maintenance Garage	Oil Can	1-pt metal	1
204	Maintenance Garage	Oven Cleaner Degreaser	24-oz aerosol	1
205	Maintenance Garage	Chemical Container	25-gal plastic	1
206	Maintenance Garage	Sae 15W40 Oil	1-gal plastic	2
207	Maintenance Garage	Dr. Film Lube	18-oz aerosol	1
208	Maintenance Garage	Unknown Machine		1
209	Maintenance Garage	Fire Extinguisher	5 to15-lb	8
210	Maintenance Garage	Condenser Coil Cleaner	1-gal pail	1

Table 1. Materials Inventory

Indiana Transportation Museum
825 Park Drive, Noblesville, IN 46060
SCP No. 7100207

Item No.	Storage Location	Material	Container type/size	No. of Containers
211	Maintenance Garage	Hirail Hydraulic Oil	33-lb metal	1
212	Maintenance Garage	Propane Tank	4 ft tall 1.5 ft	1
213	Maintenance Garage	Quikrete	50-lb bag	1
214	Maintenance Garage	Metal Part Protector	14-oz	1
215	Maintenance Garage	B660	35-lbs	10
216	Area H	Tube Lights	4 units	4
217	Area H	Fire Extinguisher	1 unit	1
218	Rail Car 25011	Glass Protective Enamel	6 cans	6
219	Rail Car 25011	Saa	1 can	1
220	Rail Car 25011	Fast Dry Spray Paint	3 cans	3
221	Rail Car 25011	2 Cycle Engine Oil	2 cans	2
222	Rail Car 25011	Turpentine	1 can	1
223	Rail Car 25011	Bodyguard Liquid Car Wax	1 can	1
224	Rail Car 25011	Spray Paint	1 can	1
225	Rail Car 25011	Acrylic Enamel, 7933	1 can	1
226	Rail Car 25011	Dulux Plus 775	1 can	1
227	Rail Car 25011	Acrylic Enamel	1 can	1
228	Rail Car 25011	Phosphorescent Spray Paint	1 can	1
229	Rail Car 25011	Lacquer Spray	1 can	1
230	Rail Car 25011	Fluorescent Spray Paint	1 can	1
231	Rail Car 25011	Protective Coating	1 can	1
232	Rail Car Nad 405	Influx 3 C355-112	15 cans	15
233	Rail Car Nad 405	Turpex Turpentine	1 can	1
234	Rail Car Nad 405	Water Seal	1 can	1
235	Rail Car Nad 405	Print Deglosser	1 can	1
236	Rail Car Nad 405	Acrylic Lacquer	1 can	1
237	Rail Car Nad 405	Urethane Retarder Thinner	2 cans	2
238	Rail Car Nad 405	Unknown Canister	1 can	1
239	Rail Car Nad 405	Unknown Canister	1 can	1
240	Rail Car Nad 405	Maintenance Coatings	1 can	1
241	Rail Car Nad 405	Lacquer Putty	1 can	1
242	Rail Car Nad 405	Alumilastic	2 cans	2
243	Rail Car Nad 405	Automotive Finish Acrylic Enamel	2 cans	2
244	Rail Car Nad 405	Wood Glo	2 cans	2
245	Rail Car Nad 405	Bright Chain Lubricant	1 bottle	1

Table 1. Materials Inventory

Indiana Transportation Museum
825 Park Drive, Noblesville, IN 46060
SCP No. 7100207

Item No.	Storage Location	Material	Container type/size	No. of Containers
246	Rail Car Nad 405	Gorilla Hair Waterproof	1 can	1
247	Rail Car Nad 405	Unknown	2 cans	2
248	Rail Car Nad 405	Polyester Body Filler	1 can	1
249	Rail Car Nad 405	Body Filler	1 can	1
250	Rail Car Nad 405	Parts Solvent (Mislabelled Can)	5-gal can	1
251	Rail Car Nad 405	Dichloro-Diflouro Methane (R-12)	4-ft cylinder	1
252	Rail Car Nad 405	Rust-Oleum Protective Enamel	2 cans	2
253	Rail Car Nad 405	Protective Enamel	1 can	1
254	Rail Car Nad 405	Freon-22	1 can	1
255	Rail Car Nad 405	Fleetline 205	1 17-gal drum	1
256	Rail Car Nad 405	5-Gal Gasoline Canister	3 cans	3
257	Rail Car Nad 405	Unlabeled	1	1
258	Rail Car Nad 405	Oil/Grease Pail	2-gallon	1
259	Rail Car Nad 405	Unknown (Flammable)	5-gallon	1
260	Rail Car Nad 405	Unlabeled Bucket	5-gal	1
261	Rail Car Nad 405	Diesel Engine Oil 15W40	(2) 2.5-gal. cont	2
262	Rail Car Nad 405	Washoff Acid	5-gallon	1
263	Rail Car Nad 405	Unknown	5-gallon	1
264	Rail Car Nad 405	Cleaning Compound	5-gal	1
265	Rail Car Nad 405	Electrolyte Nickel	250-kg	1
266	Rail Car Nad 405	Pureplex 203	10-gal	1
267	Rail Car Nad 405	Grease	5-gal	1
268	Rail Car Nad 405	Aluminum Cleaner	1-gal	3
269	Rail Car Nad 405	Unlabeled Bucket Of Metal Parts	5-gal	1
270	Rail Car Nad 405	Unlabeled Canister	15-gal	1
271	Rail Car Nad 405	Empty Bucket	5-gal	1
272	Rail Car Nad 405	Lacquer Thinner	5-gal	1
273	Rail Car Nad 405	Lacquer Thinner	5-gal	1
274	Rail Car Nad 405	Unlabeled	2.5-gal	1
275	Rail Car Nad 405	Paint Thinner	5-gal	1
276	Rail Car Nad 405	Propane Tank	50-lbs	1
277	Rail Car Nad 405	Propane Tank	17-lbs	1
278	Rail Car Nad 405	Propane Blue Rind	17-lbs	1
279	Rail Car Nad 405	Filter Sand	50-lbs	1
280	Rail Car Nad 405	Tar Remover	11-oz	1

Table 1. Materials Inventory

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Item No.	Storage Location	Material	Container type/size	No. of Containers
281	Rail Car Nad 405	Liquid Gold Polish	aerosol 10-oz	1
282	Rail Car Nad 405	Latex Paint	1-gal	2
283	Rail Car Nad 405	Acid Cleaner	1-gal	1
284	Rail Car Nad 405	Unlabeled	1-gal	1
285	Rail Car Nad 405	Finish Coating Aluminum	4 1-gal	4
286	Rail Car Nad 405	Tar Remover	11-oz	2
287	Rail Car Nad 405	Brasso Chromium Polish	7 -z	1
288	Rail Car Nad 405	Vm&P Naphtha Paint Solvent	1-qt	1
289	Rail Car Nad 405	Unknown	2 1-gal	2
290	Rail Car Nad 405	Unknown Vial (Green Fluid)	1-2 oz	1
291	Rail Car Nad 405	Bronze Paint	3-oz	1
292	Rail Car Nad 405	Flat Black Paint	1/2-pint	1
293	Rail Car Nad 405	Paint Remover Wash-88	1-pint	1
294	Rail Car Nad 405	Wax Coat	1-pint	1
295	Rail Car Nad 405	Oil Stain	8-oz	1
296	Rail Car Nad 405	Unknown	3 8-oz	3
297	Rail Car Nad 405	Liquid Kleener	1 -pint	1
298	Rail Car Nad 405	Rustoleum Regal Red 7765	8-oz	1
299	Rail Car Nad 405	Wood Finish	2 8-oz cans	2
300	Rail Car Nad 405	Plastic Wood	2 4-oz cans	2
301	Rail Car Nad 405	Ashwood Dough	4-oz	1
302	Rail Car Nad 405	Finishing Wax	2 16-oz cans	2
303	Rail Car Nad 405	Paste Spackling	8-oz	1
304	Rail Car Nad 405	Rubbing Compound	12-oz	1
305	Rail Car Nad 405	Met-All Form 1187	16-oz	1
306	Rail Car Nad 405	Atlantic Red Mo-2-3070 N011268	1-pint	1
307	Rail Car Nad 405	Finish Coating	1-pint	1
308	Rail Car Nad 405	Paint Thinner 021-192	1-pint	1
309	Rail Car Nad 405	Unknown Unlabeled (Paint?)	1-qt	6
310	Rail Car Nad 405	White Paint	1-pint	1
311	Rail Car Nad 405	Unlabeled	1-pint	1
312	Rail Car Nad 405	Lettering Enamel	1-qt	1
313	Rail Car Nad 405	Unlabeled	1-qt	1
314	Rail Car Nad 405	Unlabeled	1-qt	1
315	Rail Car Nad 405	Paint Remover Wash-88	1-pint	1

Table 1. Materials Inventory

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Item No.	Storage Location	Material	Container type/size	No. of Containers
316	Rail Car Nad 405	Surface Prep	1-qt	1
317	Rail Car Nad 405	Alcohol Solvent	32-oz	1
318	Rail Car Nad 405	8508 S Dryer Reducer	1-gal	1
319	Rail Car Nad 405	Urethane Reducer 173 Slow	1-gal	1
320	Rail Car Nad 405	8022S Mid Temp Reducer	3 1-gal cans	3
321	Rail Car Nad 405	Acrylic Enamel 45284A	1-gal	1
322	Rail Car Nad 405	Dulux Enamel	1-gal	1
323	Rail Car Nad 405	Fiber Plastic Roof Cement	1-gal	1
324	Rail Car Nad 405	Dulux Enamel	1-gal	1
325	Rail Car Nad 405	Unlabeled	12 1-gal cans	8
326	Rail Car Nad 405	Acrylic Paint	1-gal	1
327	Rail Car Nad 405	Acrylic Latex Semi Gloss	1-gal	1
328	Rail Car Nad 405	Unlabeled	3 1-gal cans	3
329	Rail Car Nad 405	Industrial Enamel	3 1-gal cans	3
330	Rail Car Nad 405	All Surface	1-qt	1
331	Rail Car Nad 405	Unlabeled	4 1-gal cans	4
332	Rail Car Nad 405	Storm King Paint	5 1-gal cans	5
333	Rail Car Nad 405	Pitch Black 99A	1-gal	1
334	Rail Car Nad 405	Unlabeled	8-oz	1
335	Rail Car Nad 405	Acrylic Enamel	2 1-gal cans	2
336	Rail Car Nad 405	Proer Alky Enamel	7 1-gal cans	7
337	Rail Car Nad 405	Industrial Coating	1-gal	1
338	Rail Car Nad 405	Coffee Can (Paint)	32-oz	1
339	Rail Car Nad 405	Various Paints/Enamel	6 1-gal cans	6
340	Rail Car Nad 405	Paint Thinner	1-gal	1
341	Rail Car Nad 405	Unlabeled	2 1-gal cans	2
342	Rail Car Nad 405	Enamel (Label Messed Up)	1-gal	1
343	Rail Car Nad 405	Reflex Iii Enamel	2 1-gal cans	2
344	Rail Car Nad 405	Polyurethane Floor Enamel	2 1-gal cans	2
345	Rail Car Nad 405	Dulux Enamel	1-gal	1
346	Rail Car Nad 405	Industrial Coating 29-616	1-gal	1
347	Rail Car Nad 405	Tire Clad Ii Enamel	1-gal	1
348	Rail Car Nad 405	33-Glazing	32-oz	1
349	Rail Car Nad 405	Primer Sealer	1-gal	1
350	Rail Car Nad 405	Dulux Plus	1-pint	1

Table 1. Materials Inventory

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Item No.	Storage Location	Material	Container type/size	No. of Containers
351	Rail Car Nad 405	Epdm Bonding W56 35	5-gal	1
352	Rail Car Nad 405	Lacquer Thinner	5-gal	1
353	Rail Car Nad 405	Epoxy Primer	1-gal	16
354	Rail Car Nad 405	Dulux Plus 77S	16-oz	1
355	Rail Car Nad 405	Wood Primer	1-gal	1
356	Rail Car Nad 405	Various Paint & Enamel (Glued To Shelf)	12 1-gal cans	12
357	Rail Car Nad 405	All Purpose Enamel	2 1-gal cans	2
358	Rail Car Nad 405	Ice Industrial Coating Enamel	1-gal	1
359	Rail Car Nad 405	All Purpose Enamel 15-2317	1-gal	1
360	Rail Car Nad 405	Polyurethanes	1-gal	1
361	Rail Car Nad 405	Industrial Enamel	1-gal	1
362	Rail Car Nad 405	Unknown Tar Like Substance	6 5-gal cans	6
363	Rail Car Nad 405	Muriatic Acid	1-gal	1
364	Rail Car Nad 405	Methyl Ethyl Ketone	1-gal	1
365	Rail Car Nad 405	Promar 200 154-8734	1-gal	1
366	Rail Car Nad 405	Martin Secur Paints	2 1-gal cans	2
367	Rail Car Nad 405	Unlabeled 90T3575	1-gal	1
368	Rail Car Nad 405	Linseed Oil	1-gal	1
369	Rail Car Nad 405	Finish Coating	1-gal	1
370	Rail Car Nad 405	Enamel Classic 99	1-gal	1
371	Rail Car Nad 405	Unlabeled	1-gal	1
372	Rail Car Nad 405	Martin Secur Paints Chrome Paint	1-qt tote	1
373	Rail Car Nad 405	Industrial Enamel	1-gal	1
374	Rail Car Nad 405	Oil/Tar Trash	3-gal bucket	1
375	Rail Car Nad 405	Lacquer 30 S	1-gal	1
376	Rail Car Nad 405	Xylol 530-6139 R2 Ky	2 1-gal cans	2
377	Rail Car Nad 405	Lacquer Seal	1-gal	1
378	Rail Car Nad 405	Rust Aluminum Enamel	1-gal	1
379	Rail Car Nad 405	Unlabeled	2.5-gallon bucket	2
380	Rail Car Nad 405	Oil Tar 7715	5-gallon bucket	1
381	Rail Car Nad 405	Grease Filled Journal Pads	2	2
382	Rail Car Nad 405	Unlabeled	2.5-gal	1
383	Rail Car Nad 405	Hydrolytic Ram		
384	Rail Car Nad 405	Pureplex 203	10-gallon	1
385	Rail Car Nad 405	Powdex Ammonia	10-gal	1

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Item No.	Storage Location	Material	Container type/size	No. of Containers
386	Rail Car Nad 405	Unknown Unlabeled	5-gal	1
387	Rail Car Nad 405	Unlabeled	1-gal	1
388	Rail Car Nad 405	Liquified Petroleum Gas Tank	3 ft cylinder	1
389	Rail Car Nad 405	Mineral Spirits	5-gal	1
390	Rail Car Nad 405	Unlabeled Rik4	5-gal	1
391	Rail Car Nad 405	Unlabeled	2.5-gal	1
392	Rail Car Nad 405	Unlabeled (Purple) (Yellow Bucket Maybe 2Ry Containment)	5-gal	1
393	Rail Car Nad 405	(Blue) Fuel Canister	2-gal	1
394	Rail Car Nad 405	Unlabeled	5-gal	1
395	Rail Car Nad 405	Lubriko Grease	25-lbs	1
396	Rail Car Nad 405	Kerosene	5-gal	1
397	Rail Car Nad 405	Da Supertreated Ii Diesel Oil	5-gal	1
398	Rail Car Nad 405	Bucket Oil/Water	5-gal	1
399	Rail Car Nad 405	Empty Unlabeled Buckets	4 5-gal	4
400	Rail Car Nad 405	Empty Water Canister	6-gal	1
401	Rail Car Nad 405	Hand Pump Canister		
402	Rail Car Nad 405	Fuel Canister	5-gal	1
403	Rail Car Nad 405	Plastic Drum Unlabeled	35-gal	1
404	Area E	Zeptide Ap Cleaner	55-gal drum	1
405	Maintenance Garage	Red Bucket Compressor Oil	5-gal	1
406	Maintenance Garage	Wasp & Hornet Killer	20-oz	1
407	Maintenance Garage	Spray Paint	12-oz	1
408	Maintenance Garage	Naspa Starting Fluid	11-oz	1
409	Maintenance Garage	Aluminum Dade	50-lbs	1
410	Maintenance Garage	Oxygen	4 ft cylinder	1
411	Maintenance Garage	Acetylene	3 ft cylinder	1
412	Maintenance Garage	5 Fire Extinguishers	various	5
413	Maintenance Garage	Thread Cutting Oil	1-gal	1
414	Maintenance Garage	Gasoline	2-gal	1
415	Maintenance Garage	Quad Sealant	10-oz	1
416	Maintenance Garage	Roundup	1.1 gal	1
417	Maintenance Garage	Polyurethane Red Insulator	20-oz	1
418	Maintenance Garage	Outboard Oil	23-oz	1
419	Maintenance Garage	Cutting Fluid	16-oz	1
420	Maintenance Garage	Body Filler	1.9-lb	1

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Item No.	Storage Location	Material	Container type/size	No. of Containers
421	Maintenance Garage	Body Filler	7-lb	1
422	Maintenance Garage	Thompsons Water Seal	1-gal	1
423	Maintenance Garage	Thread Lubricant C-55	141-lb	1
424	Maintenance Garage	Nalco Tech Clean	5-gal	1
425	Maintenance Garage	Featherup Disc Adhesive	5-oz	1
426	Maintenance Garage	Kerosene	5-gal	1
427	Maintenance Garage	Diesel Fuel	5-gal	1
428	Maintenance Garage	Diesel Fuel	5-gal	1
429	Maintenance Garage	Spray Enamel	2 12-oz	2
430	Maintenance Garage	Dry Graphite	9-oz	1
431	Maintenance Garage	Unknown	1-gal	1
432	Maintenance Garage	Compress Gas 75 Argon 25 Co2	3-ft	1
433	Maintenance Garage	Unlabeled	5-gal bucket	1
434	Maintenance Garage	850 Corrosion Inhibitor	5-gal	1
435	Maintenance Garage	High Heat Enamel	32-oz	1
436	Maintenance Garage	Oil Base Enamel	1-gal	1
437	Maintenance Garage	Metal Bucket W/ Oily Residue	5-gal	1
438	Maintenance Garage	Oil Can	2-gal	1
439	Maintenance Garage	Oil Based Enamel	2 32-oz	2
440	Maintenance Garage	Oil Based Enamel	32-oz	1
441	Maintenance Garage	Oil Based Enamel	32 -z	1
442	Maintenance Garage	Thread Cutting Oil	16-oz	1
443	Maintenance Garage	Polysulfide Joint Sealant	1.5-gal	1
444	Maintenance Garage	Xylene	5-gal	1
445	Maintenance Garage	Valve Grinding Compound	4-oz	1
446	Maintenance Garage	Unlabeled	55-gal drum	1
447	Maintenance Garage	Unlabeled	55-gal drum	1
448	Maintenance Garage	Oily Residue	1-gal can	1
449	Maintenance Garage	Metal Primer	32 -z	1
450	Maintenance Garage	Petrol Paint Conditioner	1-gal	1
451	Maintenance Garage	Mineral Spirits	5-gal	1
452	Maintenance Garage	Parts Washer	unknown	
453	Maintenance Garage	Oil Can	5-gal	1
454	Maintenance Garage	Oil Can	1-gal	1
455	Maintenance Garage	Catalyst Hardener	8-oz	1

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Item No.	Storage Location	Material	Container type/size	No. of Containers
456	Maintenance Garage	Rust Refomer	16-oz	1
457	Maintenance Garage	Unknown	16-oz	1
458	Maintenance Garage	Unknown	16-oz	1
459	Maintenance Garage	Clover Corpart	2 16-oz	2
460	Maintenance Garage	Isc 7537 Up	5-gal	1
461	Maintenance Garage	Metal Primer	1-gal	1
462	Maintenance Garage	Brake Cleaner Lubricant	5-gal	1
463	Maintenance Garage	Air Compressor Oil	1-gal	1
464	Maintenance Garage	Spray Paint	12-oz	1
465	Maintenance Garage	Oil Can	2-gal	1
466	Maintenance Garage	Metal Stripper	1-gal	1
467	Maintenance Garage	Maguires Plastx	10-oz	1
468	Maintenance Garage	Sulfurized Cutting Oil	1-gal	1
469	Maintenance Garage	Water Sol Cutting Oil	1-gal	1
470	Maintenance Garage	Fire Extinguisher		1
471	Maintenance Garage	Spray Enamel	12-oz	1
472	Maintenance Garage	Polyurethane	12-oz	1
473	Maintenance Garage	Spray Paint	2 16-0z	2
474	Maintenance Garage	Spray Paint	11-oz	1
475	Maintenance Garage	Spray Paint	12-oz	1
476	Maintenance Garage	Lacquer Spray	12-oz	1
477	Maintenance Garage	Spray Paint	12-oz	1
478	Maintenance Garage	Enamel Paint	32-oz	1
479	Maintenance Garage	Spray Metal Protector	16-oz	1
480	Maintenance Garage	Aero Kroil	10-oz	1
481	Maintenance Garage	Lubricating Oil	16-oz	1
482	Maintenance Garage	Aw68 Hydraulic Oil	5-gal	1
483	Maintenance Garage	Unlabeled	1-gal	1
484	Maintenance Garage	Universal Gp Cleaner	5-gal	1
485	Maintenance Garage	Diesel Starter Battery		1
486	Maintenance Garage	Glass Cleaner	32-oz	1
487	Maintenance Garage	Black Beauty	50-lb	1
488	Maintenance Garage	Aluminum Cleaner	7-gal	1
489	Maintenance Garage	Unable To Read	7-gal	1
490	Maintenance Garage	Unlabeled Bags	20-oz	6

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Item No.	Storage Location	Material	Container type/size	No. of Containers
491	Maintenance Garage	Unlabeled Bags	~10-gal	1
492	Maintenance Garage	Metal Primer	1-gal	1
493	Maintenance Garage	Industrial Enamel	1-gal	3
494	Maintenance Garage	Promar 200	1-gal	1
495	Maintenance Garage	Industrial Enamel	1-gal	2
496	Maintenance Garage	Protective Enamel	1-gal	1
497	Maintenance Garage	Industrial Enamel	5-gal	1
498	Maintenance Garage	Industrial Enamel	5-gal	2
499	Maintenance Garage	Mega Bond	50-lb	1
500	Maintenance Garage	Newl Ap Cleaner	1-gal	2
501	Maintenance Garage	Promar 200	1-gal	2
502	Maintenance Garage	Spray Paint	12-oz	1
503	Maintenance Garage	Acrylic Enamel	1-gal	1
504	Maintenance Garage	Primer	32-oz	1
505	Maintenance Garage	Spray Enamel	12-oz	2
506	Maintenance Garage	Spray Enamel	16-oz	1
507	Maintenance Garage	Spray Enamel	12-oz	1
508	Maintenance Garage	Electric Motor Contact Cleaner	20-oz	1
509	Maintenance Garage	Enamel	32-oz	1
510	Maintenance Garage	Spray Varnish	32-oz	1
511	Maintenance Garage	Spray Enamel	16-oz	1
512	Maintenance Garage	Solv 2000	14.5-oz	4
513	Maintenance Garage	Walnt	50-lbs	1
514	Maintenance Garage	Spray Primer	12-oz	1
515	Maintenance Garage	Unknown	5-gal	1
516	Maintenance Garage	Nuts Off Penetrating Lubricant	11-oz	1
517	Maintenance Garage	Dichloro Diflouro Methane R-2	4-ft	1
518	Maintenance Garage	R-12 ?	4-ft	1
519	Maintenance Garage	Metal Gas Can	5-gal	1
520	Maintenance Garage	Electro Solvent	5-gal	1
521	Maintenance Garage	Eye Wash Station	20-gal	1
522	Maintenance Garage	Industrial Enamel	5-gal	1
523	Maintenance Garage	Activator	32-oz	1
524	Maintenance Garage	Metal Primer	1-gal	1
525	Maintenance Garage	Powder	5-gal	19

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Item No.	Storage Location	Material	Container type/size	No. of Containers
526	Maintenance Garage	Kromer 200	1-gal	3
527	Maintenance Garage	Banday Primer	1-gal	1
528	Maintenance Garage	Unlabeled Sprayer	3-gal	1
529	Maintenance Garage	Unknown	1-gal	1
530	Maintenance Garage	Ammonia	1-gal	1
531	Maintenance Garage	Germ O Solv 2	1-gal	1
532	Maintenance Garage	Linseed Oil	1-gal	1
533	Maintenance Garage	Linseed Oil	1-gal	1
534	Maintenance Garage	Prime N Seal Activator	1-gal	1
535	Maintenance Garage	Unknown	1-gal	1
536	Maintenance Garage	Unknown	1-gal	1
537	Maintenance Garage	Body Filler	7-oz	1
538	Maintenance Garage	Metal Primer	1-gal	1
539	Maintenance Garage	Rust Neutralizer	8-oz	1
540	Maintenance Garage	Oil Based Enamel	32-oz	2
541	Maintenance Garage	Japan Drier	32-oz	1
542	Maintenance Garage	All Surface Enamel	32-oz	3
543	Maintenance Garage	Enamel	1-gal	1
544	Maintenance Garage	Wood Cleaner	16 -oz	1
545	Maintenance Garage	Metal Primer	15 -oz	1
546	Maintenance Garage	Spray Paint	11 -oz	1
547	Maintenance Garage	Neoprene Super Flash	10 -oz	1
548	Maintenance Garage	Seam Sealer	10 -oz	1
549	Maintenance Garage	Catalyst Hardener	8-0z	4
550	Maintenance Garage	Aircraft Remover	32-oz	1
551	Maintenance Garage	Suncryl Hardener	16-oz	3
552	Maintenance Garage	Spray Adhesive	11 -oz	1
553	Maintenance Garage	Spray Vinyl	12 -oz	1
554	Maintenance Garage	Hi Q Lacquer	12 -oz	1
555	Maintenance Garage	Copper Cleaner	10 -oz	1
556	Maintenance Garage	Enamel	8 -oz	1
557	Maintenance Garage	Clear Coat	32 -oz	1
558	Maintenance Garage	Spray Enamel	3-0z	3
559	Maintenance Garage	Spray Chrome	8 -oz	1
560	Maintenance Garage	Gloss Hardener	16 -oz	1

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Item No.	Storage Location	Material	Container type/size	No. of Containers
561	Maintenance Garage	Spray Enamel	11 -oz	1
562	Maintenance Garage	Clear Spray Coating	12 -oz	1
563	Maintenance Garage	Spray Enamel	11 -oz	1
564	Maintenance Garage	Spray Paint	13-oz	2
565	Maintenance Garage	Spray Paint	10 -oz	1
566	Maintenance Garage	Spray Paint	12 -oz	1
567	Maintenance Garage	Oil Based Enamel	1-gal	3
568	Maintenance Garage	Body Filler	7-lb	1
569	Maintenance Garage	Water Putty	4 lb	1
570	Maintenance Garage	Oil Base Varnish	32 -oz	1
571	Maintenance Garage	Unknown	1-gal	1
572	Maintenance Garage	Wax Stripper	1 -gal	1
573	Maintenance Garage	Paint	16 -oz	1
574	Maintenance Garage	Industrial Enamel	1-gal	1
575	Maintenance Garage	Urethane Reducer	1-gal	1
576	Maintenance Garage	La 175 Alkaline Cleaner	5-gal	1
577	Maintenance Garage	Mold Mildew Remover	32-oz	1
578	Maintenance Garage	All Purpose Cleaner	32-oz	1
579	Maintenance Garage	Multipurpose Cleaner	32-oz	1
580	Maintenance Garage	Lime Away	2 22-oz 1 16-oz	1
581	Maintenance Garage	Orange Oil	16-oz	1
582	Maintenance Garage	Wood Clean & Polish	16-oz	1
583	Maintenance Garage	Murphy Oil Soap	22-oz	1
584	Maintenance Garage	Spray Paint	12-oz	3
585	Maintenance Garage	Odor Absorber Gel	15-oz	1
586	Maintenance Garage	Unknown	5-gal	1
587	Maintenance Garage	Super Lime Sol Acid Cleaner	1-gal	1
588	Rail Car 25011	Easy Surface Prep	32-oz	1
589	Rail Car 25011	Engine Enamel	11-oz	1
590	Rail Car 25011	Clean Metal Primer	12-oz	1
591	Rail Car 25011	Oil Paint	32-oz	1
592	Rail Car 25011	Spray Paint	16-oz	1
593	Rail Car 25011	Enamel	32-oz	1
594	Rail Car 25011	Controls Rust	12-oz	1
595	Rail Car 25011	Spray Paint	11-oz	1

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Item No.	Storage Location	Material	Container type/size	No. of Containers
596	Rail Car 25011	Spray Enamel	8.5-oz	1
597	Rail Car 25011	Vip Vinyl Cleaner	32-oz	1
598	Rail Car 25011	Oil Based Enamel	32-oz	2
599	Rail Car 25011	Wheel Bearing Grease	14-oz	1
600	Rail Car 25011	Gear Oil	32-oz	1
601	Rail Car 25011	Lacquer Thinner	1-gal	1
602	Rail Car 25011	Enamel	32-oz	1
603	Rail Car 25011	Wheel Bearing Grease	16-oz	1
604	Rail Car 25011	Spray Paint	12-oz	1
605	Rail Car 25011	Diesel Fuel Anti Gel	15-oz	1
606	Rail Car 25011	Grease	10-oz	1
607	Rail Car 25011	Noalox Joint Compound	5-oz	1
608	Rail Car 25011	Oil Can	4-oz	1
609	Rail Car 25011	Pipe Joint Compound	15-oz	1
610	Rail Car 25011	Paint & Finish Remover	12-oz	1
611	Rail Car 25011	Tfe Paste	4-oz	1
612	Rail Car 25011	Pipe Thread Sealant	8-oz	1
613	Rail Car 25011	Thread Sealant	1.7-oz	1
614	Rail Car 25011	Loctite Weld	1-oz	1
615	Rail Car 25011	Gasket Maker	3.35-oz	1
616	Rail Car 25011	C5-A Antiseize	2.5-lb	1
617	Rail Car 25011	Plastic Cleaner	16-oz	1
618	Rail Car 25011	Spray Paint	12-oz	2
619	Rail Car 25011	Brake Parts Cleaner	15 -oz	1
620	Rail Car 25011	Gasket Remover	18-oz	1
621	Rail Car 25011	Fast Flux	12-oz	1
622	Rail Car 25011	Water Pump Lube	11-oz	1
623	Rail Car 25011	Trigger Spray	32-oz	1
624	Rail Car 25011	Oil Sure Neatsfoot Compound	4-oz	1
625	Rail Car 25011	Hydraulic Jack Oil	32-oz	1
626	Rail Car 25011	Adhesive Cleaner	32-oz	1
627	Rail Car 25011	Oil Gun	4-oz	1
628	Rail Car 25011	Oil Gun	6-oz	1
629	Rail Car 25011	Zep 45 Nc	18-oz	2
630	Rail Car 25011	Ez Break Anti Seize	20-oz	1

Table 1. Materials Inventory

Indiana Transportation Museum
825 Park Drive, Noblesville, IN 46060
SCP No. 7100207

Item No.	Storage Location	Material	Container type/size	No. of Containers
631	Rail Car 25011	N-1000	2-lb	1
632	Rail Car 25011	Motor Oil	32-oz	2
633	Rail Car 25011	Nc Brake Cleaner	32 oz	2
634	Rail Car 25011	Spray Paint	16-oz	1
635	Rail Car 25011	Engine Enamel	12-oz	1
636	Rail Car 25011	Nc Brake Cleaner	15-oz	1
637	Rail Car 25011	Penetrant	16-oz	1
638	Rail Car 25011	Marvel Mystery Oil	32-oz	1
639	Rail Car 25011	Spray Paint	12-oz	1
640	Rail Car 25011	Brake Cleaner	17-oz	1
641	Rail Car 25011	Wire Rope Lube	12-oz	1
642	Rail Car 25011	Brake Cylinder Lube	5-gal	1
643	Rail Car 25011	Oily Waste	5-gal	1
644	Rail Car 25011	Motor Oil	32-oz	1
645	Rail Car 25011	Rust Veto	12-oz	6
646	Rail Car 25011	Thread Sealant	2-oz	1
647	Rail Car 25011	Epoxy Repair Putty	6.5-oz	1
648	Rail Car 25011	Wheel Bearing Grease	1-gal	1
649	Rail Car 25011	Latex Gloss	5-gal	4
650	Rail Car 25011	Hydraulic Oil	5-gal	1
651	Rail Car 25011	Paint	5-gal	1
652	Rail Car 25011	Primer	12-oz	1
653	Rail Car 25011	Polyurethane	5-gal	3
654	Rail Car 25011	Chen Dip Carb Cleaner	1-gal	1
655	Rail Car 25011	Primer	32-oz	1
656	Rail Car 25011	Acrylic Enamel	16-oz	5
657	Rail Car 25011	Acrylic Enamel	1-gal	2
658	Rail Car 25011	Medium Evaporator Reducer	5-gal	2
659	Rail Car 25011	Acrylic Enamel	1-gal	4
660	Rail Car 25011	Sandblasting Sand	1-gal	1
661	Rail Car 25011	Etching Filler	1-gal	2
662	Rail Car 25011	Canval Preservative	1-gal	1
663	Rail Car 25011	Solvent Cleaner	1-gal	2
664	Rail Car 25011	Acrylic Enamel Reducer	1-gal	2
665	Rail Car 25011	Over Activator	1-gal	2

Table 1. Materials Inventory

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Item No.	Storage Location	Material	Container type/size	No. of Containers
666	Rail Car 25011	Reducer Activator	1-gal	2
667	Rail Car 25011	Midtemp Reducer	1-gal	1
668	Rail Car 25011	Variprime Converter	1-gal	1
669	Rail Car 25011	Med Evap Thinner	1-gal	1
670	Rail Car 25011	Toluene	1-gal	1
671	Rail Car 25011	Breakaway	1-gal	1
672	Rail Car 25011	Primer	16-oz	1
673	Rail Car 25011	Black Jack Roof Cement	29-oz	2
674	Rail Car 25011	Black Jack Roof Cement	29-oz	1
675	Rail Car 25011	Lacquer Primer	1-gal	5
676	Rail Car 25011	Acrylic Enamel	1-gal	2
677	Rail Car 25011	Enamel	1-gal	2
678	Rail Car 25011	Prime Sealer	1-gal	5
679	Rail Car 25011	Epoxy Sealer	32-oz	1
680	Rail Car 25011	Enamel	1-gal	1
681	Rail Car 25011	Splice Adhesive	1-gal	1
682	Rail Car 25011	Aliphatic Polyurethane	1-gal	1
683	Rail Car 25011	Unlabeled	1-gal	6
684	Rail Car 25011	Enamel	1-gal	1
685	Rail Car 25011	Rust Stop	1-gal	2
686	Rail Car 25011	Oil Base Paint	1-gal	2
687	Rail Car 25011	Self Etch Primer	1-gal	1
688	Rail Car 25011	Enamel	1-gal	1
689	Rail Car 25011	Primer Sealer	1-gal	1
690	Rail Car 25011	Paint (Latex Enamel)	1-gal	1
691	Rail Car 25011	Enamel Paint	1-gal	1
692	Rail Car 25011	Unlabeled (Paint0	16-oz	1
693	Rail Car 25011	Insect Killer	1.3 gal	1
694	Rail Car 25011	Paint/Partial Label	1-gal	1
695	Rail Car 25011	Industrial Enamel	1-gal	1
696	Rail Car 25011	Floor Enamel	1-gal	1
697	Rail Car 25011	Dulux Enamel	32-oz	9
698	Rail Car 25011	Tinners Red (80)	1-qt	1
699	Rail Car 25011	Exterior Latex Primer	1-qt	1
700	Rail Car 25011	Sears Best Acrylic Latex	1-qt	1

Table 1. Materials Inventory

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Item No.	Storage Location	Material	Container type/size	No. of Containers
701	Rail Car 25011	4 Seasons Floor Enamel	1-qt	1
702	Rail Car 25011	Speed Enamel	1-qt	1
703	Rail Car 25011	Enameloid	1/2-pint	1
704	Rail Car 25011	Briwax	450-ml	1
705	Rail Car 25011	Aerolite Enamel	1-qt	1
706	Rail Car 25011	Graphite Lubricant	1-qt	1
707	Rail Car 25011	Rust O Lastic	15-oz	1
708	Rail Car 25011	Exterior Spar Varnish	1-qt	1
709	Rail Car 25011	Caulking Compound	1-qt	1
710	Rail Car 25011	Dulux	1-qt	2
711	Rail Car 25011	R Protective Enamel	1-qt	1
712	Rail Car 25011	Unknown	1-qt	2
713	Rail Car 25011	Industrial Protective Coat 85694	17-oz	1
714	Rail Car 25011	Protective Enamel	unknown	1
715	Rail Car 25011	Silicon Gasket Maker	13-oz	1
716	Rail Car 25011	Cutting And Grinding Oil	1-gal	1
717	Rail Car 25011	Motor Oil 1.25 S4	5-qt	1
718	Rail Car 25011	Polyurethane	1-gal	1
719	Rail Car 25011	Primer 200	1-gal	1
720	Rail Car 25011	Cylinder Lubricant	5-lbs	1
721	Rail Car 25011	Spray Paint	15-oz	1
722	Rail Car 25011	Gasket Sealant	4-oz	1
723	Rail Car 25011	Gas Cylinder/Unknown	unknown	1
724	Rail Car 25011	Cleanser Polish	21-oz	1
725	Rail Car 25011	Pure Silicon	4-oz	1
726	Rail Car 25011	Ultra Enamel	8-oz	1
727	Rail Car 25011	Unknown	16-oz cans	2
728	Rail Car 25011	Antisieze Lubricant	8-oz	1
729	Rail Car 25011	Spray Paint	8-oz	1
730	Rail Car 25011	Spray Paint	17-oz	1
731	Rail Car 25011	Kroil Oil	1-gal	1
732	Rail Car 25011	1 Star Rust Killer	1-gal	1
733	Rail Car 25011	Antisieze Lubricant	1-lb	1
734	Rail Car 25011	Gasket Sealant	16-oz	1
735	Rail Car 25011	Marking Chalk	12-oz	1

Table 1. Materials Inventory

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Item No.	Storage Location	Material	Container type/size	No. of Containers
736	Rail Car 25011	Unlabeled Grease	15-oz	1
737	Rail Car 25011	Propane	14-oz	1
738	Rail Car 25011	004 Degreaser	16-oz	1
739	Rail Car 25011	Bart Chain Oil	1-gal	1
740	Rail Car 25011	Stay Clean Flux	4-oz	1
741	Rail Car 25011	Construction Adhesive 12 Oz	12-oz	1
742	Rail Car 25011	Power Steering Fluid	12-oz	1
743	Rail Car 25011	Grease	10-oz	1
744	Rail Car 25011	Carb Choke Cleaner	13-oz	1
745	Rail Car 25011	Locomotive Diesel Governor Oil	8-oz	1
746	Rail Car 25011	Plastic Roof Cement	1-gal	1
747	Rail Car 25011	Unlabeled	1-gal	1
748	Rail Car 25011	409 Cleaner	1-gal	1
749	Rail Car 25011	Gasket Sealant	11-oz	1
750	Rail Car 25011	Super Duty Lube	6-oz	1
751	Rail Car 25011	Glass Plus	20-oz	1
752	Rail Car 25011	Enamel Spray Paint	15-oz	1
753	Rail Car 25011	Magic Cutting Fluid	16-oz	1
754	Rail Car 25011	White Lithium Grease	10-oz	1
755	Rail Car 25011	Spray Paint	10-oz	1
756	Rail Car 25011	Febreze	27-oz	1
757	Rail Car 25011	Rain Z	16-oz	1
758	Rail Car 25011	Silicon Auto Sealant	3-oz	1
759	Rail Car 25011	Goo Gone	8-oz	1
760	Rail Car 25011	Armorall	8-oz	1
761	Rail Car 25011	Cleaner Degreaser	14-oz	1
762	Rail Car 25011	Jb Weld	1-oz	1
763	Rail Car 25011	Grease Cylinder	15-oz	1
764	Rail Car 25011	Brazing Flux	1-lb	1
765	Rail Car 25011	Pvc Cement	4-oz	1
766	Rail Car 25011	Purple Primer	4-oz	1
767	Rail Car 25011	Pvc Cement	16-oz	1
768	Rail Car 25011	Windex	26-oz	1
769	Rail Car 25011	Polyurethane	1-gal	1
770	Rail Car 25011	Silicon	10-oz	1

Table 1. Materials Inventory

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Item No.	Storage Location	Material	Container type/size	No. of Containers
771	Rail Car 25011	Pathfinder Herbicide	5-gal	1
772	Rail Car 25011	Insect Killer Triazicide	10-lbs	1
773	Rail Car 25011	Promar 200	1-gal	1
774	Rail Car 25011	Promar 200	1-gal	1
775	Rail Car 25011	Industrial Enamel	1-gal	1
776	Rail Car 25011	Paint Gloss Enamel	1-gal	1
777	Rail Car 25011	Oil Based Enamel	1-gal	1
778	Rail Car 25011	Industrial Enamel	1-gal	1
779	Rail Car 25011	Ice Melt	2-lbs	1
780	Rail Car 25011	Thaw Master Ice Melt	50-lb	2
781	Rail Car 25011	Kitty Litter	35-lbs	1
782	Rail Car 25011	Latex Paint	1-gal	1
783	Rail Car 25011	1 Step Rust Likker	1-gal	2
784	Rail Car 25011	Cleaner Degreaser	1-gal	1
785	Rail Car 25011	Industrial Enamel	5-gal	2
786	Rail Car 25011	Latex Enamel	32-oz	1
787	Rail Car 25011	Spray Paint	11-oz	3
788	Rail Car 25011	Wasp Spray	14-oz	1
789	Rail Car 25011	Powdered Hand Cleaner	4-lb	1
790	Rail Car 25011	Battery Cleaner	13-oz	1
791	Rail Car 25011	Paint Latex	8-oz	1
792	Rail Car 25011	Motor Diesel Engine Oil	1-gal	1
793	Rail Car 25011	Gojo Cleaner	14-oz	1
794	Rail Car 25011	Cutter	6-oz	1
795	Rail Car 25011	Off	3.5-oz	1
796	Rail Car 25011	Petroleum Jelly	13-oz	2
797	Rail Car 25011	Isopropyl Alcohol	16 0z	1
798	Rail Car 25011	Rock Salt Ice Melt	10 lbs	1
799	Rail Car 25019	R4143 Refrigerant	20-lbs	4
800	Rail Car 25019	Epoxy Floor Patch	32-oz	1
801	Rail Car 25019	Unlabeled Varnish	32-oz	1
802	Rail Car 25019	Bronze Putty	1-lb	1
803	Rail Car 25019	Paint Can	32-oz	1
804	Rail Car 25019	Unknown Jar	4-oz	1
805	Rail Car 25019	Unlabeled	32-oz	1

Table 1. Materials Inventory

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Item No.	Storage Location	Material	Container type/size	No. of Containers
806	Rail Car 25019	Glass Jar Unlabeled	2-oz	1
807	Rail Car 25019	Unlabeled	1-gal	1
808	Rail Car 25019	Latex Stain	.5-gal	1
809	Rail Car 25019	Exterior Stain	1-gal	1
810	Rail Car 25019	Maintenance Coating	1 gal	1
811	Rail Car 25019	Floor & Deck Enamel	16-oz	1
812	Rail Car 25019	Barn Paint	32-oz	1
813	Rail Car 25019	Aerolite Enamel	32-oz	4
814	Rail Car 25019	Aerolite Enamel	16-oz	1
815	Rail Car 25019	Enamel	32-oz	1
816	Rail Car 25019	Speed Gloss	32-oz	1
817	Rail Car 25019	Floor Varnish	32-0z	1
818	Rail Car 25019	Wood Sealer	32-oz	1
819	Rail Car 25019	Covase Adhesive	32-oz	1
820	Rail Car 25019	Purol	32-oz	2
821	Rail Car 25019	Calcium Carbide	2 lbs	1
822	Rail Car 25019	Wood Finish Stain	16-oz	1
823	Rail Car 25019	Catch All Filler Drier	32-oz	4
824	Rail Car 25019	R414 Hotshot Refrigerant	25-lbs	1
825	Rail Car 25019	R414 Hotshot Refrigerant	25-lbs	1
826	Rail Car 25019	Wheel Bearing Lube	16-oz	1
827	Rail Car 25019	Purple Primer	8-oz	1
828	Rail Car 25019	Joint Compound	8-oz bottles	2
829	Rail Car 25019	Aluminum Connection Epoxy	.5-oz	1
830	Rail Car 25019	Industrial Enamel	5-gal	4
831	Rail Car 25019	Motor Oil	32-oz	3
832	Rail Car 25019	Devcon Hardener	32-oz	1
833	Rail Car 25019	Silicon Sealant	10-oz	5
834	Rail Car 25019	Dri Film Lubricant	18-oz	11
835	Rail Car 25019	Concrete Binding	1-qt	1
836	Rail Car 25019	Dulux Adhesive Enamel	1-gal	11
837	Rail Car 25019	Heavy Duty Lube	11-oz	1
838	Rail Car 25019	Silathane Enamel	32-oz	1
839	Rail Car 25019	Paint	1-gal	1
840	Rail Car 25019	Mab Paint	1-gal	1

Table 1. Materials Inventory

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Item No.	Storage Location	Material	Container type/size	No. of Containers
841	Rail Car 25019	Aluminum Rust ?	1-gal	1
842	Rail Car 25019	Promar 200	1-gal	7
843	Rail Car 25019	Oil Based Enamel	1-gal	1
844	Rail Car 25019	John Deere Green	1-qt	1
845	Rail Car 25019	Paint	1-gal	4
846	Rail Car 25019	Ceramic Wall Adhesive	1-gal	1
847	Rail Car 25019	Dulux	32-oz	1
848	Rail Car 25019	Centari Enamel	1-gal	5
849	Rail Car 25019	Lucite Enamel	1-gal	1
850	Rail Car 25019	Floor Adhesive	1-gal	1
851	Rail Car 25019	Semigloss Enamel	1-gal	2
852	Rail Car 25019	Unlabeled	1-gal	3
853	Rail Car 25019	Alkyd Enamel	32-oz	1
854	Rail Car 25019	Construction Adhesive	1-gal	1
855	Rail Car 25019	Linseed Oil	16-oz	1
856	Rail Car 25019	Nourse Oil	16-oz	1
857	Rail Car 25019	Oil Can	1-gal	1
858	Rail Car 25019	Gear Oil	1-gal	1
859	Rail Car 25019	8022-S Reducer	1-gal	1
860	Rail Car 25019	Insulating Varnish	16-oz	1
861	Rail Car 25019	Trimtap	16-oz	1
862	Rail Car 25019	Metal Conditioner	1-gal	1
863	Rail Car 25019	Starting Fluid	11-oz	1
864	Rail Car 25019	Floor Grip	25-lbs	1
865	Rail Car 25019	Paint	1-gal	3
866	Rail Car 25019	Metal Conditioner	1-gal	1
867	Rail Car 25019	Aerolite Enamel	1/2-pint	1
868	Rail Car 25019	Paint	1-pint	1
869	Rail Car 25019	88 Solvent Cleaner	1-gal	2
870	Rail Car 25019	Plastic Cement	1-gal	1
871	Rail Car 25019	Heavy Duty Lube	11-oz	6
872	Rail Car 25019	3919 S Prep Solvent	1-gal	2
873	Rail Car 25019	Stainless Cut	350-ml	2
874	Rail Car 25019	Promar 200	1-gal	1
875	Rail Car 25019	Vinyl Prep	5-gal	1

Table 1. Materials Inventory

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Item No.	Storage Location	Material	Container type/size	No. of Containers
876	Rail Car 25019	Adhesive Resins	16-oz	3
877	Rail Car 25019	Metal Protector	16-oz	1
878	Rail Car 25019	Grit Paste Hand Cleaner	5-lb	50
879	Rail Car 25019	Texamatic	16-oz	2
880	Rail Car 25019	Metal Protector	16-oz	1
881	Rail Car 25019	Super Refractory Cement	32-oz	4
882	Rail Car 25019	Gear Lubricant	14-oz	1
883	Rail Car 25019	Gear Lubricant	14-oz	1
885	Rail Car 25019	Thompson Water Seal	5-gal	1
886	Rail Car 25019	Sprayer	11-oz	1
887	Rail Car 25019	Vinyl Adhesive	5-gal	1
888	Rail Car 25019	1 Step Rust	1-gal	1
889	Rail Car 25019	Vinyl Adhesive	5-gal	1
890	Rail Car 25019	Vinyl Prep	5-gal	1
891	Rail Car 25019	Liqui-Mat	5-gal	1
892	Rail Car 25019	Fire Guard Sno Fog	20-lbs	1
893	Rail Car 25019	Fire Extinguisher	2.5-lbs	1
894	Rail Car 25019	Purple Primer	8-oz	1
895	Rail Car Nad 405	Gas Can	5-gal	1
896	Rail Car Nad 405	Gear Oil Drums	55-gal	5
897	Rail Car Nad 405	Milsolv 140	55-gal	1
898	Rail Car Nad 405	Hydraulic Fluid	5-gal	1
899	Rail Car Nad 405	Hydraulic Fluid	5-gal	1
900	Rail Car Nad 405	Gas Can	empty	1
901	Rail Car Nad 405	Dde Plus	55 -gal	1
902	Rail Car Nad 405	Industrial Gas	3-ft cylinder	1
903	Rail Car Nad 405	Empty Container	2.5 gal	1
904	Rail Car Nad 405	Oil Can Unlabeled	2-gal	2
905	Rail Car Nad 405	Air Freshener	10-oz	13
906	Rail Car Nad 405	Oil Can Unlabeled	2-gal	2
907	Rail Car Nad 405	Grease Drum	25-gal	1
908	Rail Car Nad 405	Air Freshener	10-oz	3
909	Rail Car Nad 405	Rotella Motor Oil	1-gal	1
910	Rail Car Nad 405	3-Gallon Bucket	3-gal	1
911	Rail Car Nad 405	Oil Drum	55-gal	1

Table 1. Materials Inventory

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Item No.	Storage Location	Material	Container type/size	No. of Containers
912	Rail Car Nad 405	Unlabeled	2-gal	1
913	Rail Car Nad 405	Dde Plus	55-gal	1
914	Rail Car Nad 405	Oil	55-gal	1
915	Rail Car Nad 405	Water/Oil In Bucket	55-gal	1
916	Rail Car Nad 405	Empty Used For Motor Oil	5-gal	1
917	Rail Car Nad 405	Motor Oil	2-gal	1
918	Rail Car Nad 405	Oil Can Unlabeled	2-gal	2
919	Rail Car Nad 405	Zep	2-gal	1
920	Rail Car Nad 405	Unlabeled	5-gal	1
921	Rail Car Nad 405	Oil	55-gal	1
922	Rail Car Nad 405	Empty Unlabeled	2-gal	1
923	Rail Car Nad 405	Unlabeled (Water?)	3-gal	1
924	Rail Car Nad 405	Unlabeled Oil Can	2-gal	1
925	Rail Car Nad 405	Unlabeled Kitty Litter	3-gal	1
926	Rail Car Nad 405	Valvoline Metal Bucket	5-gal	1
927	Rail Car Nad 405	Unlabeled Metal Bucket	5-gal	1
928	Rail Car Nad 405	Unlabeled Blue Plastic Bucket	5-gal	1
929	Rail Car Nad 405	Protector	5-gal	1
930	Rail Car Nad 405	Parts Solvent I Kerosene Can	5-gal	1
931	Rail Car Nad 405	Unlabeled Flam Liquid	5-gal	1
932	Rail Car Nad 405	Unlabeled Metal Bucket	5-gal	1
933	Rail Car Nad 405	Fire Extinguisher	10-lbs	1
934	Rail Car Nad 405	Asphalt Roof Material		1
935	Rail Car Nad 405	Red Plastic Gas Can	5-gal	1
936	Rail Car Nad 405	Plastic Bucket Open (Oil?)	7-gal	1
937	Rail Car Nad 405	Unlabeled White Plastic Bucket	5-gal	1
938	Rail Car Nad 405	Kitty Litter Container W/ Unknown Liquid	1.5-gal	1
939	Rail Car Nad 405	Open White Plas Bucket W/ Oil (?)	5-gal	1
940	Rail Car Nad 405	Empty Container	2-gal	2
941	Rail Car Nad 405	Stacked Buckets W/ Water	3-gal	1
942	Rail Car Nad 405	Sunola 55-Gal Drum	55-gal	1
943	Rail Car Nad 405	Empty Hy Fluid Container Black	2-gal	1
944	Rail Car Nad 405	Black Plastic Bucket	3-gal	1
945	Rail Car Nad 405	Fuel Can	3-gal	1
946	Rail Car Nad 405	White Plastic Contnr	2-gal	1

Table 1. Materials Inventory

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Item No.	Storage Location	Material	Container type/size	No. of Containers
947	Rail Car Nad 405	Wheel Bearing Grease	35-gal	1
948	Rail Car Nad 405	White Plastic Contnr	2-gal	1
949	Rail Car Nad 405	White Plastic Contnr	1-gal	1
950	Rail Car Nad 405	Black Plastic Bucket	5-gal	1
951	Rail Car Nad 405	Metal Fuel Can (Water, Paint?)	1-gal	1
952	Rail Car Nad 405	White Plastic Bucket	5-gal	1
953	Rail Car Nad 405	Metal Grease Bucket	5-gal	5
954	Rail Car Nad 405	Empty Motor Oil	2-gal	1
955	Rail Car Nad 405	White Plastic Contnr	1-gal	1
956	Rail Car Nad 405	Unlabeled Metal Bucket	5-gal	1
957	Rail Car Nad 405	Black Plastic Bucket	3-gal	1
958	Rail Car Nad 405	Metal Grease Drum	10-gal	1
959	Rail Car Nad 405	Plastic Container	2-gal	1
960	Rail Car Nad 405	Open Bucket	7-gal	1
961	Rail Car Nad 405	Bio Ren 2000 Surface Cleaner	5-gal	1
962	Rail Car Nad 405	Unsealed Hydraulic Fluid	5-gal	1
963	Rail Car Nad 405	Empty Blue Plastic Bucket	5-gal	1
964	Rail Car Nad 405	Black Metal Drum	55-gal	1
965	Rail Car Nad 405	Air Compressor Oil	55-gal	1
966	Rail Car Nad 405	Red/Black Drum	55-gal	1
967	Rail Car Nad 405	Coffee Can W. Purple Liquid	.5-gal	1
968	Rail Car Nad 405	Plastic Buckets	5-gal	5
969	Rail Car Nad 405	Gas Cylinder Lpg	2-ft	1
970	Outside Rail Car Nad 405	Metal Drum	15-gal	1
971	Outside Rail Car Nad 405	Hydraulic Oil	55-gal	1
972	Outside Rail Car Nad 405	Unlabeled Citgo Drum (Rd-943?	55-gal	1
973	Outside Rail Car Nad 405	Wr32 Procity	55-gal	1
974	Outside Rail Car Nad 405	Motor Oil Drum	15-gal	1
975	Outside Rail Car Nad 405	Rd953 Drum	55-gal	1
976	Outside Rail Car Nad 405	White Metal Drum	55-gal	1
977	Outside Rail Car Nad 405	White Plastic Bucket	5-gal	1
978	Outside Rail Car Nad 405	Drum Cut In Half	25-gal	1
979	Outside Rail Car Nad 405	Rd 943	55-gal	1
980	Outside Rail Car Nad 405	Propane Cylinder	1-ft	1
981	Outside Rail Car Nad 405	Propane Cylinder	1-ft	1

Table 1. Materials Inventory

Indiana Transportation Museum
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Item No.	Storage Location	Material	Container type/size	No. of Containers
982	Outside Rail Car Nad 405	Oil Can	12-oz	1
983	Rail Car Rail Car 25023	Single Use Crucible	unit	1
984	Rail Car Rail Car 25023	Zep Degreaser	55-gal	1
985	Rail Car Rail Car 25023	Citgo Railroad Rd 943	55-gal	1
986	Rail Car Rail Car 25023	Thermite	boxes	20
987	Rail Car 8099	Unknown	55-gal	1
988	Rail Car 8099	Antifreeze	55-gal	1
989	Rail Car 8099	Vac Pump Oil	1-gal	1
990	Rail Car Prr 497329	Gypsum Cement	100-lb bags	6
991	Rail Car 497329	Gas Can	1/4-gal	1
992	Rail Car 497329	Gas Can	1/2-gal	1
993	Rail Car 497329	Kerosene	5-gal	1
994	Rail Car 497329	Nicad Block 5-Cell Batteries	units	5
995	Rail Car 497329	Kaylo	boxes	3
996	Rail Car 497329	Calcium Silicate Fiberglass Insulation	boxes	12
997	Rail Car 497329	Lubricating Grease	16-oz	1
998	Rail Car 497329	Lithium Grease	16-oz	2
999	Rail Car 18013	Oil Can	1/2-gal	1
1000	Rail Car 18013	6-Cell Batteries	units	4
1001	Rail Car Navy Car Blt 545	Steel Canister Unknown	5-gal	1
1002	Rail Car Navy Car Blt 545	1 Empty, 1 Gasoline	55-gal	2
1003	Rail Car Navy Car Blt 545	Unknown	55-gal	5
1004	Rail Car Navy Car Blt 545	Fuel Tank	50-gal	1
1005	Rail Car Navy Car Blt 545	Fuel Tank	150-gal	1
1006	Rail Car Navy Car Blt 545	Ast	275-gal	1
1007	Rail Car Navy Car Blt 545	Under Belly Yellow Fuel Tank	200-gal	2
1008	Rail Car Navy Car Blt 545	Poly Tank	250-gal	1
1009	Rail Car Navy Car Blt 545	Blue Steel Cases	cases	6
1010	Maintenance Building	Bleach	1-gal	2
1011	Maintenance Building	Kilz Primer	1-gal	2
1012	Rail Car Red Boxcar	Gas Can Unknown	5-gal	1
1013	Rail Car Red Boxcar	Naline Nickel Iron Electrolyte	35-gal	1
1014	Rail Car Red Boxcar	Oil Can	2-gal	1
1015	Rail Car Red Boxcar	Fuel Can	5-gal	1
1016	Rail Car 9026	Fire Extinguisher	unit	1

Table 1. Materials Inventory

Indiana Transportation Museum
825 Park Drive, Noblesville, IN 46060
SCP No. 7100207

Item No.	Storage Location	Material	Container type/size	No. of Containers
1017	Rail Car 9026	Diesel Fuel Tank	50-gal	1
1018	Rail Car 3097	Air Tank Compression Tank	18-gal	1
1019	Rail Car 3097	The Works Toilet Cleaner	32-oz	1
1020	Rail Car 3097	The Works Toilet Cleaner	32-oz	1
1021	Rail Car 3097	Lysol Toilet Cleaner	24-oz	1
1022	Rail Car 3097	Microlite Body Filler	2-lb	1
1023	Rail Car 3097	Creme Hardener	2.75-oz tube	1
1024	Rail Car 3097	Creme Hardener	3/4-oz tube	1
1025	Rail Car 3097	Compressor Tank	10-gal	1
1026	Rail Car Silver Navy	Pathfinder Ii Weed Killer	2.5-gal	38
1027	Rail Car Silver Navy	Fuel Tank	30-gal	1
1028	Rail Car Silver Salon 1602	Diesel Fuel Tank	275-gal	1
1029	Rail Car Silver Salon 1602	Antifreeze	1 1-gal	1
1030	Rail Car Silver Salon 1602	15W30 Diesel Oil	1-gal	11
1031	Rail Car Silver Salon 1602	Paint	1-qt	1
1032	Rail Car Silver Salon 1602	Red Max Floor Stripper	1-gal	1
1033	Rail Car Silver Salon 1602	Fresh Air Rtu	1-qt	1
1034	Rail Car Silver Salon 1602	Glass Cleaner	2-liter	1
1035	Rail Car Silver Salon 1602	Glass Plus	1-qt	2
1036	Rail Car Silver Salon 1602	Proxi Stain Remover	1-qt	1
1037	Rail Car Silver Salon 1602	Biological Liquid Odor Control	1-qt	1
1038	Rail Car Silver Salon 1602	Swiffer Cleaner	42-oz	1
1039	Rail Car Silver Salon 1602	Soft Scrub	26-oz	1
1040	Rail Car Silver Salon 1602	Carpet Cleaner	22-oz	1
1041	Rail Car Silver Salon 1602	Carpet Shampoo	64-oz	1
1042	Rail Car Silver Salon 1602	Isopropyl Alcohol	1-pt	1
1043	Rail Car Prr 9036	Oakite	5-gal	1
1044	Rail Car Prr 9036	Sodium Silicate	55-gal	1
1045	Rail Car Prr 9036	Sodium Silicate	35-gal	1
1046	Rail Car Prr 9036	Propane Tank	150-lb	1
1047	Rail Car Prr 9036	Oil Can & Lube Oil	1/2-gal	1
1048	Rail Car Prr 9036	Clover Compound	16-oz	1
1049	Rail Car Prr 9036	Lacquer Thinner	5-gal	1
1050	Rail Car Prr 9036	Kerosene	5-gal	1
1051	Rail Car Prr 9036	Black Bucket	5-gal	1

Table 1. Materials Inventory

Indiana Transportation Museum
825 Park Drive, Noblesville, IN 46060
SCP No. 7100207

Item No.	Storage Location	Material	Container type/size	No. of Containers
1052	Rail Car Prr 9036	Diesel Additive	5-gal	1
1053	Rail Car Prr 9036	Gas Tank	2.5-gal	2
1054	Rail Car Prr 9036	Gas Tank	5-gal	1
1055	Rail Car 47181	Oily Journal Pads	55-gal	1
1056	Interurban Rail Car 1056	Black Beauty Buckets	5-gal	21
1057	Interurban Rail Car Yellow	6-Cell Batteries	units	20
1058	Interurban Rail Car Yellow	6-Cell Batteries	units	20
1059	Rail Car Burned Out	Open Drums	55-gal	11
1060	Rail Car Prr 9036	Sodium Hydroxide	7-gal	1
1061	Area G	Track Hoist		1
1062	Area G	Large Gray Cabinet		1
1063	Area G	Small Lathe		1
1064	Storage Pod 4	Thermite	box	1

Appendix B

Summary of Analytical Results

Polychlorinated Biphenyl (PCB) and Lead Analytical Results

Indiana Transportation Museum
825 Park Drive
Noblesville, IN

Sample Location	Sample ID	Media	Date	Units	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Lead
Oil on Larger Lathe	IDEM001:O062217	Oil	6/22/17	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	Not Analyzed
Wipe Sample from Stained Stone Beneath Larger Lathe	IDEM002:WP062217	Wipe	6/22/17	ug/wipe	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	Not Analyzed
Wipe Sample from Metal Side of Larger Lathe	IDEM003:WP062217	Wipe	6/22/17	ug/wipe	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	Not Analyzed
Oil on Smaller Lathe	IDEM004:O062217	Oil	6/22/17	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	Not Analyzed
Wipe Sample from Base of Horizontal Milling Maching	IDEM005:WP062217	Wipe	6/22/17	ug/wipe	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	Not Analyzed
Paint Chips from Band Saw	IDEM006:PC062217	Paint Chips	6/22/17	mg/kg	<0.0800	<0.0800	<0.0800	<0.0800	173	<0.160	<0.160	3,000

Hazardous Waste Testing Analytical Results for Sandblast Media

EPA Site ID No. INR000144168
Indiana Transportation Museum
825 Park Drive
Noblesville, IN 46060

Inventory Item Number	Sample ID	Date	Media	Analytical Method	Prep Method	Units	Arsenic	Barium	Cadmium	Chromium, Total	Lead	Selenium	Silver	Mercury
					Chemical Abstracts Service Registry Number (CASRN)		7440-38-2	7440-39-3	7440-43-9	7440-47-3	7439-92-1	7782-49-2	7440-22-4	7439-97-6
					2017 Commercial/Industrial Direct Contact with Soil Screening Levels, IDEM RCG (mg/kg)		30	100,000	--	--	800	5800	5800	3.1
					Maximum Concentration of Contaminants for the Toxicity Characteristic as determined by TCLP, USEPA (mg/L)		5.0	100.0	1.0	5.0	5.0	1.0	5.0	0.2
Sand Blast Media	WCSB:S100417	10/4/17	Soil	EPA 6010B	EPA3050B	mg/kg	<2	1067	<2	52	63	<2	<2	<1
	WCSB:S100417	10/4/17	Soil	TCLP Metals 6010B ICP/7471A Mercury	EPA 1311	mg/L	<0.01	0.42	<0.005	<0.01	0.020	<0.01	<0.05	<0.002

Area G Equipment - Waste Characterization Analytical Results - PCB & Lead

Indiana Transportation Museum
825 Park Drive
Noblesville, IN

Inventory Item Number	Sample ID	Sample Date	Media	Units	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Lead
171	171:PC101217	10/12/17	Paint Chips	mg/kg	<1.0	<1.0	<1.0	<1.0	8.54	6.81	<1.0	0.475
172	172:PC101217	10/12/17	Paint Chips	mg/kg	<1.0	<1.0	<1.0	<1.0	1.95	3.99	<1.0	0.108
174	174:PC101217	10/12/17	Paint Chips	mg/kg	<1.0	<1.0	<1.0	<1.0	2.83	13.7	<1.0	1.275
175	175:PC101217	10/12/17	Paint Chips	mg/kg	<1.0	<1.0	<1.0	<1.0	7.85	8.77	<1.0	Not Analyzed
184	184:PC101217	10/12/17	Paint Chips	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	1200	<1.0	2500
185	185:PC101217	10/12/17	Paint Chips	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	21.1	<1.0	0.900
1061	1061:PC101217	10/12/17	Paint Chips	mg/kg	<1.0	<1.0	<1.0	<1.0	17.5	2.1	<1.0	Not Analyzed
1062	1062:PC101217	10/12/17	Paint Chips	mg/kg	<1.0	<1.0	<1.0	<1.0	22.1	2.23	<1.0	0.083
1063	1063:PC101217	10/12/17	Paint Chips	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	2.7	<1.0	Not Analyzed

Appendix C

ENVision Laboratories, Inc.
Quality Manual

QUALITY MANUAL

ENVision Laboratories, Inc.
1439 Sadlier Circle West Drive
Indianapolis, IN 46239

Responsible Parties

Name	Function	Phone	Signatures	Date
Travis Garrett	Laboratory Technical Director	317-351-8632	Travis J. Garrett	06-01-15
Cheryl Crum	Quality Assurance Manager	317-351-8632	Cheryl A. Crum	06-01-15
David Norris	Deputy Technical Director	317-351-8632	David Norris	06-01-15

Revision Number:	**15**	**Effective Date:**	**06-01-15**
Distribution List:	This *Quality Manual* governs the quality program for all operating units of the laboratory, as shown on the organization chart presented in the manual.		

SECTION 2 - TABLE OF CONTENTS

SECTION 3 – INTRODUCTION AND SCOPE

The purpose of this *Quality Manual* is to outline the quality system for the ENVision Laboratories, Inc. The *Quality Manual* defines the policies, procedures, and documentation that assure analytical services continually meet a defined standard of quality that is designed to provide clients with data of known and documented quality and, where applicable, demonstrate regulatory compliance.

POLICY

The *Quality Manual* sets the standard under which all laboratory operations are performed including the laboratory's organization, objectives, and operating philosophy.

3.1 Scope of Testing

The laboratory scope of NELAC accredited analytical testing services includes those listed on the following table:

EPA Method 8015B: GC/FID – Gasoline Range Organics
EPA Method 8015B: GC/FID- Diesel & Extended Range Organics
EPA Method 8270C: Semivolatile Organic Compounds by GC/MS
EPA Method 8260B: Volatile Organic Compounds by GC/MS
EPA Method 3520C: Continuous Liquid-Liquid Extraction
EPA Method 3550C: Ultrasonic Extraction
EPA Method 5030B: Purge-and-Trap for Aqueous Samples
EPA Method 5035A: Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples
EPA Method 1684: Total, Fixed, and Volatile Solids in Water, Solids, and Biosolids

3.2 Table of Contents, References and Appendices

The table of contents is in Section 2 of this Manual. This *Quality Manual* uses the references from the 2009 TNI Standard.

3.3 Terms & Definitions and Acronyms Used

Quality control terms are generally defined within the section that describes the activity.

Terms and Definitions

2009 TNI Standard Volume 1 Module 1 & 2 Sec 3.0 and Module 4 Sec 1.3

Acronyms

A list of acronyms used in this document and their definitions are:

AA	–	Accrediting Authority
ANSI	–	American National Standards Institute
ASQC	–	American Society for Quality Control
ASTM	–	American Society for Testing and Materials
Blk	–	Blank
°C	–	degrees Celsius
cal	–	calibration
CAR	-	Corrective Action Report
CAS	–	Chemical Abstract Service
CCV	–	Continuing calibration verification
CEO	-	Chief Executive Officer
COC	–	Chain of custody
DOC	–	Demonstration of Capability
DRO	-	Diesel Range Organics
EPA	–	Environmental Protection Agency
ERO	-	Extended Range Organics
GC/FID	-	gas chromatography/flame ionization detector
GC/MS	–	gas chromatography/mass spectrometry
GRO	-	Gasoline Range Organics
ICP-MS	–	inductively coupled plasma-mass spectrometry
ICV	–	Initial calibration verification
INELA	–	Institute for National Environmental Laboratory Accreditation
ISO/IEC	–	International Organization for Standardization/International Electrochemical Commission
LCS	–	Laboratory control sample
LFB	–	Laboratory fortified blank
LOD	-	Limit of Detection
LOQ	-	Limit of Quantitation
MDL	–	method detection limit
mg/Kg	–	milligrams per kilogram
mg/L	–	milligrams per liter
MS	–	matrix spike
MSD	–	matrix spike duplicate
NELAC	–	National Environmental Laboratory Accreditation Conference
NELAP	–	National Environmental Laboratory Accreditation Program
NIST	–	National Institute of Standards and Technology
PID	-	Photo Ionization Detector
PT	–	Proficiency Test(ing)
PTOB	–	Proficiency Testing Oversight Body
PTPA	–	Proficiency Testing Provider Accreditor
QA	–	Quality Assurance
QC	–	Quality Control
QAM	–	Quality Assurance Manager
RL	–	Reporting level
RPD	–	Relative percent difference
RSD	–	Relative standard deviation
SD	-	Standard Deviation
SOPs	–	Standard operating procedures
spk	–	spike
std	–	standard
TPH	-	Total Petroleum Hydrocarbon
TNI	-	The NELAC Institute
ug/L	–	micrograms per liter
VOC	–	Volatile organic compound

SECTION 4 – ORGANIZATIONAL ROLES AND RESPONSIBILITIES

POLICY

The laboratory is a legally identifiable organization. Through application of the policies and procedures outlined in this chapter, the laboratory assures that it is impartial and that personnel are free from undue commercial, financial, or other undue pressures that might influence their technical judgment. The laboratory is responsible for carrying out testing activities that meet the requirements of the TNI Standard and that meet the needs of the client.

Mission Statement: ENVision Laboratories, Incorporated is an innovative, state-of-the-art environmental laboratory aimed at providing competitively priced analytical data with superior customer service. We view ourselves as partners with our clients, our employees and our community. Our goal is moderate growth, annual profitability, and maintaining a fun work environment.

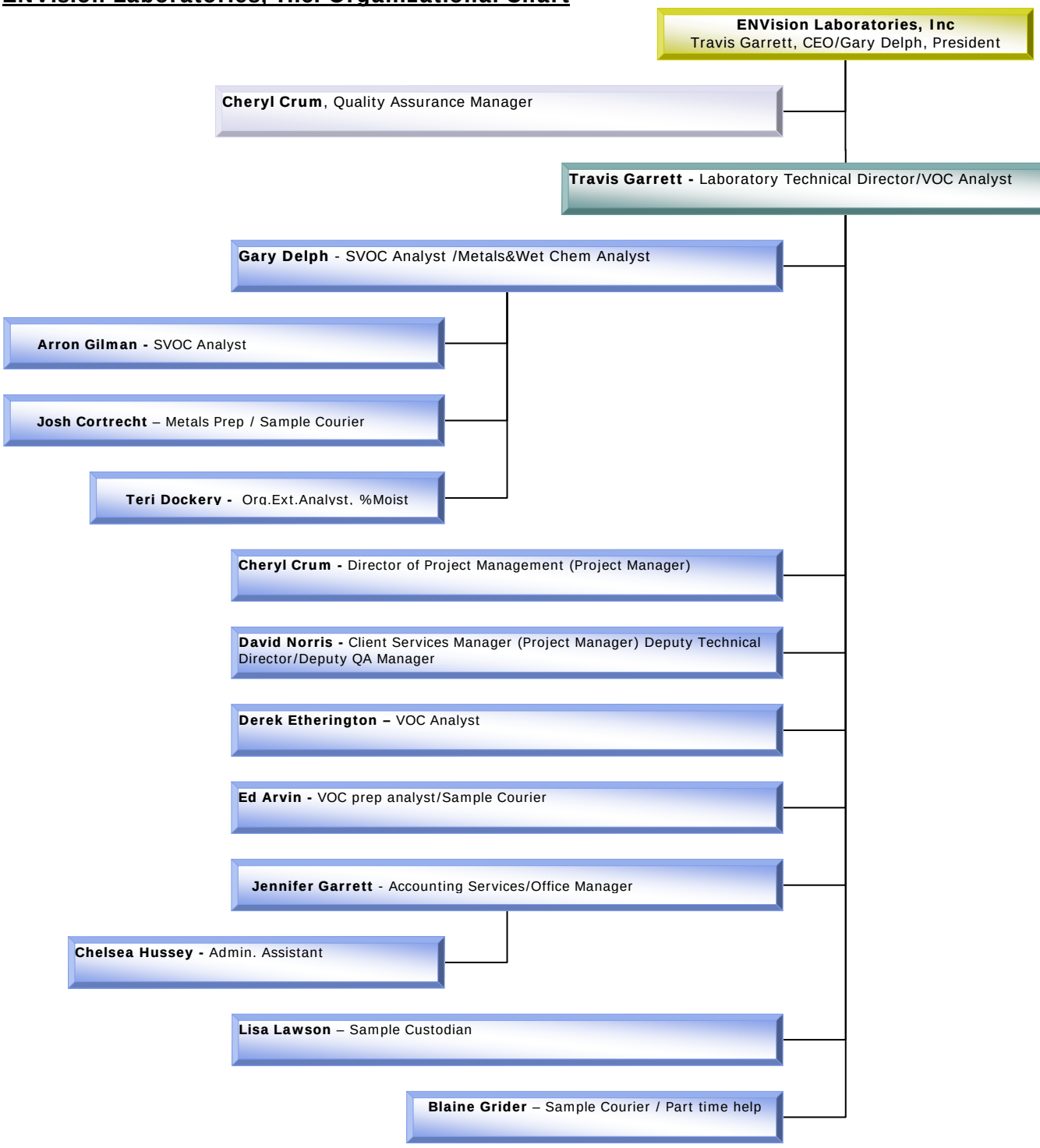
4.1 Laboratory Organizational Structure

Policy

The organizational structure (see chart below) minimizes the potential for conflicting or undue interests that might influence the technical judgment of analytical personnel. All laboratory personnel must attempt to avoid involvement in any activities that would diminish competence, impartiality, judgment, or operational integrity.

The laboratory is a privately owned, commercially independent testing laboratory operating in Indianapolis, IN. The federal tax ID number is available upon request, if applicable.

ENVision Laboratories, Inc. Organizational Chart



4.2 Responsibility and Authority

The term "MANAGEMENT" includes the titles, Laboratory Technical Director, Deputy Technical Directors, CEO, President, Quality Assurance Manager, and Deputy Quality Assurance Manager.

Policy

Management has overall responsibility for the technical operations and authority needed to generate the required quality of laboratory operations.

Management's commitment to quality and to the Quality System is stated in the Quality Policy, which is upheld through the application of related policies and procedures.

Management ensures technical competence of personnel operating equipment, performing tests, evaluating results, or signing reports, and limits authority to perform laboratory functions to those appropriately trained and/or supervised.

Procedure

The assignment of responsibilities, authorities, and interrelationships of the personnel who manage, perform, or verify work affecting the quality of environmental tests is documented in Section 17.1 of the Quality Manual.

Management bears specific responsibility for maintenance of the Quality System. This includes defining roles and responsibilities to personnel, approving documents, providing required training, providing a procedure for confidential reporting of data integrity issues, and periodically reviewing data, procedures, and documentation.

Management ensures that audit findings and corrective actions are completed within required time frames.

Designated alternates are appointed by management during the absence of the Laboratory Technical Director or the Quality Assurance Manager, and always if the absence is more than 15 days.

Management is responsible for defining the minimal level of education, qualifications, experience, and skills necessary for all positions in the laboratory and assuring that technical staff have demonstrated capabilities in their tasks.

Training is kept up to date as described in Section 17.4 by periodic review of training records and through employee performance review.

SECTION 5 – QUALITY SYSTEMS

The laboratory's Quality System is documented in this *Quality Manual* and associated quality system documents. Together they describe the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of the organization for ensuring quality in its work processes, products, and services. All associated quality documents are available for an on-site assessment.

5.1 Quality Policy

The quality policy is signed and dated, and is issued under the authority of the highest level of laboratory management, which demonstrates management's commitment to integrity, ethics, the quality system and associated standards.

Quality Policy Statement

The objective of the quality system and the commitment of management is to consistently provide our customers with data of known and documented quality that meets their requirements. Our policy is to use good professional practices, to maintain quality, to uphold the highest quality of service, and to comply with the 2009 TNI Standard. The laboratory ensures that personnel are free from any commercial, financial, and other undue pressures, which might adversely affect the quality of work. This policy is implemented and enforced through the unequivocal commitment of management, at all levels, to the Quality Assurance (QA) principles and practices outlined in this manual. However, the primary responsibility for quality rests with each individual within the laboratory organization. Every laboratory employee must ensure that the generation and reporting of quality analytical data is a fundamental priority. Every laboratory employee is required to familiarize themselves with the quality documentation and to implement the policies and procedures in their work. All employees are trained annually on ethical principles and procedures surrounding the data that is generated. The laboratory maintains a strict policy of client confidentiality.

5.2 Quality Manual

Policy

Management ensures that the laboratory's policies and objectives for quality are documented by reference or by inclusion in the *Quality Manual*, and that the *Quality Manual* is communicated to, understood by, and implemented by all personnel concerned.

Where the *Quality Manual* documents laboratory requirements, a separate SOP or policy is not required.

Procedure

All employees sign a form, kept with their training file stating that they have read and understood the *Quality Manual*, including the quality policy. The *Quality Manual* is maintained current and up-to-date by the Quality Assurance Manager.

SECTION 6 – DOCUMENT MANAGEMENT

This Section describes procedures for document management, which includes controlling, distributing, reviewing, and accepting modifications. The purpose of document management is to preclude the use of invalid and/or obsolete documents.

The laboratory manages three types of documents, 1) controlled, 2) approved, and 3) obsolete.

A CONTROLLED DOCUMENT is one that is uniquely identified, issued, tracked, and kept current as part of the quality system. Controlled documents may be internal documents or external documents.

APPROVED means reviewed, and either signed and dated, or acknowledged in writing or secure electronic means by the issuing authority(ies).

OBSOLETE DOCUMENTS are documents that have been superseded by more recent versions.

POLICY

All documents that affect the quality of laboratory data are managed appropriate to the scope and depth required.

6.1 Controlled Documents

Policy

Documents will be reviewed and approved for use by Quality Assurance Manager and/or Laboratory Technical Director prior to issue.

Procedure

Documents are reviewed every 2 years to ensure their contents are suitable and in compliance with the current quality systems requirements and changing regulations or procedures. However, test method SOP's are reviewed annually.

Approved copies of documents are available at all locations where operations are essential to the effective functions of the laboratory. Copies of documents to distribute to laboratory personnel are assigned a unique number and recorded in the Quality Assurance Manager's Controlled document logbook. Management will determine the employees to whom the documents will be appropriately distributed. The unique document number is recorded next to the individual's name and the document storage area will be indicated. The employee initials that the copy was received. When the document is no longer valid, the date the document became obsolete is recorded, and the retrieved copies are checked off next to each employee's name.

Controlled internal documents are uniquely identified with 1) date of issue, 2) revision identification, 3) page number, 4) total number of pages or a mark to indicate the end of the document, and 5) the signatures of the issuing authority (i.e. management).

A master list of controlled internal documents is maintained that includes distribution, location, and revision dates. A master list of controlled external documents is also maintained that includes title, author, copyright date, and date of publication, and location. The controlled document list is maintained by the Quality Assurance Manager. The controlled document list is updated periodically.

6.1.1 Document Changes to Controlled Documents

6.1.1.1 Paper Document Changes

Policy

Document changes are approved by the original approving authority.

The document management process allows for handwritten modifications to documents.

Procedure

Document changes are approved with signature and dated by management. The modified document is then copied and distributed, and obsolete documents are removed.

Amendments to documents are incorporated into a new revision and reissued as soon as practicable.

6.1.1.2 Electronic Document Changes

Procedure

Suggested revisions to electronic documents are presented to management for review and approval. Changes to electronic documents are approved either on an accompanying form or through electronic means (such as email, change tracking functions, or memoranda).

Where practicable, the altered text or new text in the draft is identified during the revision or review process to provide for easy identification of the modifications.

6.2 Obsolete Documents

Policy

All invalid or obsolete documents are removed, or otherwise prevented from unintended use.

Procedure

Obsolete documents retained for legal use or historical knowledge preservation are appropriately marked and retained. Obsolete documents are identified as being obsolete by management. All copies of the obsolete document are collected from employees according to the Master List log. One copy of the obsolete document will be retained by the Quality Assurance Manager and clearly marked “Obsolete” on the

front cover of the document. All other copies are destroyed by the Quality Assurance Manager.

6.3 Standard Operating Procedures

STANDARD OPERATING PROCEDURES (SOPs) are used to ensure consistency of application of common procedures, are written procedures that describe in detail how to accurately reproduce laboratory processes, and are of two types: 1) test method SOPs, which have specifically required details, and 2) general use SOPs which document the more general organizational procedures. SOPs accurately reflect all phases of current laboratory activites.

General use SOPs do not have to be formal documents with predefined section headings and contents. They can be less formal descriptions of procedures described in the *Quality Manual* or other documents.

Policy

Copies of all (General Use and Test Method) SOPs and published or referenced test methods are accessible to all personnel.

Procedure

Each SOP indicates the effective date, the revision number, and the signature(s) of the Quality Assurance Manager, Laboratory Technical Director, and Deputy Technical Director. See SOP on Writing SOP's ENQA01 for the numbering system used for organization and how SOP's are distributed to personnel.

6.3.1 Test Method SOPs

Policy

The laboratory has SOPs for all test methods performed and for procedures that are part of the Quality System that accurately reflect how the analytical process is carried out. Where equipment manuals or published methods accurately reflect laboratory procedures in detail, a separate SOP is not required.

Any deviation from a test method is documented, including both a description of the change made and a technical justification. The deviation from a test method is reported to the client.

Procedure

Each Test Method SOP includes or references (as applicable) the following:

a) identification of the test method;
b) applicable matrix or matrices;
c) detection limit;
d) scope and application, including components to be analyzed;
e) summary of the test method;
f) definitions;
g) interferences;
h) safety;

i) equipment and supplies;
j) reagents and standards;
k) sample collection, preservation, shipment and storage;
l) quality control, including acceptance criteria (5.4.10.6);
m) calibration and standardization;
n) procedure;
o) data analysis and calculations;
p) method performance;
q) pollution prevention;
r) data assessment and acceptance criteria for quality control measures;
s) corrective actions for out-of-control ;
t) contingencies for handling out-of-control or unacceptable data;
u) waste management;
v) references; and,
w) any tables, diagrams, flowcharts and validation data.

SECTION 7 – REVIEW OF REQUESTS, TENDERS AND CONTRACTS

POLICY

The review of all new work assures that oversight is provided so that requirements are clearly defined, the laboratory has adequate resources and capability, and the test method is applicable to the customer's needs. This process assures that all work will be given adequate attention without shortcuts that may compromise data quality.

Contracts for new work may be formal bids, signed documents, verbal, or electronic.

PROCEDURE

7.1 Procedure for the Review of Work Requests

The laboratory determines if it has the necessary accreditations, resources, including schedule, equipment, deliverables, and personnel to meet the work request.

The laboratory informs the client of the results of the review if it indicates any potential conflict, deficiency, lack of accreditation, or inability of the lab to the complete the work satisfactorily.

The client is informed of any deviation from the contract including the test method or sample handling processes. All differences between the request and the final contract are resolved and recorded before any work begins. It is necessary that the contract be acceptable to both the laboratory and the client.

The review process is repeated when there are amendments to the original contract by the client. The participating personnel are given copies of the amendments.

The Director of Project Manager or Client Services Manager will review the work request. For routine projects and other simple tasks, a review by the Director of Project Manager or Client Services Manager is considered adequate. The Director of Project Manager or Client Services Manager confirms that the laboratory has any required certifications, that it can meet the client's data quality and reporting requirements, and that the lab has the capacity to meet the clients turn around needs. For new, complex, or large projects, the proposed work contract is given to the Laboratory Technical Director. The Laboratory Technical Director will in turn forward the work contract to the appropriate personnel to evaluate items such as:

- Contractual obligations, bonding issues, and payment terms
- Method capabilities, analyte lists, reporting limits, and quality control limits
- Turnaround time feasibility
- QA/QC issues; including certifications/accreditation
- Formal laboratory quote
- Final report formatting and electronic deliverable documents
- Final sample disposal requirements
- Need for subcontractor laboratory

The Director of Project Manager or Client Services Manager submits the bid and formal quote to the client and maintains copies of all signed contracts and updated contracts in the appropriate client file.

7.2 Documentation of Review

Records are maintained for every contract or work request, when appropriate. This includes pertinent discussions with a client relating to the client's requirements or the results of the work during the period of execution of the contract.

If a contract needs to be amended after work has commenced, the laboratory must report any suspensions, revocations, or voluntary withdrawals of accreditation to the client.

SECTION 8 – SUBCONTRACTING OF TESTS

A SUBCONTRACT LABORATORY is defined as a laboratory external to this laboratory, or at a different location than the address indicated on the front cover of this manual, that performs analyses for this laboratory.

POLICY

When subcontracting analytical services, the laboratory assures work requiring accreditation is placed with a NELAP-accredited laboratory or one that meets applicable statutory and regulatory requirements for performing the tests.

PROCEDURE

A list of subcontractors is maintained by the Quality Assurance Manager.

A copy of the certificate and the analyte list for subcontractors are maintained as evidence of compliance.

The laboratory shall advise the client of the intent to subcontract the work in writing (email is acceptable). When possible, the laboratory gains the approval of the client to subcontract all of their work prior to implementation, preferably in writing. The Director of Project Management or Client Services Manager retains the written client approval for subcontracted work in the appropriate client file. (See SOP ENSPL01 Section 6.0 for procedure for subcontracting samples.)

The laboratory performing the subcontracted work and all non-NELAP accredited work is identified in the final report. The laboratory assumes responsibility to the client for the subcontractor's work, except in the case where a client or a regulating authority specified which subcontractor is to be used.

If a contract needs to be amended after work has commenced to a subcontractor laboratory, the laboratory must report any suspensions, revocations, or voluntary withdrawals of accreditation to the client.

SECTION 9 – PURCHASING SERVICES AND SUPPLIES

POLICY

The laboratory ensures that purchased supplies and services that affect the quality of environmental tests are of the required or specified quality by using approved suppliers and products.

The laboratory has procedures for purchasing, receiving, and storage of supplies that affect the quality of environmental tests.

PROCEDURE

The Laboratory Technical Director, Quality Assurance Manager or their designee reviews and approves the supplier of services and supplies and approves technical content of purchasing documents prior to ordering. A list of technically approved items for ordering is created by the Laboratory Technical Director. Approval to order items not on the approved list must be made in writing by the Laboratory Technical Director or Quality Assurance Manager.

Evaluation of suppliers is accomplished by ensuring the supplier ships the product or material ordered and that the material is of the appropriate quality by signing packing slips or other supply receipt documents. The purchasing documents contain the data that adequately describe the services and supplies ordered.

The laboratory keeps a list of approved suppliers.

Analysts list needed items on designated board for ordering. The items are reviewed, approved for appropriateness and then ordered by one of the following personnel: Laboratory Technical Director, Quality Assurance Manager or their designee.

Online orders are checked for accuracy before final submission. Order confirmations are received through email and are printed and verified for accuracy, initialed, and dated. As ordered items are received, the accompanying packing lists are cross-checked with received items, initialed, and dated as received. Packing slips are then cross-checked with the applicable order confirmation and attached to it. Orders are inspected and verified to contain the correct item ordered. Once all items for each order are received, the order confirmation and attached packing lists are retained in the appropriate vendor file.

Phone orders are recorded on the appropriate order form (see Appendix 4 & 5) which includes vendor name, vendor phone number, date of order, item numbers and/or item description and quantity ordered. As ordered items are received, the accompanying packing lists are cross-checked with received items, initialed and dated as received. Packing slips are then cross-checked with the applicable order form and attached to it. Once all items for each order are received, the order form and attached packing lists are retained in the appropriate vendor file.

SECTION 10 – SERVICE TO THE CLIENT

The laboratory collaborates with clients and/or their representatives in clarifying their requests and in monitoring of the laboratory performance related to their work. Each request is reviewed to determine the nature of the request and the laboratory's ability to comply with the request within the confines of prevailing statutes and/or regulations without risk to the confidentiality of other clients.

The Laboratory Sales Representative seeks client feedback, both positive and negative, from customers during client visits, phone conversations, and email. The feedback is provided to management to improve the management system, testing, and calibration activities, and customer service.

10.1 Client Confidentiality

Policy

The laboratory confidentiality policy is to not divulge or release any information to a third party without proper authorization.

All electronic data (storage or transmissions) are kept confidential, based on technology and laboratory limits, as required by client or regulation.

Procedure

During the course of business, the laboratory is privy to data or information considered confidential or proprietary to the clients. This information includes but is not limited to test results, origin of samples, business relationships with clients, information about the client's business, laboratory procedures, and client list. All such information is kept strictly confidential and discussed only with those designated as technical contacts, purchasing agents for the particular project or with corporate officers for the client's company. The information will not be discussed with anyone not designated as a contact without written permission from the client.

A confidentiality statement is used on all email, documents, and transmitted (fax) information. The following Confidentiality Notice (or equivalent) is used:

Confidentiality Notice: *The information contained in this message is intended for the use of the addressee, and may be confidential and/or privileged. If the reader of this message is not the intended recipient, or the employee or agent responsible to deliver it to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify the sender immediately.*

SECTION 11 – COMPLAINTS

The purpose of this section is to assure that customer complaints are addressed and corrected. This includes requests to verify results or analytical data.

POLICY

The laboratory management reviews all complaints and determines appropriate action.

PROCEDURE

All customer complaints are documented (ie. via email, phone log, project notes) by the person receiving the complaint and taken to management for review. The Laboratory Technical Director or Quality Assurance Manager will determine when a complaint justifies further action. If it is determined that a complaint is without merit, it is documented, and the client is contacted. If it is determined that the complaint has merit, a corrective action is initiated. See Section 13 for corrective action procedures.

SECTION 12 – CONTROL OF NON-CONFORMING WORK

NON-CONFORMING WORK is work that does not meet acceptance criteria or requirements. Non-conformances can include unacceptable quality control results (see Section 24 Assuring the Quality of Results) or departures from standard operating procedures or test methods. Requests for departures from laboratory procedures are approved by the Laboratory Technical Director or Quality Assurance Manager and documented.

POLICY

The policy for control of non-conforming work is to identify the non-conformance, determine if it will be permitted, and take appropriate action. All employees have the authority to stop work on samples when any aspect of the process does not conform to laboratory requirements.

PROCEDURE

Non-conformance of work with established policies and procedures or those of the client will be investigated upon discovery. See Appendix 3 for the Non-conformance/Corrective Action Report form. The Laboratory Technical Director or Quality Assurance Manager will assign the appropriate personnel to investigate the issue. Any non-conformance will be evaluated for its significance, its impact on the data, and the need for corrective action. The client is notified within five business days if their data has been impacted. If necessary, work will be halted until the issue is resolved. Resumption of work after non-conformance is authorized by the Laboratory Technical Director or Quality Assurance Manager.

The procedure for investigating and taking associated corrective actions of non-conforming work are described in Section 13.

Whenever the identification of non-conformance casts doubt on the ability of the laboratory to comply with its own policies and procedures, an audit of the area affected should be performed to evaluate compliance.

SECTION 13 – CORRECTIVE ACTION

CORRECTIVE ACTION is the action taken to eliminate the causes of an existing nonconformity, defect, or other undesirable situation in order to prevent recurrence.

POLICY

Deficiencies cited in external assessments, internal quality audits, data reviews, client complaints or inquiries, or managerial reviews are documented and require corrective action. Corrective actions taken are appropriate for the magnitude of the problem and the degree of risk.

PROCEDURE

Any analyst or member of management recognizing that an issue warrants investigation can initiate corrective action. The Quality Assurance Manager is responsible for monitoring and recording corrective action. See Appendix 3 for the Non-conformance/Corrective Action Report form.

All deficiencies are investigated and a corrective action plan developed and implemented if determined necessary. The implementation is monitored for effectiveness.

Specific corrective action protocols specified in test methods may over-ride general corrective action procedures specified in this manual.

13.1 Selection and Implementation of Corrective Actions

ROOT CAUSE is the condition or event that, if corrected or eliminated, would prevent the recurrence of a deficiency.

Once an exceedance or nonconformance is noted, the first action is an investigation to determine the root cause. Records are maintained of nonconformances requiring corrective action to show that the root cause(s) was investigated, and includes the results of the investigation.

Where uncertainty arises regarding the best approach for analysis of the cause of exceedances that require corrective action, appropriate personnel will recommend corrective actions to be initiated by the analyst.

The Quality Assurance Manager ensures that corrective actions are discharged within the agreed upon time frame.

13.2 Monitoring of Corrective Action

Policy

Appropriate personnel, as determined by the QA Manager, will monitor implementation and documentation of the corrective action to assure that the corrective actions were effective. The QA Manager or Laboratory Technical Director has the authority to assign for work to resume if a work stoppage has been deemed appropriate for non-conformance.

Procedure

The Quality Assurance Manager will assign a unique number, CA#, to the top of the Non-conformance/Corrective Action Report Form (Appendix 3). The unique number, client name, project number or lab area effected, date assigned, analyst assigned, and closure date are recorded in the Table of Contents section of the Corrective Action Logbook. A deadline date for the investigation is assigned on the Non-conformance/Corrective Action Report. The analyst must return the form to the Quality Assurance Manager before the deadline expires.

The Quality Assurance Manager will monitor the effectiveness of the solution implemented by appropriate follow-up and record findings on the Non-conformance/Corrective Action Report form. The closure of the CAR will be document on the form by the signatures of the applicable lab manager, Quality Assurance Manager, and Laboratory Technical Director. The QA Manager will review Corrective Action Report forms for failures that indicate a systemic or reoccurring problem. If the QA Manager suspects that the laboratory is not in compliance with its own policies and procedures or with the TNI Standard, an internal audit of the appropriate area will be conducted.

13.3 Technical Corrective Action

CAUSE ANALYSIS in corrective action investigates the root cause of the problem.

Policy

Sample data associated with a failed quality control indicator is evaluated for the need to be reanalyzed or qualified.

Procedure

Unacceptable quality control results are documented, and if the evaluation requires cause analysis, the cause and solution are recorded.

The analyst is responsible for initiating or recommending corrective actions and ensuring that exceedances of quality control acceptance criteria are documented. Analysts routinely implement corrective actions for data with unacceptable QC measures. First level correction may include re-analysis without further assessment. If the test method SOPs addresses the specific actions to take, they are followed. Otherwise, corrective actions start with assessment of the cause of the problem.

The Laboratory Technical director or Quality Assurance Manager review corrective action reports and suggest improvements, alternative approaches, and procedures where needed.
If the data reported are affected adversely by the nonconformance, the client is notified in writing.

The discovery of a non-conformance for results that have already been reported to the client must be immediately evaluated for significance of the non-conformance, its acceptability to the client, and determination of the appropriate corrective action.

13.4 Policy for Exceptionally Permitting Departures from Documented Policies and Procedures

Policy

The laboratory allows the release of non-conforming data only with approval on a case-by-case basis by the Laboratory Technical Director or Quality Assurance Manager. To the extent possible, samples are reported only if all quality control measures are acceptable. If a specific quality control measure is found to be out of control, and the data is to be reported, all samples associated with the failed item are reported with appropriate lab defined data qualifier(s). Planned departures from procedures or policies do not require audits or investigations.

Procedure

Permitted departures for non-conformances, such as QC failures, are fully documented and include the reason for the departure, the affected SOP(s), the impact of the departure on the data, and the data.

SECTION 14 – PREVENTIVE ACTION

PREVENTIVE ACTION, rather than corrective action, is a pro-active process aimed at minimizing or eliminating inferior data quality or other non-conformance through scheduled maintenance and review, before the non-conformance occurs.

Preventive action includes, but is not limited to, review of QC data to identify quality trends, regularly scheduled staff quality meetings, annual budget reviews, annual managerial reviews, scheduled preventive instrument maintenance, review of SOPs for consistency against reference methods, work load reviews, and other actions taken to identify potential quality problems and/or to implement process improvement plans. If preventive action is required, action plans are developed, implemented, and monitored to reduce the likelihood of the occurrence of such non-conformances and to take advantage of the opportunities for improvement.

All employees have the authority to recommend preventive action procedures, however management is responsible for implementing preventive action.

SECTION 15 – CONTROL OF RECORDS

RECORDS are a subset of documents, usually data recordings that include annotations, such as daily refrigerator temperatures posted to a laboratory form, lists, spreadsheets, or analyst notes on a chromatogram. Records may be on any form of media, including electronic and hard copy. Records include Chain of Custody records, analytical reports, and Project Management notes/project folders. Records allow for the historical reconstruction of laboratory activities related to sample-handling and analysis.

POLICY

The laboratory maintains a record system appropriate to its needs, records all laboratory activities, and complies with applicable standards or regulations as required.

PROCEDURE

The laboratory retains all original observations, calculations and derived data, calibration records, and a copy of the test report for a minimum of five years.

Records of all procedures to which a sample is subjected while in the possession of the laboratory are kept.

Analytical records should include the following:

- Laboratory sample ID code
- Date of analysis and time of analysis is required if the holding time is 72 hours or less or when time critical steps are included in the analysis, e.g., extractions, and incubations
- Instrumentation identification and instrument operating conditions/parameters (or reference to such data)
- Analysis type
- All manual calculations, e.g., manual integrations
- Analyst's or operator's initials/signature
- sample preparation including cleanup and separation protocols, ID codes, volumes, weights, instrument printouts, meter readings, calculations, reagents
- Sample analysis
- standard and reagent origin, receipt, preparation, and use
- calibration criteria, frequency and acceptance criteria
- data and statistical calculations, review, confirmation, interpretation, assessment and reporting conventions
- quality control protocols and assessment
- electronic data security, software documentation and verification, software and hardware audits, backups, and records of any changes to automated data entries
- method performance criteria including expected quality control requirements

15.1 Records Management and Storage

Policy

All quality records, including electronic records, are easy to retrieve, legible, and protected from deterioration or damage; held secure and in confidence; and are available to accrediting authorities for a minimum of five years.

The laboratory maintains a record management system for all quality records including laboratory notebooks, instrument logbooks, standards logbooks, and records for data reduction, validation, storage and reporting.

Archived information and access logs are protected against fire, theft, loss, environmental deterioration, vermin, and in the case of electronic records, electronic or magnetic sources.

In the event that the laboratory transfers ownership or goes out of business, all quality records are maintained and are available to accrediting authorities for a minimum of five years.

Procedure

All electronic records are backed-up. See SOP ENQA06 for Data Backup/Archiving procedure. Access to protected records is limited to laboratory management or their designees to prevent unauthorized access or amendment.

Procedures for identification, collection, access, filing, storage, and disposal of records are found below:

Identification: Records are uniquely identified.

Collection: Observations, data, and calculations are recorded at the time they are made. All generated data, except those that are generated by automated data collection systems, are recorded directly, promptly and **legibly in permanent black ink**. All documentation entries are signed or initialed by responsible staff. The reason for the signature or initials is clearly indicated in the records (e.g., sampled by, prepared by, reviewed by, etc.) When mistakes are made in technical records, each mistake is crossed out with a single line (not erased, made illegible, or deleted) and the correct value entered alongside. Corrections are signed or initialed by the person making the correction. When changes are made to technical records for reasons other than for correction of transcription errors, the reason for the change is recorded on the document.

Storage: All records stored on electronic media are supported by the hardware and software required for retrieval and have hard-copies or write protected copies.

Filing: Records are filed promptly and in an organized fashion.

Access: Access to archived information is documented with an access log.

Disposal: Records are disposed of according to applicable regulation, client request, or after five years.

15.2 Legal Chain of Custody Records

EVIDENTIARY SAMPLE DATA are used as legal evidence.

Procedures for evidentiary samples are documented in a SOP ENSPL01 Section 7.0.

SECTION 16 – AUDITS AND MANAGEMENT REVIEW

AUDITS measure laboratory performance and verify compliance with accreditation/ certification and project requirements. Audits specifically provide management with an on-going assessment of the quality system. They are also instrumental in identifying areas where improvement in the quality system will increase the reliability of data. Audits are of four main types: internal, external, performance, and system.

As part of the overall internal audit program, the laboratory shall ensure that a review is conducted with respect to any inappropriate actions or vulnerabilities related to data integrity. Discovery of potential issues shall be handled in a confidential manner until such time as a follow up evaluation, full investigation, or other appropriate actions have been completed and the issues clarified. All investigations that results in finding of inappropriate activity shall be documented and include an disciplinary actions involved, corrective actions taken, and all appropriate notifications of clients. All documentation of these investigations and actions taken are maintained for at least five years.

16.1 Internal Audits

Policy

The laboratory conducts internal audits of its quality and management systems activities, including data integrity, using trained and qualified personnel at least annually. Personnel may not audit their own activities except when it can be demonstrated that an effective audit will be carried out.

Procedure

Annually, the laboratory prepares a schedule of internal audits to be performed during the year. The audit schedule is maintained by the Quality Assurance Manager. These audits verify compliance with the requirements of the quality system, including analytical methods, SOPs, ethics policies, other laboratory policies, and the 2009 TNI Standard.

It is the responsibility of the Quality Assurance Manager to plan and organize audits as required by the schedule and requested by management.
The area audited, the audit findings, and corrective actions are recorded.

All investigations that result in findings of inappropriate activity are documented and include any disciplinary actions involved, corrective actions taken, and all appropriate notifications of clients.

Clients must be notified within five business days, in writing, when audit findings cast doubt on the validity of the data.

Audits are reviewed after completion to assure that corrective actions were implemented in a timely manner and were effective.

16.2 External Audits

Policy

It is the laboratory's policy to cooperate and assist with all external audits, whether performed by clients or an accrediting authority.

All external audits are fully documented and tracked to closure.

Procedure

Management ensures that all areas of the laboratory are accessible to auditors as applicable and that appropriate personnel are available to assist in conducting the audit.

Any findings related to an external audit follow corrective action procedures.

Management ensures that corrective actions are carried out within the timeframe specified by the auditor(s).

16.3 Performance Audits

Performance audits may be Proficiency Test Samples, internal single blind samples, double blind samples through a provider or client, or anything that tests the performance of the analyst and method.

The policy and procedures for Proficiency Test Samples are discussed in Section 23.7

16.4 System Audits and Management Reviews

Policy

Top level management reviews the quality system and maintains records of review findings and actions.

Procedure

The quality system is reviewed annually, and findings are recorded. Managers assure that actions are performed within agreed time frames. See Managerial Review SOP ENQA09 for review procedure.

Findings from management reviews are recorded. These records ensure that corrective actions are completed in an appropriate time frame.

SECTION 17 – PERSONNEL, TRAINING, AND DATA INTEGRITY

17.1 Job Descriptions

Policy

Job descriptions are available for all positions that manage, perform, or verify work affecting data quality, and are located in the employee training files maintained by the QA Manager. The laboratory must use personnel who are employed, or under contract to, the laboratory.

Procedure

Job descriptions include the specific tasks, minimum education and qualifications, skills, and experience required for each position. The education and technical background of each employee (generally in the form of a resume) is documented in each employee training file maintained by the Quality Assurance Manager.

17.1.1 Metals/Wet Chemistry Analyst

The Metals/Wet Chemistry Analyst is responsible for the preparation and analysis of all samples requiring metals and/or wet chemistry analysis. This includes sample preparation and analysis, instrument maintenance, data reduction, validation, reporting and archiving, and carrying out any and all requirements of the established QA program that pertain to their area. Analyst must be able to follow good laboratory practices, adhere to policies and procedures set forth in the Quality Assurance Manual, and comply with the latest version of the National Environmental Laboratory Accreditation Program.

Minimum Requirements: Bachelor's Degree in Biology/Chemistry/Environmental Science or related science and/or 3 years environmental laboratory experience.

17.1.2 Organic Extractions Analyst

The Organic Extractions Analyst is responsible for the preparations of all water and soil samples requiring SVOC or TPH-DRO/ERO analysis. This includes sample extraction, concentration and packaging, maintaining all extraction records and carrying out any and all requirements of the established QA program that pertain to their area. The analyst will also be responsible for general laboratory duties such as washing glassware and maintenance of the lab. Analyst must be able to follow good laboratory practices, adhere to policies and procedures set forth in the Quality Assurance Manual, and comply with the latest version of the National Environmental Laboratory Accreditation Program.

Minimum Requirements: High School degree.

17.1.3 SVOC or TPH-DRO/ERO Analyst

The SVOC or TPH-DRO/ERO Analyst is responsible for the analysis of all samples requiring semivolatile organic compounds and/or TPH-DRO/ERO. This includes chemical analysis, instrument maintenance, data reduction, validation, reporting and archiving, and carrying out any and all requirements of the established QA program that pertain to their area. Analyst must be able to follow good laboratory practices, adhere to policies

and procedures set forth in the Quality Assurance Manual, and comply with the latest version of the National Environmental Laboratory Accreditation Program.

Minimum Requirements: Bachelor's Degree in Biology/Chemistry/Environmental Science or related science and/or 3 years environmental laboratory experience, and knowledge of Chemstation Software

17.1.4 **VOC Prep Analyst**

The VOC Prep Analyst is responsible for the preparation of all water and soil samples requiring volatile organic compounds and/or TPH-GRO analysis. This includes sample measuring, weighing, diluting, or archiving samples, maintaining all preparation records and carrying out any and all requirements of the established QA program that pertain to their area. The analyst will also be responsible for general laboratory duties such as washing glassware and maintenance of the lab. Analyst must be able to follow good laboratory practices, adhere to policies and procedures set forth in the Quality Assurance Manual, and comply with the latest version of the National Environmental Laboratory Accreditation Program.

Minimum Requirements: High School degree.

17.1.5 **VOC Analyst**

The VOC Analyst is responsible for the analysis of all samples requiring volatile organic compounds and/or TPH-GRO. This includes chemical analysis, instrument maintenance, data reduction, validation, reporting and archiving, and carrying out any and all requirements of the established QA program that pertain to their area. Analyst must be able to follow good laboratory practices, adhere to policies and procedures set forth in the Quality Assurance Manual, and comply with the latest version of the National Environmental Laboratory Accreditation Program.

Minimum Requirements: Bachelor's Degree in Biology/Chemistry/Environmental Science or related science and/or 3 years environmental laboratory experience, and knowledge of Chemstation Software

17.1.6 **Director of Project Management/Client Services Manager (Project Managers)**

The Director of Project Management / Client Services Manager (Project Managers) prepare and deliver final reports to clients in a timely manner and are the primary lines of communication to the clients. The Project Managers review the logged samples in the LIMS system, generate draft invoices, and track due dates. Project Managers are responsible for evaluating all aspects of incoming or potential projects. They must determine in advance if volume of samples, matrices, testing parameters, quoted price, and/or turnaround time required are within the capabilities of ENVision or a subcontractor laboratory before beginning new work. It is also the responsibility of the Project Managers to review requests, tenders, and contracts before commencing work. Project Managers must consider accreditation status, subcontracted analyses, analytical methods, reporting limits, QA/QC requirements, and other data quality objectives before beginning new work. The project manager will notify the client immediately of any potential conflict and record the resolution of any issues in the project file. The Project Manager also has the responsibility of updating the client of any accreditation suspensions, revocation, or withdrawls that occur after work has commenced. The

Project Managers cooperate with the clients to clarify client requests and monitor the labs performance in relation to the work completed.

Minimum Requirements: Bachelor's Degree in Biology/Chemistry/Environmental Science or related science and/or 5 years environmental laboratory experience.

17.1.7 **Safety Manager**

The Safety Manager plans, develops, and implements a safety program to ensure a safe workplace for all employees. The Safety Manager conducts safety training and promotes a high degree of safety awareness among employees. The Safety Manager is responsible for maintaining MS/DS sheets for chemicals, properly identifying potential hazards using signs, investigating work-related injuries, and coordinating annual solvent monitoring of all Extractions analysts. The Safety Manager conducts regular safety audits/inspections and assures the laboratory is adhering to the policies in the company's Safety Manual.

Minimum Requirements: High School degree / safety training.

17.1.8 **Sample Custodian**

The Sample Custodian receives samples delivered directly from clients and accepts shipments of sample coolers from couriers. The Sample custodian is responsible for unpacking sample coolers, recording sampling temperatures, comparing samples to the COC and noting discrepancies. The Sample Custodian also log samples into the LIMS system, assign due dates and provides analysts with a work list for each job. The Sample Custodian accurately labels the samples, distributes them to the appropriate storage area, splits and subcontracts samples, if necessary, archives samples subsequent to analysis and arranges for appropriate sample disposal. The Sample Custodian also prepares customer bottle kits. The Sample Custodian must be able to follow good laboratory practices, adhere to policies and procedures set forth in the Quality Assurance Manual, and comply with the latest version of the National Environmental Laboratory Accreditation Program.

Minimum Requirements: High School degree

17.1.9 **Quality Assurance Manager**

The Quality Assurance Manager (QAM) has the authority and responsibility for ensuring that the quality system is implemented and followed. The QAM is the focal point for the quality system and has oversight of quality control data. The QAM maintains the Quality Assurance Manual, all training files, SOPs, logbooks, Proficiency Test records, MDL and DOC documentation. The QAM also ensures the laboratory is in compliance with the latest version of the National Environmental Laboratory Accreditation Program. The QAM has direct access to the Laboratory Director and is independent of operations where the QAM has oversight. The Quality Assurance Manager ensures that quality control procedures are being followed, quality systems are maintained, audits are scheduled and performed, and Proficiency Testing samples are ordered and reported. The QAM evaluates data objectively and performs assessments without managerial influence. The QA Manager notifies laboratory management of deficiencies in the quality system and monitors corrective action. The Quality Assurance Manager must have general knowledge of the analytical test methods performed in the laboratory. The Deputy QA Manager assumes these responsibilities in the absence of the Quality

Assurance Manager. The QAM must have documented training and/or experience in QA/QC Procedures and the laboratory's quality system.

Minimum Requirements: Bachelor's Degree in Biology/Chemistry/Environmental Science or related science and/or 10 years environmental laboratory experience.

17.1.10 **Laboratory Technical Director**

The Laboratory Technical Director exercises full time day-to-day supervision of laboratory operations and is experienced in the fields of the laboratory's accreditation. The Laboratory Technical Director's responsibilities include, but are not limited to, monitoring standards of performance in quality control and quality assurance; signing demonstrations of capability; monitoring the validity of the analyses performed and data generated in the laboratory to assure reliable data. The Laboratory Technical Director also ensures that analytical methods are interpreted and executed appropriately and that instrumentation is adequate, maintained, and operated properly. The Laboratory Technical Director coordinates with the Quality Assurance Manager to develop and implement Standard Operating Procedures as well as performing Managerial Audits. The Laboratory Technical Director observes work flow to ensure proper staffing and materials are available for performing the analyses. The Technical Director certifies that personnel with appropriate educational and/or technical background perform all tests for which the laboratory is accredited. The Deputy Technical Director assumes these responsibilities in the absence of the Technical Director.

Minimum Requirements: Bachelor's Degree in Biology/Chemistry/Environmental Science or related science and/or 10-15 years environmental laboratory experience.

17.1.11 **Chief Executive Officer (CEO) and President**

The CEO and President are responsible for the overall administrative, technical, and financial direction of the company. The CEO and President assume financial responsibility and financial liability for the company, develop company policies and procedures, research and consider the growth potential for current and future markets, and keep the company's focus on the technical edge of the environmental laboratory market. The CEO and President are committed to insure a framework is in place for the company to provide quality systems guidelines of the highest standard.

Minimum Requirements: Bachelor's Degree in Biology/Chemistry/Environmental Science or business and/or 10-15 years environmental laboratory business experience.

17.2 Data Integrity and Ethics

DATA INTEGRITY is the result of the processes that together assure valid data of known and documented quality.

Data integrity and ethics procedures in the laboratory include training, signed and dated integrity documentation for all laboratory employees, periodic in-depth monitoring of data integrity, and documented data integrity procedures.

Policy

The Quality Assurance Manager upholds the spirit and intent by supporting integrity procedures, by enforcing data integrity procedures, and by signing and dating the data integrity procedure training forms.

Data integrity procedures and evidence of inappropriate actions are reviewed annually or through regularly scheduled internal audits, and are updated by management.

The mechanism for confidential reporting of ethics and data integrity issues is (1) unrestricted access to senior management, (2) an assurance that personnel will not be treated unfairly for reporting instances of ethics and data integrity breaches, and (3) anonymous reporting.

Employees are required to understand, through training and review of quality systems documents, that any infractions of the laboratory data integrity procedures will result in a detailed investigation that could lead to very serious consequences such as immediate termination, or civil/criminal prosecution.

Any potential data integrity issue is handled confidentially until a follow-up evaluation, full investigation, or other appropriate actions have been completed and the issues clarified. Inappropriate activities are documented, including disciplinary actions, corrective actions, and notifications of clients, if applicable. These documents are maintained for a minimum of 5 years.

Procedure

Any determination for detailed investigation of data integrity issues must be communicated to senior management. Allegations are investigated and remain confidential to the extent necessary.

Documentation for all investigations that result in findings of inappropriate activity include any disciplinary actions involved, corrective actions taken, and all appropriate notifications of clients.

Data integrity procedures are reviewed annually and are periodically monitored through in-depth data review, records review, or other thorough check processes. Once per quarter, the Quality Assurance Manager will perform and document an in-depth data review. The generated data is manually traced back through all steps of the process and the availability of original data to document each step is confirmed and documented. Records of these reviews will be maintained by the Quality Assurance Manager.

17.3 Data Integrity and Ethics Training

Policy

Data integrity training is provided for all employees initially upon hire and annually thereafter.

Procedure

Attendance at an initial data integrity training (part of new employee orientation) and the annual refresher training is recorded with a signature attendance sheet or other form of documentation that demonstrates all staff have participated and understand the critical need for honesty and full disclosure in all analytical reporting and all aspects of their job functions. Employees are made aware that any violations of the laboratory data integrity procedures shall result in a detailed investigation that could lead possibly lead to termination of employment or civil/criminal prosecution. During the data integrity training, specific examples of breaches of ethical behavior are discussed including improper data manipulations, adjustments of instrument time clocks, and inappropriate changes in concentrations of standards. The training includes discussion regarding all data integrity procedures, data integrity training documentation, in-depth data monitoring and data integrity procedure documentation. Data integrity training requires emphasis on the importance of proper written narration on the part of the analyst with respect to those cases where analytical data may be useful, but are in one sense or another partially deficient. The data integrity procedures also include written ethics agreements.

Training records regarding data integrity and ethics are signed and dated by the Quality Assurance Manager.

Topics covered are provided in writing to all trainees.

17.4 General Training

Policy

All personnel are appropriately trained and competent in their assigned tasks before they contribute to functions that can affect data quality. It is management's responsibility to assure personnel are trained.

Only trained personnel are authorized by management to perform specific tasks.

Training records are kept on individual training forms in training/personnel files maintained by the Quality Assurance Manager. See Section 2.1 of SOP ENQA03 on Training for Laboratory Personnel.

Procedure

New staff members are given introductory training and orientation upon arrival.

Attendance at training sessions is documented on signature sheets.

The initial training for a new task will contain the following steps:

- All documentation involved with a new and unfamiliar task will be read and understood by the trainee.
- Training will be under the direct supervision of a qualified senior analyst. During the time the analyst is training, the trainee may sign laboratory notebooks or logbooks, but laboratory notebooks must be cosigned by the senior analyst, who is responsible for the data generated.
- The trainee will demonstrate competency in the new task before they can operate independently. The competency for a test method is accomplished by a demonstration of capability as indicated in Section 19. Approval of competency is noted by the initials or signature of the qualified senior analyst on the training form.
- Each step of the training process is documented.

Ongoing training will consist of the following:

- The analyst attests, through signature, that they have read, understood and agreed to perform the latest version of the *Quality Manual* and any method SOP's that the analyst performs.
- Annually, the analyst will show continued proficiency in each method they perform.
- Other training as determined by management.
- Analysts also participate in a safety training program provided by the Safety Officer.
- Proof of acceptable on-going training is documented by the annual demonstrations of capability for each analyst and each method.

SECTION 18 – ACCOMMODATIONS & ENVIRONMENTAL CONDITIONS

POLICY

Laboratory facilities are designed and organized to facilitate testing of environmental samples. Environmental conditions are monitored to ensure that conditions do not invalidate results or adversely affect the required quality of any measurement.

Environmental tests are stopped when the environmental conditions jeopardize the results.

Access to, and use of areas affecting the quality of the environmental tests is controlled by restriction of areas to authorized personnel only. Such areas are posted with signs to indicate restrictions.

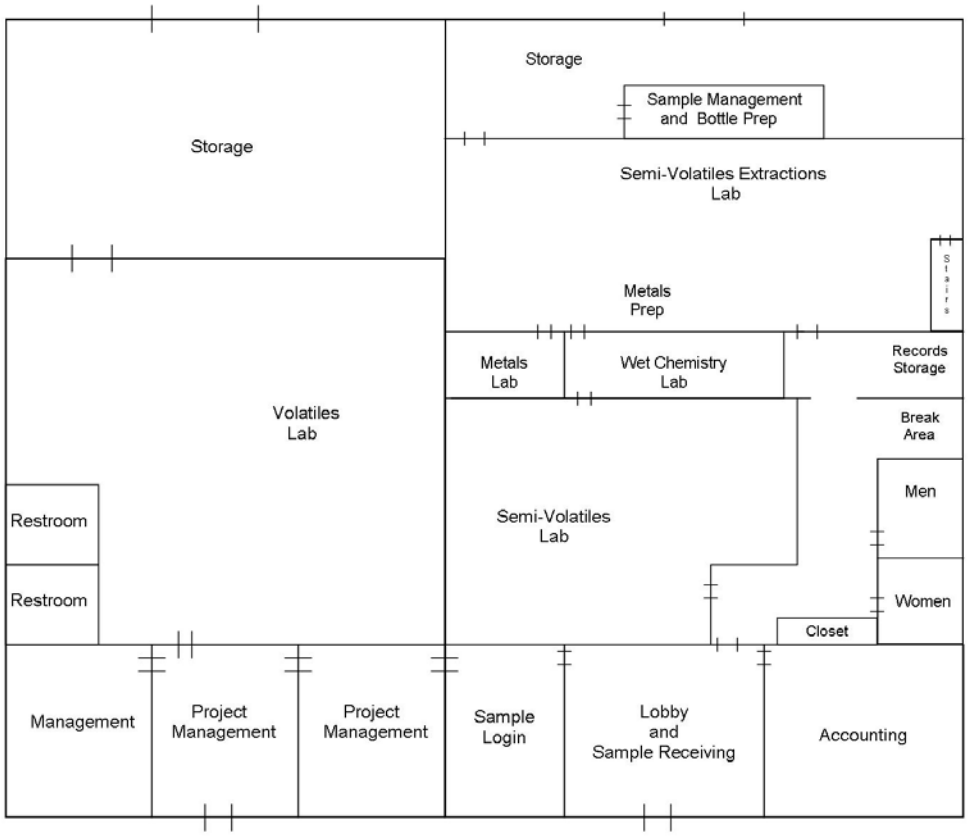
The laboratory work spaces are adequate, and appropriately clean to support environmental testing and ensure an unencumbered work area. Work areas may include: access and entryways to the lab, sample receipt areas, sample storage areas, chemical and waste storage areas, and data handling and storage areas.

PROCEDURE

Laboratory space is arranged to minimize cross-contamination between incompatible areas of the laboratory. If the laboratory environment is required to be controlled by method or regulation, the adherence is recorded.

Good housekeeping practices are used to assure contamination does not affect data quality. If it is believed that any environmental condition is adversely affecting the sample results, an investigation will begin by the Quality Assurance Manager or Laboratory Technical Director to determine the source of the problem. All sample analysis should be stopped until a resolution has been found. The Quality Assurance Manager may determine that a particular environmental condition must be monitored as a result of the investigation. Due attention is given to minimizing any environmental conditions that would adversely affect quality of measurement.

ENVision Laboratories, Inc. occupies 7200 square feet of space as shown in the following floor plan:



SECTION 19 – TEST METHODS AND METHOD VALIDATION

A test method is validated before it is put into use. All methods are published or documented. The laboratory selects appropriate methods that have been published either in international, regional, or national standards. The laboratory only uses methods for environmental testing which meet the needs of the client and which are appropriate for the environmental tests it undertakes. The laboratory ensures it uses the latest valid edition of a method unless it is not appropriate for the data objectives or not possible to do so. When necessary, the method is supplemented with additional details to ensure consistent application. Laboratory-developed or non-standard methods are not used by ENVIsion Laboratories. An in-house method manual is maintained for each accredited analyte or test method. The manual consists of copies of published or referenced test methods. In cases where modifications to the published method have been made by the laboratory or where the referenced test method is ambiguous or provides insufficient detail, these changes or clarifications must be clearly described. The in-house method manual is maintained by the QAO and is accessible to all personnel.

When the use of specific methods for a sample analysis are requested or mandated, only those methods shall be used. When the client does not specify the method to be used, the methods shall be fully documented and validated, and be available to the client. The laboratory shall inform the client when the method requested by the client is considered inappropriate or out of date.

19.1 Demonstration of Capability (DOC)

A DEMONSTRATION OF CAPABILITY (DOC) is a procedure to establish the ability of the analyst to generate data of acceptable accuracy and precision.

WORK CELLS consist of analysts with specifically defined tasks who together perform the method. Work cells together meet specified acceptance criteria and demonstrations of capability.

Policy

The laboratory confirms that it is capable of generating data of acceptable accuracy and precision on all methods before employing them.

Procedure

The DOC is documented and the completed forms are kept in the training files for each analyst and are available upon request.

A DOC is performed for each analyte whenever the method, analysts, “work cell” member, analytes, or instrument type is changed. In laboratory areas which use “work cells”, the group as a unit must meet the criteria for DOC.

The Laboratory Technical Director certifies that technical staff members in their area of expertise are trained and authorized to perform all tests for which we are accredited by signing the DOC form.

The procedure for DOC is outlined in SOP ENQA03 Training for Laboratory Personnel, Section 2.2.

19.2 On-Going (or Continued) Proficiency

After the demonstration of capability is completed, on-going proficiency is maintained and demonstrated at least annually through the analysis of either single-blind samples, performing another DOC, or use of four consecutive laboratory control samples compared to pre-determined acceptance limits for precision and accuracy. This is documented in the training file of each analyst by the Quality Assurance Manager.

19.3 Initial Test Method Evaluation

For chemical analyses, the INITIAL TEST METHOD EVALUATION involves the determination of the Limit of Detection (LOD), confirmation of the Limit of Quantitation (LOQ), an evaluation of precision and bias, and an evaluation of the selectivity of the method.

19.3.1 Limit of Detection (LOD)

The LIMIT OF DETECTION (LOD) is an estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte-and matrix specific and may be laboratory-dependent.

19.3.2 Limit of Quantitation (LOQ)

The LIMIT OF QUANTITATION (LOQ) is an estimate of the minimum amount of a substance that can be reported with a specified degree of confidence.

Policy

If an LOD study is not performed, concentrations less that the Limit of Quantitation are not reported. If results are not reported outside of the calibration range (low), the LOD determination is not required.

The lowest calibration standard is equal to the LOQ.

The LOQ will always be greater than the LOD.

Procedure

LODs are determined from a quality system matrix using all sample processing steps, and are verified annually or when there is a change in the test method or instruments affects sensitivity. There is no annual requirement for determination of the LOD. However, the confirmation must be repeated annually. The initial LOD must be confirmed by qualitative analysis of a sample spiked at no more than 2-3x the LOD. A successful confirmation is the detection of a signal response that is greater than background. If a response is not detected, the analyst must double the concentration and repeat the process. The LOD is the value of the concentration at which a signal is detected. All steps of the analytical process must be included in the

LOD determination and confirmation. This confirmation takes into account any analyte losses during sample preparation and prevents the use of an LOD that is unrealistically low. The LOD must be determined for every piece of equipment used for that analysis.

The most common method for determination of the LOD is the MDL procedure found in 40 CFR 136, Appendix B. Generally, MDLs are determined by analyzing replicate (usually seven) samples of a working standard that has passed through all sample processing procedures specific to a matrix (filtration, extraction, etc.), as defined in the method. The MDL is calculated from the standard deviation of these replicate results as described in Part 1030 E of Standard Methods for the Examination of Water and Wastewater, 18th Edition (1992) and 40 CFR Part 136, Appendix B. This amounts to multiplying the obtained standard deviation by a dimensionless confidence interval factor, which is 3.14 for a collection of seven samples.

At no time will data be reported below the LOD.

The LOQ is typically determined by use of the lowest calibration standard. The LOQ is verified using a quality systems matrix sample spiked at 1-2 times the determined LOQ that returns a concentration within the acceptance criteria for accuracy, according to the requirements of the method or client data quality objectives.

19.3.3 Precision and Bias

PRECISION is the degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves. Precision is usually expressed as standard deviation, variance, or range, in either absolute or relative terms.

BIAS is the systematic error that contributes to the difference between the mean of a significant number of test results and the accepted reference value.

Policy

Precision and bias are determined for standard and non-standard methods.

Procedure

Precision and bias are determined for standard methods through the performance of a DOC.

Precision and bias using non-standard, modified standard or laboratory-developed methods are compared to the criteria established by the client (when requested), the method, or the laboratory.

Replicate spikes in a quality system matrix are analyzed according the procedures outlined in the 2009 TNI Standard where applicable.

Precision is assessed through the calculation of relative percent difference (RPD) and relative standard deviation (RSD) for replicate samples. Laboratory precision is assessed through the analysis of a sample/sample duplicate pair or the analysis of matrix

spike/matrix spike duplicate (MS/MSD).

Laboratory accuracy is determined through the analysis of quality control check samples, laboratory control samples (LCS), surrogate compound spikes and MS/MSD pairs.

Control charts are useful in following trends in analytical precision, accuracy, and identifying problem occurrences. In general, a parameter of known value is measured periodically during a sample set, and its measured value is compared with its theoretical value. From a number of such measurements, the standard deviation, SD, can be calculated. Acceptance windows for this measurement can then be set, typically ± 3 SD. Data can then be plotted on a graph with the measured value on the Y-axis and the sample sequence on the X-axis. The acceptance windows are shown on the graph as dotted lines extending from the Y-axis representing Y± 3 SD, when Y is the mean of several measurements.

19.3.4 Selectivity

SELECTIVITY is the capability of a test method or instrument to respond to a target substance or constituent in the presence of non-target substances (EPA-QAD).

The laboratory evaluates selectivity through retention time requirements defined in the test method SOPs.

19.4 Estimation of Uncertainty

ESTIMATION OF UNCERTAINTY consists of the sum (combining the components) of the uncertainties of the numerous steps of the analytical process, including, but not limited to, sample plan variability, spatial and temporal sample variation, sample heterogeneity, calibration/calibration check variability, extraction variability, and weighing variability.

Procedure

The use of the LCS data incorporates all variables over which the laboratory exercises control.

When requested by a client, the uncertainty is calculated using the average and standard deviation of the current LCS database expressed as twice the relative standard deviation. This provides the uncertainty at the 95% confidence level. This calculation is shown in the example below:

LCS average = 92.5%
LCS Std Dev = 5.7

Uncertainty = +/- (2)(5.7)/92.5 = +/- 12.3%

19.5 Laboratory-Developed or Non-Standard Method Validation

Laboratory developed, modified standard methods, and non-standard methods are not performed or utilized by ENVision Laboratories.

19.6 Control of Data

Policy

All calculations and all relevant data are subject to appropriate checks in a systematic manner.

Commercial off-the-shelf software (e. g. word processing, database and statistical programs) used within the designed application range is considered sufficiently validated when in-house programming is not used.

Procedure

The laboratory assures that computers and software are protected, maintained, and secure through measures such as documentation, locked access, and control of the laboratory environment. See Computer System SOP ENQA08.

The laboratory has procedures to insure that reported data are free from transcription and calculation errors. See Section 23.8 for procedures of data review.

The laboratory has procedures that all quality control measures are reviewed and evaluated before data are reported. See Section 23.8 for procedures of data review.

The laboratory has procedures to address manual calculations, including manual integrations. See ENVision SOP ENQA02 Manual Integration Procedures.

The laboratory assures that computers, user-developed computer software, automated equipment, or microprocessors used for the acquisition, processing, recording, reporting, storage, or retrieval of environmental test data are:

a) documented in sufficient detail and validated as being adequate for use;
b) protected for integrity and confidentiality of data entry or collection, data storage, data transmission and data processing;
c) maintained to ensure proper functioning and are provided with the environmental and operating conditions necessary to maintain the integrity of environmental test data; and
d) held secure including the prevention of unauthorized access to, and the unauthorized amendment of, computer records.
e) backed up on a regular basis to ensure storage space for newly acquired data.

SECTION 20 – EQUIPMENT

20.1 General Equipment Requirements

Policy

The laboratory provides all the necessary equipment required for the correct performance of the scope of environmental testing presented in this *Quality Manual*.

All equipment and software used for testing and sampling is capable of achieving the accuracy required and complies with the specifications of the environmental test method as specified in the laboratory SOP.

The laboratory has procedures for safe handling, transport, storage, use and planned maintenance of measuring equipment to ensure proper functioning and in order to prevent contamination or deterioration.

Procedure

Equipment is operated only by authorized personnel.

Up-to-date instructions on the use and maintenance of equipment (including any relevant manuals provided by the manufacturer of the equipment) are readily available for use by laboratory personnel.

All equipment is calibrated or checked before being placed into use to ensure that it meets laboratory specifications and the relevant standard specifications.

Test equipment, including hardware and software, are safeguarded from adjustments which would invalidate the test results measures by limiting access to the equipment and using password protection where possible.

Equipment that has been subject to overloading, mishandling, given suspect results, or been shown to be defective or outside specifications is taken out of service, isolated to prevent its use, or clearly labeled as being out of service until it has been shown to function properly. If it is shown that previous tests are affected, then procedures for non-conforming work are followed.

When equipment is needed for a test that is outside of permanent control of the laboratory, the lab ensures the equipment meets the requirements of this manual prior to its use by inspecting or otherwise testing it.

Each item of equipment and the software used for testing and significant to the results is uniquely identified and records of equipment and software are maintained. This information includes the following:

a) identity of the equipment and its software;
b) manufacturer's name, type identification, serial number or other unique identifier;
c) checks that equipment complies with specifications of applicable tests;
d) current location;
e) manufacturer's instructions, if available, or a reference to their location;

f) dates, results and copies of reports and certificates of all calibrations, adjustments, acceptance criteria, and the due date of next calibration;

g) maintenance plan where appropriate, and maintenance carried out to date; documentation on all routine and non-routine maintenance activities and reference material verifications;

h) any damage, malfunction, modification or repair to the equipment;

i) date received and date placed into service (if available); and

j) condition when received, if available (new, used, reconditioned).

See Appendix 1 for list of all Instrument/Equipment.

20.2 Support Equipment

SUPPORT EQUIPMENT includes, but is not limited to: balances, ovens, refrigerators, freezers, incubators, water baths, temperature measuring devices, volumetric dispensing devices, and thermal/pressure sample preparation devices.

Policy

All support equipment is maintained in proper working order and records are kept of all repair and maintenance activities, including service calls.

Procedure

All raw data records are retained to document equipment performance. These records include logbooks, data sheets, or equipment computer files.

All support equipment is calibrated or verified annually over the entire range of use using NIST traceable references where available. A NIST reference thermometer should be re-calibrated or replace every 5 years. The results of the calibration of support equipment must be within specifications or (1) the equipment is removed from service until repaired, or (2) records are maintained of correction factors to correct all measurements.

Support equipment such as balances, ovens, refrigerators, freezers, and water baths are checked with a NIST traceable reference if available, each day the equipment is used, to ensure they are operating within the expected range for the application for which the equipment is to be used.

Mechanical volumetric dispensing equipment, including burettes (except Class A glassware) are checked for accuracy quarterly.

Glass micro-liter syringes have a certificate attesting to the established accuracy. If the general certificate of accuracy from the manufacturer of the glass micro-liter syringes is not available, the accuracy of the syringe is demonstrated upon receipt (See SOP EN01) and documented.

20.2.1 Support Equipment Maintenance

Regular maintenance of support equipment, such as balances and fume hoods is conducted at least annually.

Maintenance on other support equipment, such as ovens, refrigerators, and thermometers is conducted on an as needed basis.

Records of maintenance to support equipment are documented in Instrument Maintenance Logs. Each piece of support equipment does not necessarily have its own logbook. Maintenance logbooks may be shared with equipment that is housed in the same laboratory area.

20.2.2 Support Equipment Calibration

Calibration requirements for analytical support equipment are found in the table below. For analytical instrumentation, the calibration requirements are found in the test method SOP's.

Table 20.2 - 2 Calibration And Maintenance

Instrument	Activity	Frequency	Documentation
Balance	1. Clean 2. Check alignment 3. Service Contract	1. Before use 2. Before use 3. Annual	Worksheet/log book Post annual service date on balance
ASTM Class 1Weights	1. Only use for the intended purpose 2. Use plastic forceps to handle 3. Keep in case 4. Re-calibrate	Once every 5 years	Keep certificate
Thermometers: glass	Check at the temperature used, against a reference NIST certified thermometer	1. Annual for glass and electronic	Calibration factor and date of calibration on thermometer and worksheet/log book
pH electrometers	Calibration: 1. pH buffer aliquot are used only once 2. Buffers used for calibration will bracket the pH of the media, reagent, or sample tested.	Before use	Worksheet/log book
pH probe	Maintenance: Use manufacturer's specifications	As needed	Worksheet/log book
Refrigerators	1. Thermometers are immersed in liquid to the appropriate immersion line 2. The thermometers are graduated in increments of 1°C or less	Temperatures are recorded each day in use	Worksheet/log book

20.3 Analytical Equipment

20.3.1 Maintenance for Analytical Equipment

Policy

All equipment is properly maintained, inspected, and cleaned.

Procedure

Maintenance of analytical instruments and other equipment may include regularly scheduled preventive maintenance or maintenance on an as-needed basis due to instrument malfunction and is documented in Instrument Maintenance Logs, which become part of the laboratory's permanent records.

For each instrument, every maintenance event is documented in a logbook that is specific to the instrument. Logbooks delineate between routine and non-routine maintenance activities. Instruments with multiple daily routine maintenance checks maintain both routine and non-routine maintenance logbooks. Each instrument maintenance logbook should contain the following:

- The name of the item of equipment
- The manufacturer's name and equipment serial number
- Checks that equipment complies with the specification
- Date equipment received and date placed in service
- Equipment location, if appropriate
- Condition when received (ie. new or used)
- History of any damage, malfunction, modification or repair
- Details of the Maintenance Plan and maintenance carried out to date and planned for the future

Each log entry includes the following:

- Dates and names of staff involved
- A description of the work, including problems encountered and their solutions
- Part numbers and/or serial numbers of major replacement components

Table 20.3-1 Analytical Equipment Maintenance

Instrument	Procedure	Frequency
Hewlett Packard GC/MS	Ion gauge tube degassing	As required
	Pump oil-level check	Monthly
	Pump oil changing	Semi-annually
	Analyzer bake-out	As required
	Analyzer cleaning	As required
	Resolution adjustment	As required
	COMPUTER SYSTEM AND PRINTER:	
	Air filter cleaning	As required
	Change data system air filter	As required
	Printer head carriage lubrication	As required
	Paper sprocket cleaning	As required
	Drive belt lubrication	As required
Gas Chromatograph	Compare standard response to previous day or since last initial calibration	Daily
	Check carrier gas flow rate in column	Daily via use of known compound retention
	Check temp. of detector, inlet, column oven	Daily
	Septum replacement	As required
	Glass wool replacement	As required
	Check system for gas leaks with SNOOP	W/cylinder change as required
	Check for loose/fray wires and insulation	Monthly
	Bake injector/column	As required
	Change/remove sections of guard column	As required
	Replace connectors/liners	As required
	Change/replace column(s)	As required
Flame Ionization Detector (FID)	Detector cleaning	As required
Photoionization Detector (PID)	Change O-rings	As required
	Clean lamp window	As required
Balances	Weight check	Daily, when used
	Clean pan and check if level	Daily, when needed
	Field service	At least annually
Deionized/Distilled Water	Monitor for VOA's	Daily
	Replace filter	As Needed
Drying Ovens	Temperature monitoring	Daily
	Temperature adjustments	As required
Refrigerators/ Freezers	Temperature monitoring	Daily
	Temperature adjustment	As required
	Defrosting/cleaning	As required
Vacuum Pumps/ Air Compressor	Drained	As required
	Belts checked	As required
	Lubricated	As required
pH/Specific Ion Meter	Calibration/check slope	Daily, when used
	Clean electrode	As required
Centrifuge	Check brushes and bearings	Every 6 months or as needed
Water Baths	Temperature Monitoring	Daily
	Water replaced or added	As required

20.3.2 Initial Instrument Calibration

Initial instrument calibration and continuing instrument calibration verification are an important part of ensuring data of known and documented quality. If more stringent calibration requirements are included in a mandated method or by regulation, those calibration requirements override any requirements outlined here or in laboratory SOPs. Generally, instrument calibrations are provided in test methods.

Policy

All initial instrument calibrations are verified with a standard obtained from a second source traceable to a national standard when commercially available. If a second source is not available, a standard prepared from a separate lot may be used as long as the manufacturer can demonstrate the lot was prepared independently from other lots purchased.

Any samples that are analyzed after an unacceptable initial calibration are re-analyzed or the data are reported with qualifiers, appropriate to the scope of the unacceptable condition.

Quantitation is always determined from the initial calibration unless the test method or applicable regulations require quantitation from the continuing calibration.

The lowest calibration standard is the lowest concentration for which quantitative results can be reported without qualification. The lowest calibration standard is equal to the Limit of Quantitation and is greater than the limit of detection.

The highest calibration standard is the highest concentration for which quantitative results can be reported.

Data reported that are greater than the highest calibration standard without dilution are considered to be an estimate and are reported with a flag and explained in the “Comments” section at the back of the analytical report.

Procedure

Initial instrument calibration includes calculations, integrations, acceptance criteria, and associated statistics referenced in the test method SOP.

Sufficient raw data records are collected to allow reconstruction of the initial instrument calibration. These include, at a minimum, calibration date, test method, instrument, analysis date, analyte names, analysts signature or initials, concentration and response, calibration curve or response factor, or unique equation or coefficient used to reduce instrument responses to concentration.
Calibration date and expiration date (when recalibration is due) is recorded for equipment requiring calibration, where practicable.

Acceptance criteria are listed in individual test method SOPs.

Corrective actions are performed when the initial calibration results are outside acceptance criteria. Calibration points are not dropped from the middle of the curve

unless the cause is determined and documented. If the cause cannot be determined, the calibration curve is re-prepared. If the low or high calibration point is dropped from the curve, the working curve is adjusted and sample results outside the curve are qualified.

Results that are less than the lower calibration standard are considered to have increased uncertainty, and are either reported with a qualifier code or explained in the case narrative.

Results that are greater than the highest calibration standard are either diluted to within the calibration range, or considered to be an estimate; and are reported with a qualifier code and explained in the case narrative.

For instrumentation where single point calibration is recommended by manufacturer's instructions, such as with some ICP and ICP/MS technologies (with a zero and single point calibration), the following apply:

a) For single point plus zero blank calibrations, the zero point and the single point standard are analyzed prior to the analysis of samples, and the linear range of the instrument established by analyzing a series of standards, one of which is at the lowest quantitation level.
b) Zero blank and single point calibration standards are analyzed with each analytical batch for methods where they are specified.
c) A standard corresponding to the limit of quantitation is analyzed with each analytical batch and must meet established acceptance criteria when using single point plus zero blank calibrations.
d) The linearity of single point plus zero blank calibrations is verified at a frequency established by the method or the manufacturer.

20.3.3 Continuing Instrument Calibration

Policy

The validity of the initial calibration is verified prior to sample analysis by use of a continuing instrument calibration verification (CCV) standard.

Corrective action is initiated for continuing instrument calibration verification results that are outside of acceptance criteria.

Procedure

Continuing instrument calibration verification is performed at the beginning and end of each analytical batch, except for instances when an internal standard is used. For methods employing internal standards, only one verification is performed at the beginning of the analytical batch.

Continuing instrument calibration verification is performed whenever it is expected that the analytical system may be out of calibration or might not meet verification acceptance criteria.

Continuing instrument calibration verification is performed when the time period for calibration or the most recent calibration verification has expired.

Continuing instrument calibration verification is performed for all analytical systems that have a calibration verification requirement.

Calibration is verified for each compound, element, or other discrete chemical species.

The calculations and associated statistics for continuing instrument calibration are included or referenced in the test method SOP.

Sufficient raw data records are retained to allow reconstruction of the continuing instrument calibration verification. Continuing instrument calibration verification records connect the continuing verification date to the initial instrument calibration.

Acceptance criteria for calibration are method specific and contained in the individual test method SOPs. Sample analyses must not occur until the analytical system is calibrated or calibration verified. If samples are analyzed using a system on which the calibration is not verified, the results are flagged.

20.3.4 Unacceptable Continuing Instrument Calibration Verifications

If routine corrective action for continuing instrument calibration verification fails to produce a second consecutive (immediate) calibration verification within acceptance criteria, then a new calibration is performed or acceptable performance is demonstrated after corrective action with two consecutive calibration verifications.

For any samples analyzed on a system with an unacceptable calibration, some results may be useable if qualified and under the following conditions:

a) If the acceptance criteria are exceeded high (high bias) and the associated samples are below detection, then those sample results that are non-detects may be reported as non-detects.

b) If the acceptance criteria are exceeded low (low bias) and there are samples that exceed the maximum regulatory limit, then those exceeding the regulatory limit may be reported.

SECTION 21 – MEASUREMENT TRACEABILITY

Measurement quality assurance comes in part from traceability of standards to certified materials.

POLICY

All equipment used that affects the quality of test results are calibrated prior being put into service and on a continuing basis. These calibrations are traceable to national standards of measurement where available.

Measurements from laboratory equipment provide the uncertainty required by test method or client.

If traceability of measurements to SI units is not possible or not relevant, evidence for correlation of results through interlaboratory comparisons, proficiency testing, or independent analysis is provided.

PROCEDURE

All equipment that affects the quality of test results are calibrated according to the minimum frequency suggested by the manufacturer, by regulation, by method, or as needed.

Clients can verify that required uncertainty is achieved by reviewing the internal quality control data, if requested.

21.1 Reference Standards

REFERENCE STANDARDS are standards of the highest quality available at a given location, from which measurements are derived.

Policy

Reference Standards, such as ASTM Class 1 weights, are used for calibration only and for no other purpose unless it is shown that their performance as reference standards will not be invalidated.

Procedure

Reference standards, such as ASTM Class 1 weights, are calibrated by an entity that can provide traceability to national or international standards.
The following reference standards are sent out to be calibrated to a national standard:

a) Class 1 weights are sent out for calibration every year.
b) Reference thermometers are sent out for calibration every year.

21.2 Reference Materials

REFERENCE MATERIALS are substances that have concentrations that are sufficiently well established to use for calibration or as a frame of reference.

Policy

Reference materials, where commercially available, are traceable to national standards of measurement, or to Certified Reference Materials, usually by a Certificate of Analysis.

Internal reference materials, such as working standards or intermediate stock solutions, are checked as far as technically and economically possible.

Procedure

Purchased Reference Materials require a Certificate of Analysis where available. Otherwise, purchased reference materials are verified by application to a certified reference material, interlaboratory comparison, and/or demonstration of capability.

Internal Reference Materials, such as working standards and intermediate stock solutions, are checked with second source standard verification and proficiency tests.

a) Internal thermometers are checked annually against the NIST certified reference thermometer.
b) Working class weights are checked against Class 1 weights annually.

21.3 Transport and Storage of Reference Standards and Materials

Policy

The laboratory handles and transports reference standards and materials in a way that protects their integrity.

Procedure

Reference standard and material integrity is protected by separation from incompatible materials and/or minimizing exposure to degrading environments or materials.

Reference standards and materials are stored according to manufacturer's recommendations and separately from working standards or samples.

21.4 Labeling of Reference Standards, Reagents, and Materials

Policy

Reference standards and materials are tracked from purchase, receipt, and storage through disposal.

Expiration dates must be monitored to ensure the reference standard or material's integrity is maintained.

Reagent quality is verified upon receipt and prior to use

Procedure

Records for all standards, reagents, reference materials, and media include:

1. the manufacturer/vendor name (or traceability to purchased stocks or neat compounds)
2. the manufacturer's Certificate of Analysis or purity (if supplied)
3. the date of receipt
4. reference to the method of preparation
5. date of preparation
6. recommended storage conditions
7. the expiration date after which the material shall not be used unless its reliability is verified by the laboratory. It may be documented elsewhere if referenced.
8. preparer's initials (if prepared)

In methods where the purity of reagents is not specified, analytical reaqent grade is used. If the purity is specified, that is the minimum acceptable grade. Purity is verified and documented according to Section 9, Purchasing, Services, and Supplies.

For original containers, if an expiration date is provided by the manufacturer or vendor it shall be recorded on the container. If an expiration date is not provided by the manufacturer or vendor, it is not required.

All containers of prepared standards and reference materials have a preparation date and unique identifier. See the appropriate laboratory standard notebook for assigning proper standard identifier.

Standard preparation records are kept in laboratory notebooks and indicate traceability to purchased stocks or neat compounds, reference to the method of preparation, date of preparation, expiration date, and preparer's initials.

Prepared reagents are verified to meet the requirements of the test method through internal Quality Control measures and blank analysis.

SECTION 22 – SAMPLE MANAGEMENT

22.1 Sample Receipt

Policy

Laboratory management is responsible for ensuring that all sample acceptance criteria are verified and that samples are logged into the sample tracking system and properly labeled and stored.

Procedure

When samples are received at the laboratory, their condition is documented, they are given unique identifiers, and they are logged into the sample tracking system.

22.2 Sample Acceptance

Policy

The laboratory has a sample acceptance policy stated in SOP ENSPL01 Attachment #4 and posted in the sample receiving area that specifies the minimum conditions a sample must meet on receipt. If these conditions are not met, the client is contacted prior to any further processing.

Procedure

The sample acceptance policy is available to sample collection personnel, and emphasizes the need for use of water resistant ink, use of appropriate containers, adherence to holding times, sample volume requirements, and what to do with compromised samples.

The following checks need to be made and documented on the COC at the time of acceptance of the samples (refer to SOP ENSPL01: Sample Management for more detailed information):

The Sample Custodian or designee will record the temperature of the temperature blank, if provided (this should consist of a small plastic bottle of water that accompanies the samples). Temperature is determined using a non-invasive infrared thermometer gun which is recertified annually by the manufacturer for accuracy. (The QA Coordinator will retain all records of certification of thermometer gun.)

Clients should be notified if samples are delivered and have not had the cooling process started. Samples should be received at a temperature of 4+/- 2 degrees C or within +/- 2 degrees C of required temperature specified by the method. Samples that are hand delivered to the laboratory on the same day that they are collected may not meet these criteria. In these cases, the samples shall be considered acceptable if there is evidence that the chilling process has begun such as arrival on ice. Thermal preservation is not required in the field if the samples are received and refrigerated at the laboratory within fifteen minutes of collection.

Each container should have a label with an identifier matching that on the chain of custody. Labels should be water resistant and marked with indelible ink.
Note condition of sample containers (intact, cracked or broken).
Check for proper container type and preservation.
Check volatile organics samples for headspace.
Check for proper amount of sample for the analyses required.
Check that samples have not exceeded holding times.

If the checks performed upon sample receipt indicate the criteria are not met, then 1) the sample is rejected as agreed with the client, 2) the decision to proceed is documented and agreed upon with the client, 3) the condition is noted on the Chain of Custody form and/or lab receipt documents, or 4) the data are qualified in the report.

22.3 Sample Identification

Policy

Samples, including subsamples, extracts, and digestates, are uniquely identified in a permanent chronological record (electronic database) to prevent mix-up and to document receipt of all sample containers.

Procedure

Samples are assigned sequential numbers that reference more detailed information kept in the Lims Login database. The sample number is generated by using the last number of the year the sample was received followed by the number of sample it is for the year. For example, sample 6-100 is the one hundredth sample received in the year 2006. Each project is also given a number to identify the project. The project number is assigned by using the year the project was received and the number of project it is for the year. For example, project 2006-30 is the thirtieth project received in the year 2006. For each sample that is received with multiple sample bottles, an identifying letter (a, b, c, etc.) is included on the label. This unique identifier follows the sample and subsequent extracts or digestates through the entire analytical process.

The following information is collected in the Lims Login database:

a) Client or project name
b) Date and time of sampling
c) Date and time of receipt at lab
d) Unique laboratory identification number
e) Unique field identification number
f) Initials of recorder
g) Analyses requested
h) Comments regarding rejection (if any).

22.4 Sample Storage

To avoid deterioration, loss or damage to the sample during storage, handling and preparation storage conditions are monitored for any required criteria, verified, and the verification recorded in logbooks. This includes temperature monitoring and holding times.

Samples are held secure, as required. Samples are stored apart from standards, reagents, food or potentially contaminating sources, and such that cross-contamination is minimized. All portions of samples, including extracts, digestates, leachates, or any product of the sample is maintained according to the required conditions.

22.5 Sample Disposal

After completion of all analyses, samples are routinely retained in a storage area at ambient temperature for approximately thirty additional days, after which they are discarded. Special arrangements are sometimes made to retain samples under refrigeration for an extended period of time on a project-specific basis.

Samples are disposed of according to Federal, State and local regulations. Procedures are available in SOP ENSPL02 for the disposal of samples, digestates, leachates, and extracts.

22.6 Sample Transport

Samples that are transported under the responsibility of the laboratory, where necessary, are done so safely and according to storage conditions. This includes moving bottles within the laboratory. Specific safety operations are addressed outside of this document.

SECTION 23 – QUALITY OF TEST RESULTS

23.1 Essential Quality Control Procedures

Policy

All essential quality control elements are collected and assessed on a continuing basis.

The qualities of test results are recorded in such a way that trends are detectable, and where practicable, are statistically evaluated.

For test methods that do not provide acceptance criteria for an essential quality control element or where no regulatory criteria exist, acceptance criteria are developed. Control limits are developed using the mean, plus or minus 3 standard deviations; or static limits such as ± 15 percent. In-house established limits are maintained by the Quality Assurance Manager.

The quality control procedures specified in test methods are followed by laboratory personnel. The most stringent of control procedures is used in cases where multiple controls are offered. If it is not clear which is the most stringent, that mandated by test method or regulation is followed.

Procedure

To monitor the validity of environmental tests performed, review includes any one or combination of the techniques below:

a) use of certified reference materials and/or internal quality control using secondary reference materials;
b) participation in proficiency testing programs;
c) replicate testing using the same or different methods;
d) retesting of retained samples; and/or
e) correlation of results for different characteristics of a sample.

Written procedures to monitor quality controls including acceptance criteria, are located in the test method SOPs, except where noted, and include such procedures as:

a) use of laboratory control samples and blanks to serve as positive and negative controls for chemistry methods;
b) use of laboratory control samples to monitor test variability of laboratory results;
c) use of calibrations, continuing calibrations, certified reference materials and/or PT samples to monitor accuracy of the test method;
d) measures to monitor test method capability, such as limit of detection, limit of quantitation, and/or range of test applicability, such as linearity;
e) use of regression analysis, internal/external standards, or statistical analysis to reduce raw data to final results;
f) use of reagents and standards of appropriate quality;
g) procedures to ensure the selectivity of the test method;

h) measures to assure constant and consistent test conditions, such as temperature, humidity, rotation speed, etc., when required by test method;

23.2 Internal Quality Control Practices

Analytical data generated with QC samples that fall within prescribed acceptance limits indicate the test method is IN CONTROL.

QC samples that fall outside QC limits indicate the test method is OUT OF CONTROL (non-conforming) and that corrective action is required or that the data are qualified.

Policy

Detailed QC procedures and QC limits are included in test method standard operating procedures (SOPs), or where unspecified in the SOPs, are detailed elsewhere.

All QC measures are assessed and evaluated on an on-going basis, so that trends are detected.

Procedure

The following general controls are used:

Positive and Negative Controls such as:

a) Blanks (negative)
b) Laboratory control sample (positive)

Selectivity is assured through:

a) absolute and relative retention times in chromatographic analyses;
b) two-column confirmation when using non-specific detectors;
c) use of acceptance criteria for mass-spectral tuning (found in test method SOPs);
d) use of the correct method according to its scope assessed during method validation

Consistency, Variability, Repeatability, and Accuracy are assured through:

a) proper installation and operation of instruments according to manufacturer's recommendations or according to the processes used during method validation;
b) monitoring extraction efficiency through surrogates and matrix spikes
c) selection and use of reagents and standards of appropriate quality; and
d) cleaning glassware appropriate to the level required by the analysis. Cleaning procedures not provided in test method SOPs are provided in a separate SOP EN36.
e) following SOPs and documenting any deviation, assessing for impact, and treating data appropriately;
f) testing to define the variability and/or repeatability of the laboratory results, such as replicates;

g) use of measures to assure the accuracy of the test method, including calibration and/or continuing calibrations, use of certified reference materials, proficiency test samples, or other measures;

Acceptance or rejection criteria are created according to laboratory policy where no method or regulatory criteria exist. Acceptance criteria define the boundary for the appropriate response from laboratory personnel, such as corrective action, reporting with qualifiers, reanalysis, review, and others.

Test Method Capability is assured through:

a) establishment of the limit of detection where appropriate;

b) establishment of the limit of quantitation or reporting level; and/or

c) establishment of the range of applicability such as linearity;

Data reduction is assured to be accurate by:

a) selection of appropriate formulae to reduce raw data to final results such as regression;

b) periodic review of data reduction processes to assure applicability;

c) data reduction and statistical interpretations specified by each test method.

See Appendix 2 for the key elements of a quality control system for a laboratory performing chemistry testing.

23.3 Method Blanks

Policy

The Method Blank is used to assess the samples in the preparation batch for possible contamination during the preparation and processing steps. The Method Blank consists of a quality system matrix (ie. DI Water) that is similar to the associated samples and is known to be free of the analytes of concern. Contaminated blanks are identified according to the acceptance limits in the test method SOPs or laboratory documentation.

Samples associated with a contaminated blank are evaluated as to the appropriate corrective action for the samples (e.g. reprocessing or data qualifying codes). The corrective action is documented.

Procedure

The Method Blank is processed along with and under the same conditions as the associated samples to include all steps of the analytical process.

The laboratory identifies a blank as contaminated when analyte results are greater than the reporting limit AND greater than 1/10 of that found in any sample, or where the contamination affects the sample results according to test method requirements or client objectives.

When a blank is determined to be contaminated, the cause must be investigated and measures taken to minimize or eliminate the problem.

Data that are unaffected by the blank contamination (non-detects or other analytes) are reported unqualified.

Sample data that are suspect due to the presence of a contaminated blank are reanalyzed or qualified.

23.4 Laboratory Control Samples

LABORATORY CONTROL SAMPLES (LCS) are prepared from analyte free water, and spiked with verified and known amounts of analytes for the purpose of establishing precision or bias measurements.

Policy

Laboratory control samples are analyzed at a frequency mandated by method, regulation, or client request, whichever is more stringent.

Procedure

The results of laboratory control samples (LCS) are calculated in percent recovery or other appropriate statistical technique that allows comparison to established acceptance criteria. Any affected samples associated with an out of control LCS are reprocessed for re-analysis of the results reported with appropriate flags/qualifiers.

LCS recovery is calculated as follows:

$$\% \text{ Recovery} = \frac{SSC}{SA} \times 100$$

Where: SSC = Measured concentration of the spiked standard
SA = Spike concentration added to the sample

The individual LCS is compared to the acceptance criteria as published in the mandated test method, or where there are no established criteria, the laboratory established limits. For those methods with extremely long lists of analytes, a representative number may be chosen to report. For methods that include 1-10 targets, spike LCS with all components. For methods that include more than 20 targets, spike LCS with at least 16 compounds with a full list LCS performed once over a 2 year period.

Samples analyzed along with an LCS determined to be “out of control” are considered suspect and the samples may need reprocessed and reanalyzed. If the LCS has a high bias and the samples associated are non-detect, the results can be reported with a data qualifier. If the LCS has a low bias and the samples associated have detections above regulatory limits, the results can be reported with a data qualifier. If neither criteria applies and there is not sufficient sample volume remaining for reanalysis, the original data is reported with appropriate data qualifiers.

23.5 Matrix Spikes and Matrix Spike Duplicates

MATRIX SPIKES (MS and MSD) are environmental samples fortified with a known amount of analyte to help assess the affect of the matrix on method performance. The results from matrix spike/matrix spike duplicate (MS/MSD) pairs are used to assess the effect of sample matrix on precision and accuracy of analytical results.

Policy

The MS/MSD results are used to help assess the effect of the sample matrix on method performance.

Procedure

The laboratory procedure for MS/MSD includes spiking appropriate analytes at appropriate concentrations, calculating percent recoveries and relative percent difference (RPD), and evaluating and reporting the results.

Matrix spike recovery is calculated as follows:

$$\% \text{ Recovery} = \frac{(SSC - SC)}{SA} \times 100$$

Where: SSC = Measured concentration of the spiked sample
SC = Measured concentration of the unspiked sample
SA = Spike concentration added to the sample

A matrix spike (and a matrix spike duplicate, if necessary) is analyzed with each batch of twenty or fewer samples per matrix per sample preparation method. Where there are no established criteria, the laboratory uses in-house established limits as the control limits for MS/MSD. For MS/MSD results outside established criteria corrective action is documented or the data reported with appropriate data qualifying codes.

For those methods with extremely long lists of analytes, a representative number may be chosen to report. For methods that include 1-10 targets, spike MS/MSD with all components. For methods that include more than 20 targets, spike MS/MSD with at least 16 compounds with a full list MS/MSD performed once over a 2 year period.

23.6 Surrogate Spikes

SURROGATES are substances with chemical properties and behaviors similar to the analytes of interest used to assess extraction or preparation method performance in individual samples.

Policy

Surrogates are added to all samples (in test methods where surrogate use is appropriate) prior to sample preparation or extraction.

Procedure

Surrogate recovery results are compared to the acceptance criteria as published in the mandated test method.

Where there are no established criteria, the laboratory uses in-house established limits as surrogate control limits.

For surrogate results outside established criteria, data are evaluated to determine the impact. Corrective actions include reanalysis or data qualifying as appropriate.

23.7 Proficiency Test Samples or Interlaboratory Comparisons

Policy

The laboratory participates in proficiency test samples (PT) as required. To maintain accreditation, the laboratory must successfully complete two PT studies for each requested PT field of testing within the most recent three rounds. For supplemental testing, the laboratory must successfully analyze two sets of PT studies that are at least 15 calendar days apart.

The laboratory institutes corrective action procedures for failed PT samples. The laboratory will send corrective action reports for PT failures to Accrediting Body.

The laboratory does not share PT samples with other laboratories, does not sub-contract PT samples to (or receive PT samples from) other laboratories, does not communicate with other laboratories regarding current PT sample results, and does not attempt to obtain the assigned value of any PT sample from the PT provider.

Procedure

Proficiency Testing (PT) samples are treated as typical samples in the normal production process where possible, including the same analysts, preparation, digestion, extraction, calibration, quality control and acceptance criteria, sequence of analytical steps, number of replicates, and sample log-in. PT samples are diluted as instructed by PT provider and becomes the environmental sample. PT samples are not analyzed multiple times unless routine environmental samples are analyzed multiple times.

The working range of the calibration under which the PT sample is analyzed shall be the same range as used for routine samples. A result above or equal to the lowest calibration standard will be reported as the resultant value. A result below the lowest calibration standard will be reported as less than the value of the lowest calibration standard. For instruments (such as ICP) that employ standardization with a zero point or single point calibration, the lab will use the normal laboratory determined reporting limits for reporting the PT results.

Laboratories must obtain **ALL** PT samples from and report PT results to a PTOB/PTPA-approved PT Provider. The laboratory will authorize the PT provider to release all accreditation and remediation results and acceptable/not acceptable status directly to the Primary Accrediting Authority Department's Laboratory Accreditation Program in addition to the laboratory. PT study results will be released by the PT Provider to the laboratory and the Departments Laboratory Accreditation Program at the same time. The laboratory will notify the PT Provider if a PT sample is being used for corrective action purposes.

PT samples are analyzed at least five (5) months apart and no longer than seven (7) months apart unless the PT sample is being used for corrective action to reestablish successful history in order to maintain accreditation, or is being used to reinstate accreditation after suspension, in which case the analysis dates of successive PT samples for the same accreditation parameter shall be at least fifteen (15) days apart. Failure to meet the semiannual schedule or successfully analyze and report a PT Study is regarded as a failed study. Failure of two consecutive PT Studies for a field of accreditation will results in accreditation suspension. Revocation of accreditation will occur if, while suspended, the laboratory fails to successfully analyze a PT Study for a suspended field of testing. Denial of accreditation or revocation is also possible if analysis of a PT Study is performed by personnel other

than the analysts associated with routine analysis of environmental samples in the laboratory.

Corrective action procedures are followed for unacceptable PT results to determine the cause of the failure. The requirements for corrective action and documentation of the corrective action are described in Section 13 of the QA Manual.

All records necessary for historical reconstruction of the analysis and reporting of analytical results of the PT samples will be retained by the laboratory and/or Quality Assurance Manager for 5 years. The records include a copy of the reporting forms used to report the analytical results, either written forms or online data entry summaries. All records will be made available to the Primary Accrediting Authority during on-site laboratory audits.

Any questions or complaints about PT samples should be directed to the PT Provider. If the PT provider is unable or unwilling to resolve the question or complaint to the satisfaction of the laboratory, the laboratory will refer those questions to the PT Provider Accreditor.

23.8 Data Review

Policy

The laboratory reviews all data generated in the laboratory for compliance with method, laboratory and, where appropriate, client requirements.

Procedure

Initially, the analyst reviews data for acceptability of quality control measures and accuracy of the final result(s). After the initial review, a second reviewer considers all manual transfers and calculations of data in detail and spot checks all electronic transfers of data. All data review is documented by the reviewer's signature or initials and date being indicated on the data package. Final reports are compared to raw data either directly or through several reviewed steps. Project Managers review final reports against historical data and perform final review of Quality Control parameters before releasing the report.

SECTION 24 – REPORTING OF RESULTS

POLICY

The result of each test carried out is reported accurately, clearly, unambiguously, and objectively and complies with all specific instructions contained in the test method.

Data are reported without qualification if they are greater than the lowest calibration standard, lower than the highest calibration standard, and without compromised sample or method integrity.

24.1 Test Reports

Policy

The report format has been designed to accommodate each type of test performed and to minimize the potential for misunderstanding or misuse.

Procedure

Each test report generated contains the following information (unless not required by the client):

a) a title, Analytical Report;
b) the name and address of the laboratory, the location of the laboratory if different from the address, and the phone number and name of a contact person;
c) unique identification of the test report, such as a project number, on each page and a pagination system that ensures that each page is recognized as part of the test report and a clear identification of the end of the report, such as page 3 of 10;
d) the name and address of the client if applicable;
e) the identification of the test method used;
f) an unambiguous identification of the sample(s), including the client identification code;
g) the date of sample receipt when it is critical to the validity and application of the results, date and time of sample collection, dates the tests were performed, the time of sample preparation and analysis if the required holding time for either activity is less than or equal to 72 hours;
h) reference to the sampling plan and procedures used by the laboratory where these are relevant to the validity or application of the results;
i) the test results with failures identified, calibration range exceedances noted, units of measurement, an indication of whether results are calculated on a dry weight or wet weight basis
j) the name, function, and signature or an equivalent electronic identification of the person authorizing the test report, and the date of issue;
k) a statement to the effect that the results relate only to the samples;
l) at the laboratory's discretion, a statement that the report shall not be reproduced except in full without written approval of the laboratory;

m) certification that the results are in compliance with the 2009 TNI Standard (including NELAC logo on front page with wording “Accredited in Accordance with NELAC”) if accredited to be in compliance or provide reasons and/or justification if they do not comply. (Results for non-NELAC certified tests are noted on the cover page of the report.)

24.2 Supplemental Test Report Information

When necessary for interpretation of the results or when requested by the client, test reports include the following additional information:

a) deviations from, additions to, or exclusions from the test method, information on specific test conditions, such as environmental conditions, and any non-standard conditions that may have affected the quality of the results, and any information on the use and definitions of data qualifiers;
b) a statement of compliance/non-compliance when requirements of the quality systems are not met, including identification of test results that did not meet 2009 TNI Standard sample acceptance requirements, such as holding time, preservation, etc.;
c) where applicable and when requested by the client, a statement on the estimated uncertainty of the measurement;
d) where appropriate and needed, opinions and interpretations
    a. When opinions and interpretations are included, the basis upon which the opinions and interpretations are documented. Opinions and interpretations are clearly marked as such in the test report.
e) additional information which may be required by specific methods or client;
f) qualification of results with values outside the working range.
g) Level package data as requested by IDEM

24.3 Environmental Testing Obtained from Subcontractors

Test results obtained from test performed by subcontractors are clearly identified on the test report by subcontractor name and/or accreditation number.The test results from subcontractors are reported in writing or electronically and include the subcontractor’s NELAP accreditation number. A copy of the subcontractors report is be made available to the client if requested.

24.4 Electronic Transmission of Results

All test results transmitted by telephone, fax, e-mail, or other electronic means comply with the requirements of this *Quality Manual* and associated procedures to protect the confidentiality and proprietary rights of the client.

24.5 Amendments to Test Reports

Policy

Material amendments to a test report after it has been issued are made only in the form of another document or data transfer. All supplemental reports meet all the requirements for the initial report and the requirements of this *Quality Manual*.

Procedure

Amended test reports are titled, “Revised report” or an equivalent form of wording to assure they can be differentiated from other test reports.

When it is necessary to issue a complete new report, the new report is uniquely identified and contains a reference to the original that it replaces.

24.6 Use of Accreditation

The laboratory will display the most recent accreditation certificate and make accurate statements concerning accreditation status. The laboratory will not imply endorsement by the accrediting body through incorrect use of the certificate of accreditation, accreditation status, or the accrediting body’s logo. Upon suspension, revocation, or voluntary relinquishment of accreditation, the laboratory shall discontinue use of all documents/materials that contain reference to the accreditation, remove all display of the accreditation logo, and return certificates of accreditation to the accrediting body within 48 hours.

24.7 Notification Requirements

The laboratory will notify the Accrediting Body Department in writing for the following:

- within 20 calendar days of a permanent change in laboratory supervisor
- within 30 calendar days of a change in the legal name of the laboratory
- within 30 calendar days of a change in any item contained on the application for accreditation
- change in the laboratory’s capability to produce valid analytical results continues for more than 90 calendar days for any field of accreditation listed on the laboratory’s scope of accreditation.
- Within 48 hours if an out-of-state laboratory with primary or secondary accreditation has any change in the laboratory’s accreditation status from any other primary accreditation body

SECTION 25 – APPENDICES

Appendix 1:

Instrument/Equipment	Manufacturer
5890 Series II GC with FID, 7673 Auto sampler	Hewlett-Packard
5890 Series II GC with 5971 MSD, 7673A Auto sampler	Hewlett-Packard
5890 Series II GC with FID, LSC 2000, 5100 Auto sampler	Hewlett-Packard, Tekmar, EST
5890 Series II GC with 5972 MSD, 7673 Auto sampler	Hewlett-Packard
5890 Series II GC with 5972 MSD, LSC 3000 (2 systems)	Hewlett-Packard
8100 Auto sampler (2 systems)	Tekmar, EST
ICAP 61E Trace Analyzer with TJA Autosampler	Thermo Jarrell Ash
FIMS 100 Mercury Analyzer with AS90 Plus Autosampler	Perkin-Elmer
AR50 pH/Ion Meter	Accumet
XL 2020 Sonicator	Misonix
05-015-50 Laboratory Oven	Cole-Parmer
Lab-Line L-C Oven	Thermo Scientific
Analytical Balance Model D160	Denver Instruments
Scout Pro Top Loading Balance (3)	OHAUS
Isotemp Water Baths (4)	Fisher Scientific
Dynac Centrifuge	Clay Adams
Reverse Osmosis Water Purification System	RainSoft, Inc.
1173PD Recirculating Chiller (2)	VWR
miniMOD Block Digestion System	CPI
6-position TCLP tumbler	Environmental Express
6890 GC/MS 5973 MSD Encon Concentrator Centurion Auto sampler	Agilent

Appendix 2:

Instrument Specific Quality Control Requirements

Analysis Group	QC Check	Frequency Performed	Quality Assurance Target	Range
Volatile Organics GC/MS	Method Blank	Initially & every 12 hours		
	System Performance Check (BFB)	Initially & every 12 hours		mid
	Continuing Calibration Standards	Initially & every 12 hours	A	mid
	Matrix Spike/Matrix Spike Duplicate (MS/MSD)	Minimum 5% of samples	A,P	mid
	Surrogates, Internal Std.	Every sample	A	mid
	Performance Test Sample (PT)	Semi-annually	A	low-high
	MDL or LOD verification	Annually	A, P	low
	Second Source Check Std.	After each calibration curve	A	low

Analysis Group	QC Check	Frequency Performed	Quality Assurance Target	Range
Semivolatile Organics GC/MS	Method Blank	One per batch of 20 or fewer samples		
	Laboratory Control Sample (LCS/LCSD)	One set per batch of 20 or fewer samples	A,P	
	Continuing Calibration Standards.	Initially & every 12 hours	A	mid
	System Performance Check (DFTPP)	Initially & every 12 hours		
	Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One set per batch of 20 or fewer samples	A	mid
	Surrogates, Internal Std.	All samples	A	
	MDL or LOD verification	Annually	A, P	low
	Performance Test Sample (PT)	Semi-annually	A	low-high
	Second Source Standard Check	After each calibration curve	A	mid

Analysis Group	QC Check	Frequency Performed	Quality Assurance Target	Range
TPH (GC)	Method Blank	One per batch of 20 or fewer samples		
	Laboratory Control Sample (LCS/LCSD)	One set per batch of 20 or fewer samples	A,P	mid
	Continuing Calibration Standards.	Initially & every 12 hours	A	mid
	Retention Time Standard	Beginning and end of each run		
	Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One set per batch of 20 or fewer samples	A,P	mid
	Surrogates	All samples	A	
	MDL or LOD verification	Annually	A, P	low
	Performance Test Sample (PT)	Semi-annually	A	low-high
	Second Source Standard Check	After each calibration curve	A	mid

Analysis Group	QC Check	Frequency Performed	Quality Assurance Target	Range
ICP	Instrument Blank	Initial, every run		
	Initial Calibration Blank	Initial, every run		
	Initial Calibration Verification (ICV)	After each calibration curve	A	mid-high
	Interference Check Sample (ICS)	Beginning and end of each run		high
	Continuing Calibration Blank (CCB)	Initially and every 10 samples		
	Continuing Calibration Verification (CCV)	Initially and every 10 samples	A	mid-high
	Preparation Blank	One per batch of 20 or fewer samples		
	Laboratory Control Sample (LCS)	One per batch of 20 or fewer samples	A	mid
	Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One set per batch of 20 or fewer	A,P	mid
	Performance Test Sample (PT)	Semi-annually	A	low-high

A= Accuracy
P=Precision

Appendix 3

Non-conformance/Corrective Action Report
ENVision Laboratories, Inc. (page 1 of 2)

CA#_____

1. Identification of Non-conformance

Non-conformance: _____

Identified by: _____

How Identified: _____

Non-conformance Accepted? Y N Corrective Action Required? Y N

Responsible for Corrective Action: _____

2. Investigation

Employees Assisting:_____

Root Cause (circle):

Missed Holding Time	QC Failure
Data Entry Error	Calculation Error
Sample Prep. Error	Login/Labeling Error
Mis-identified Compound	Laboratory Contamination
Other _____	

Potential Solutions: (1) _____

(2) _____

(3) _____

Selected Solution: _____

Deadline for Investigation: _____

Non-conformance/Corrective Action Report
ENVision Laboratories, Inc. (page of 2 of 2)

CA# _____

3. Implementation of Solution

Responsible for implementation of Solution:_____

Resources Needed for Implementation of Solution:_____

Deadline for Implementation of Solution:_____

4. Monitoring of Effectiveness of Solution

Process for Evaluation:_____

Date of Review:_____

Signature/Date:_____

5. Closure of CAR

Approvals:

Lab Manager (if applicable)	Date
Quality Assurance Manager	Date
Laboratory Technical Director	Date

Appendix 4

Compressed Gas Order Form

ORDER DATE: ORDERED BY:

VENDOR used: *Praxair*

317-481-4550

Gas Type	Quantity Ordered
UHP Helium	
UHP Hydrogen	
UHP Nitrogen	
Breathing Air	
Zero Air	
Liquid Argon	

Appendix 5

Bottle Order Form

ORDER DATE:

ORDERED BY:

circle VENDOR used:

VWR *317-371-2951*

Quality Environmental Containers *800-255-3950*

Item Description	# of cases ordered
4 oz jars	
1 liter amber glass	
40 mL vial w/HCL pres.	
40 mL vial w/ no pres.	
1 liter plastic	
500ml plastic	
250ml plastic	
T-Handles	
Tared vials w/stir bar	

Appendix D

Enviro-Chem Laboratories, Inc.
Quality Manual

Method 218.6 Quality Control

11.1 Because there is no sample prep, the LRB is equivalent to a CCB. The LRB/CCB is run after the calibration, and then after every 10 sample injections. Reagent blank data are used to assess contamination from a laboratory environment. If the Cr (VI) value in the reagent blank exceeds the determined MDL, then laboratory or reagent contamination should be suspected. Any determined source of contamination should be corrected and the samples reanalyzed.

11.2 Because there is no sample prep, the LFB is equivalent to an IPC. The LFB/IPC is run in conjunction with the LRB/CCB after the calibration, and then after every 10 sample injections. Calculate accuracy as percent recovery (Section 11.7). If the recovery of Cr (VI) falls outside the control limits (Section 11.3), then the procedure is judged out of control, and the source of the problem should be identified and resolved before continuing the analysis.

11.3 Until sufficient data become available (usually a minimum of 20-30 analyses), assess laboratory performance against recovery limits of 90-110%. When sufficient internal performance data becomes available, develop control limits from the percent mean recovery (x) and the standard deviation(s) of the mean recovery. These data are used to establish upper and lower control limits as follows:

UPPER CONTROL LIMIT = x + 3s LOWER
CONTROL LIMIT = x - 3s

11.4 To verify that the instrument is properly calibrated on a continuing basis, run a LRB and IPC (Section 4.3) after every 10 analyses. The results of analyses of standards will indicate whether the calibration remains valid. If the measured concentration of the IPC (a midpoint calibration standard) deviates from the true concentration by more than ±5%, perform another analysis of the IPC. If the discrepancy is still ±5% of the known concentration then the instrument must be recalibrated and the previous 10 samples reanalyzed. The instrument response from the calibration check may be used for recalibration purposes.

11.5 Quality control sample (QCS) – After each calibration, the laboratory will analyze a QCS (secondsource standard). If criteria provided with the QCS are not within ±10% of the stated value, corrective action must be taken and documented.

11.6 The laboratory must add a known amount of Cr (VI) to a minimum of 10% of samples. The concentration level can be the same as that of the laboratory fortified blank (Section 7.5).

11.7 Calculate the percent recovery for Cr (VI) corrected for background concentration measured in the unfortified sample, and compare this value to the control limits established in Section 11.3 for the analysis of LFBs. Fortified recovery calculations are not required if the concentration of Cr (VI) added is less than 2X the sample background concentration.

Percent recovery may be calculated in units appropriate to the matrix, using the following equation:

$$R = \frac{C_F - C}{F} \times 100$$

where:

R = percent recovery
C_F = fortified sample concentration
C = sample background concentration
F = concentration equivalent of Cr (VI) added to sample

11.8 If the recovery of Cr (VI) falls outside control limits established in Section 11.3 and the recovery obtained for the LFB was shown to be in control (Section 11.2), the recovery problem encountered with the fortified sample is judged to be matrix related, not system related. The result for Cr (VI) in the unfortified sample must be labeled 'suspect matrix'.

Method 7199 Quality Control

1 Quality Control

1.1. Each analytical batch, made up of no more than 20 samples, must include a Preparation Blank, an LCS, a sample Duplicate, a Pre-Digestion Soluble Matrix Spike, Pre-Digestion Insoluble Matrix Spike and a Post Digestion Matrix Spike.

1.1.1. The Preparation Blank is prepared using 50 mL of digestion solution, which is then carried through the entire prep process and analyzed. The blank must be less than the method detection limit or one-tenth of the regulatory limit or action level, whichever is greater, or the entire batch must be re-digested

1.1.2. The LCS for Method 7199 is prepared by adding 1 mL of the 10 ppm spiking solution to 50 mL of digestion solution. This is then carried through the entire prep process and analyzed. Recovery must be within 80% to 120% or the entire batch must be reanalyzed

1.1.3. The sample duplicate is prepared by taking a second aliquot of one of the field samples and analyzing it as an independent field sample.

1.1.4. The Pre-Digestion Soluble Matrix Spike is prepared by adding 1 mL) of the 10 ppm spiking solution to an aliquot of sample, and then proceeding from step 10.3 of the Procedure section of this SOP. An acceptance range for matrix spike recoveries is 75-125%. If the matrix spike recovery is outside these recovery limits, the data is to be flagged.

1.1.5. The Pre-Digestion Insoluble Matrix Spike is prepared by adding 10-20 mg of $PbCr0_4$ to a separate aliquot of sample, and then proceeding from step 10.3 of the Procedure section of this SOP. An acceptance range for matrix spike recoveries is 75-125%. If the matrix spike recovery is outside these recovery limits, the data is to be flagged

1.1.6. The Post Digestion Matrix Spike is prepared by adding 0.05 mL of a 10 ppm Chromate standard solution to a 5 ml aliquot of digestate. An acceptance range for the Post Digestion Matrix Spike recovery is 85-115%. If the matrix spike recovery is outside these recovery limits, use the Method of Standard Additions (MSA) to analyze. If the MSA technique is applied post digestion, and no spike is observed from the MSA, these results indicate that the matrix is incompatible with Cr (VI) and no further effort is required.

2 Data Analysis and Calculations

2.1. Calculate the result using the following equation:

$$\text{Concentration , mg/kg} = \frac{A \times D \times E}{B \times C}$$

Where:
A = Concentration observed in the digest (ug/mL)
B = Initial moist sample weight
C = % Solids/100
D = Dilution Factor
E = Final Digest Volume

Appendix E

STAT Analysis Corporation
Quality Manual

STAT Analysis Corporation

Quality Assurance Manual

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QA 001

Revision 15
Effective Date: April 4, 2016

Printed Name	Signature/Date
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Bruce Gallant **Laboratory Director**	4/1/2016
Surendra N. Kumar, Ph.D. **President/CEO**	4/1/2016

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Policy Statement

STAT Analysis Corporation

This Quality Manual summarizes the policies and operational procedures associated with STAT Analysis Corporation in Chicago, Illinois. Specific protocols for sample handling and storage, chain-of-custody, and laboratory analysis, data reduction, corrective action, and reporting are described. All policies and procedures have been structured in accordance with the current, as of the date of this publication, requirements of The NELAC Institute (TNI) standards, American Industrial Hygiene Association – Laboratory Accreditation Program, LLC (AIHA-LAP, LLC) Policy, National Voluntary Laboratory Accreditation Program (NVLAP) standards adopted in National Institute of Standards and Technology (NIST) Handbook 150, 2006 Edition, the requirements of the Consumer Products Safety Commission (CPSC), and International Standards Organization/International Electrotechnical Commission (ISO/IEC) 17025 (2005) regulations, guidance, and technical standards. The laboratory management is committed to comply with these standards. NVLAP has issued specific requirements for referencing the NVLAP term, logo, and symbol (NIST Handbook 150, 2006). STAT uses the NVLAP term and symbol for purposes of announcing the accredited status and for use on reports that describe testing within the scope of accreditation. STAT complies with the conditions detailed in NIST Handbook 150, Annex A. STAT Analysis does not use or reference the logo from any other accrediting authority.

This Quality Assurance Manual (QAM) has been prepared in accordance with the guidance documents available from Accreditating organizations. Further details on these policies and procedures are contained in SOPs and related documents. This QAM, SOPs, and related documentation describe the laboratory's management system policies related to quality. The purpose of this Quality Assurance Manual is to describe the quality management system in place at STAT Analysis Corporation. It is STAT's policy to keep abreast of policy revisions issued by accrediting agencies and to implement changes within a reasonable time frame by revising this QAM and other appropriate SOPs in order to be compliant with existing accrediting agency policies. The QA Director monitors and tracks the schedule for policy updates based on notification by accreditation agencies. After identifying the changes to be addressed, the management team meets to create, plan and develop the implementation schedule. The QA Director oversees the implementation within the scheduled deadline.

STAT Analysis Corporation performs chemical analyses for inorganic and organic constituents, microbiological analyses, and asbestos analyses in various matrices and products. The objective of STAT Analysis Corporation's quality management system is to produce data that is scientifically valid and of known and documented quality in accordance with standards developed by TNI, ISO/IEC 17025, AIHA-LAP, LLC, NIST/NVLAP, CPSC and any applicable federal or state government entity's regulations or requirements. STAT Analysis Corporation conducts all business with integrity and in an ethical manner. The laboratory management is committed to good professional practice, to the quality of its environmental testing in servicing its customers, and to continually improve the effectiveness of the management system. All personnel involved with testing activities within the laboratory must review this quality manual. It is the responsibility of each staff member, manager, director, and owner

to perform their duties with the highest ethical standards and professional conduct to ensure compliance with this Quality Manual and related documentation.

Surendra N. Kumar, Ph.D.
President/CEO

Bruce Gallant, Laboratory Director

Table of Contents

1. INTRODUCTION

It is the policy of STAT Analysis Corporation (STAT) to produce well documented and defensible analytical results of the highest degree of repeatability, precision, and accuracy in a laboratory that employs state of the art analytical instrumentation operated by highly skilled, qualified, motivated, and responsible analysts. The laboratory management is committed to follow TNI, AIHA-LAP, LLC, CPSC, NIST/NVLAP, and ISO/IEC 17025 requirements. This Quality Manual is based on TNI, ISO 17025, NIST/NVLAP and AIHA-LAP, LLC standards. All employees are to be trained and committed to following the requirements herein.

The primary purpose of this document is to establish and maintain uniform operational and quality control guidelines for operations that affect the quality of the data produced in this laboratory. The establishment of, and adherence to, uniform elements of an intra-laboratory quality control program are essential to the production of reliable analytical data. The QA/QC requirements for all relevant preparation and analytical methods, and any verified modifications of such, used in this laboratory are described in this manual or described in relevant Standard Operating Procedures (SOPs).

While the implementation of a quality assurance policy is a management function, each individual has a responsibility for the operational aspects of quality control. It is the individual responsibility of each analyst and his/her supervisor to monitor quality control indicators and to provide for corrective actions when necessary. These corrective actions can range from routine corrective action to stopping work until the nonconformity has been resolved. Appropriate communication processes, such as training, seminars, and one-on-one instructions are used to train personnel regarding the effectiveness of the management system. Personnel are trained regarding relevance and importance of their activities and how they contribute to the achievement of the objectives of the management system. Personnel are trained on the importance of meeting customer requirements as well as statutory and regulatory requirements. Laboratory management ensures that the integrity of the management system is maintained when changes are planned and implemented.

This manual and the quality control protocols described herein are not to be viewed as all-inclusive. Rather, they serve as a basic foundation on which to build stronger quality assurance/quality control program. It is the policy of this laboratory to use the most stringent controls whether dictated by methodologies and SOPs, accrediting bodies, or Quality Assurance Project Plans (QAPP). STAT reviews the QAM annually. The QAM is updated whenever the need for changes or updates is required. Each SOP will be reviewed whenever the need for changes or updates are required. The need for changes may arise due to availability of new or improved technologies or changes published in the reference method.. The current revision of the SOP will be compared to the reference method for technical and procedural merit to determine if any changes are necessary. Furthermore, as part of Internal Audit, each SOP is reviewed and need for changes or updates determined.

This revision (Rev. 15) of the QAM was developed by modifying Rev.14 of the QAM. Summary of the changes made is presented in Appendix 1.

2. LABORATORY ORGANIZATION and MANAGEMENT STRUCTURE

Hi-Tek Environmental Inc., d/b/a, STAT Analysis Corporation (STAT), FEIN 36-4128978, was incorporated in December 1996. The laboratory is located at 2242 W. Harrison Street, Chicago, IL 60612. An electronic keypunch provides limited access to this building.

It is company policy that all employees must be free from commercial, financial and other pressures that might adversely interfere with the quality of their work. All employees must be aware that customer relations and service are an integral part of their job description. To prevent the possibility of staff being placed under pressure by customers or other sections of the laboratory, reporting relationships have been established to isolate staff from this pressure. The responsibilities of the employee in dealing with the customer will be specified in order to maintain independence of judgment and integrity.

The Organizational Chart for STAT is shown in Appendix 2.

2.1 Staff Qualifications and Responsibilities

This section will show that STAT have personnel, who, irrespective of other responsibilities, have the authority and the resources to fulfill their responsibilities, including the development, implementation, maintenance, and continuous improvement of the management system. They also have the resources to identify departures from the management system or other SOPs and to initiate corrective actions to minimize or prevent such departures.

2.1.1 President/CEO- ensures that those who hold the positions of Laboratory Director, Technical Manager, and Quality Assurance Director, meet the requirements of TNI, ISO 17025, NIST/NVLAP, and AIHA-LAP, LLC.

2.1.2 Key Personnel

2.1.2.1 Vice President/ Chief Science Officer

Duties

The Vice President/ Chief Science Officer (CSO) provides strategic input for the company's mid- and long-term goals from the scientific standpoint. The CSO forges external scientific partnerships with government, university and other private scientific or health related organizations. The CSO is the spokesperson for the company technical meetings and conferences, gives technical talks and marketing presentations, writes scientific reports, publishes journal articles and gray papers. When the opportunities arise, the CSO designs, leads and provides oversight of projects involving unique applications of analytical chemistry. The CSO is responsible for finding, selecting and recruiting scientific personnel and specifying analytical instrumentation. The CSO work on company legal matters and when required serves as expert witness.

Qualifications

The CSO should have a Ph.D. in chemistry or related scientific field.

2.1.2.2 Laboratory Director

Duties
The Laboratory Director has the overall responsibility for analytical and operational activities of the laboratory. The director will be responsible for supervision (and appointment of supervisors) of laboratory personnel and ensuring that sufficient numbers of qualified staff are employed to supervise and perform the work of the laboratory. The Director will be responsible for production and quality of data reported by the laboratory.

Qualifications

The Laboratory Director should have a minimum of 2 years experience managing a laboratory. He or she shall have earned a bachelor's degree, or higher, in chemistry.

2.1.2.3 Technical Manager

Duties
The Technical Manager, under the general direction of the laboratory director, is responsible for the appropriateness of the technical background of all tests performed by the laboratory and to insure the laboratory's compliance with the TNI and ISO 17025 standards. The development, validation and approval of new methods is overseen by the Technical Manager in coordination with Department Managers and the Quality Assurance Director. The Technical Manager has the responsibility to monitor performance standards in quality assurance and quality control and monitoring the validity of the analyses performed and the data generated in the laboratory to assure quality data. This individual is part of the whole corrective action process and is responsible for the final approval of any corrective actions performed at the laboratory. He/she shall be available during at least 50 percent of the laboratory operating hours to address technical issues for laboratory staff and customers and acceptable onsite supervision must be demonstrated. The Technical Manager maintains the LIMS. The Technical Manager provides proper educational direction to laboratory staff. The Technical Manager's responsibilities meet those defined for the Technical Manager in TNI Standard 4.1.7.2 and 5.2.6.1, NIST Handbook 150 Section 4.1, and AIHA-LAP, LLC Section 2A.5.1.1

The Technical Manager ensures that all laboratory personnel possess the necessary educational and technical background appropriate to the job they perform. By signing the Demonstration of Capability statement, the Technical Manager certifies that the laboratory analyst has met the requirements to perform the specific test method analysis.

In the event that the Technical Manager is absent for more than 15 consecutive calendar days, the Technical Manager will appoint the Laboratory Director as a temporary replacement. In the event that the Technical Manager is absent for more than 20 business days (for AIHA-LAP, LLC) or for more than 35 calendar days (For TNI), the acting Technical Manager or the Quality Assurance Director will notify the Accrediting Authorities (IEPA, AIHA-LAP, LLC, NVLAP, ORELAP, Kentucky DEP) in writing within 20 business days. This notification requirement shall be in effect if the Technical Manager, the Microbiology Technical Manager, the QA Director, the Microbiology QA Manager, or an analyst who is the only staff member that performs a test, are absent for reasons of extended family leave, illness, temporary disability, etc.

Qualifications
The Technical Manager should have a minimum of 4 years experience in an environmental laboratory. He or she shall have earned a bachelor's degree, or higher, in chemistry with a minimum of 24 college semester credit hours in chemistry.

2.1.2.4 Microbiology Technical Manager
Duties
The Microbiology Technical Manager, under the general direction of the laboratory director, is responsible for the appropriateness of the technical background of all tests performed by the microbiological laboratory. The Microbiology Technical Manager has the responsibility to monitor performance standards in quality assurance and quality control and monitoring the validity of the analyses performed and the data generated in the laboratory to assure quality data. The Microbiology Technical Manager is located on site and has the responsibility for the function and administration of the day-to-day operation of the microbiological laboratory. The Microbiology Technical Manager provides proper educational direction to microbiological laboratory staff. The Microbiology Technical Manager, or designee, functions as the approved signatory.

Qualifications
The Microbiology Technical Manager should have a minimum of 2 years experience in a microbiological environmental laboratory. He or she shall have earned a bachelor's degree, or higher, in microbiology, biology, or related life science, with a minimum of 20 college semester credit hours in microbiology.

2.1.2.5 Quality Assurance Director
Duties:

The Quality Assurance Director (or Manager) has the responsibility for the maintenance, coordination and continuous improvement of the Quality Assurance and Quality control (QA/QC) program for the laboratory and to insure the laboratory's compliance with the TNI, AIHA-LAP, LLC and ISO 17025 standards. The QA Director is responsible for training all new employees on their first day of employment in the importance of the QAM, the ethics policy and other issues as specified in SOP 1230 Section 14.1. The QA Director functions as the Data Integrity officer and reviews and

approves all analytical SOPs or test methods. The QA Director is responsible for conducting or arranging an annual internal audit of the entire laboratory operation and technical systems, as described in SOP 006 Management Review of the Quality System, in order to gauge the effectiveness of the Quality System and to determine if opportunities for improvement are present. The Quality Assurance Director is responsible for conducting Internal Audits as described in SOP 1220 as well as the day-to-day monitoring of the laboratory quality systems and the data review procedures for the laboratory and also acts as the Lab's Data Integrity Officer by implementing a program to detect and deter illegal or improper actions by the laboratory or staff.

The QA Director reports directly to the President/CEO and is independent from the Technical Manger.

In the event that the QA Director is absent for more than fifteen consecutive calendar days, the President/CEO will appoint either the Technical Manager or the Laboratory Director as a temporary replacement.

Qualifications
The Quality Assurance Director must have a minimum of a bachelor's degree in natural or physical sciences and have documented training or experience in QA/QC and statistical procedures. He/she also must have a general knowledge of the analytical test methods.

2.1.2.6 Microbiology Quality Assurance Manager

Duties
The Microbiology Laboratory Quality Assurance Manager has the responsibility for the maintenance and coordination of the quality assurance and quality control (QA/QC) program for the microbiological laboratory. The Microbiology Laboratory QA Manager is responsible for the data review procedures for the laboratory and re-analyzing five percent of all samples. The Microbiology Laboratory QA Manager will also provide genus/species identification when needed. The Microbiology Laboratory QA Manager is responsible for conducting an annual internal audit of the microbiological laboratory operation.

Qualifications
The Microbiology Laboratory QA Manager must have a minimum of a bachelor's degree in microbiology, biology, or related life science. The Microbiology Laboratory QA Manager must have a minimum of six months of relevant microbiological laboratory experience and familiarity with microbiological QA/QC.

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2.1.2.7 Department and Project Managers

Duties
Department Managers are responsible for supervising analysts, analysts in training, and technicians. They are responsible for reviewing and verifying data produced by analysts in training and technicians. Project Managers are responsible for primary customer contact. They review and approve customer's reports for completeness and adherence to all project specific criteria.

Qualifications
Department Managers must have a minimum of a bachelor's degree in natural or physical sciences, enough course work to qualify for a minor in chemistry, and have at least one year of experience in the analyses pertaining to the applicable fields of testing.

Project Managers must have a minimum of a bachelor's degree in natural or physical sciences and have at least one year of experience in the analyses of environmental samples.

2.1.1 Non-Key Personnel

2.1.3.1 Analysts

Duties
The analyst is responsible, under the direction of the Department Manager, for the applicable analyses of the samples submitted to the laboratory. Analysts shall be responsible for complying with all quality assurance and quality control requirements pertaining to their technical functions.

Qualifications
The analyst shall have a bachelor's degree (or equivalent), or an associates degree with one year experience, or greater than two years experience with experience in natural or physical sciences. Analysts will have one year of full-time employment in the environmental testing field, and have documented proof of technical proficiency via in-house training at STAT, including an Initial Demonstration of Capability (IDOC). Analysts shall have demonstrated ability to produce reliable results through accurate analysis of certified reference materials (CRMs), proficiency testing samples, or in-house quality control samples. Their performance must be documented. Instrumentation Analysts must have four hours of equipment manufacturer training or two-week apprenticeship under an experienced analyst.

2.1.3.2 Analyst in Training

Analyst in training must meet the requirements of Technician while in process of meeting the requirements of Analyst.

2.1.3.3 Technician

Duties
The technician is responsible for carrying out the designated activities related to the analysis of materials submitted to the laboratory and works under the direct supervision of the Department Manager or Analyst.

Qualifications
The Technician shall have a minimum of a high school diploma or equivalent. Technicians will have documented proof of technical proficiency via in-house training at STAT, including an IDOC. Instrumentation Technicians must have four hours of equipment manufacturer training or two-week apprenticeship under an experienced analyst.

2.2 Approved Signatories

All analysts that have passed training for a particular analysis can sign off on data either as analyst or secondary review (as appropriate). All customer correspondence is to be signed either by the Laboratory Director, Technical Manager, Department Managers, or Project Managers as appropriate. For asbestos and microbiology, analysts sign reports. Quotes can be generated and signed by the President/CEO, VP/Chief Science Officer (CSO), Laboratory Director,) or Project Manager (unless specific approval is given to another employee by the named individuals). All bid proposals are to be signed by the President/CEO, VP, Chief Science Officer (CSO), Laboratory Director, Project Managers or designee.

2.3 New Work Requirements

All new analyses must undergo a thorough review prior to release. The Laboratory Director, Technical Manager, Quality Assurance Director, and Department Manager may undertake this review. This review may include:

- Staff and appropriate equipment are available as well as appropriate workspace to perform the task.
- Standard Operating Procedure must be in place.
- Initial Demonstration of Capability (IDOC) must be performed.
- Method Detection Limit Study (if applicable) must be performed.
- A Blind Quality Control Sample must be satisfactorily completed, if available.

The procedure to review new work and new test method analyses is outlined in SOP 220 Customer Service.

2.4 Departures from Policies and Procedures

All laboratory personnel are instructed to follow the policies and procedures as outlined in the Quality Assurance Manual and supporting laboratory documentation. On occasion, departures

from these policies and procedures may be taken. Any such departures must be fully defined, documented, and approved by the Technical Manager or the President/CEO. If the departure is considered a permanent change, a new revision of the laboratory's quality documentation may be necessary.

Any modifications to reference test methods are listed in Section 5 of the test method SOPs. These modifications are approved by management as indicated by the signatures on the SOP cover page.

Minor modifications to test methods for particular samples are allowed if these modifications are fully documented. An example follows:

The test method SOP states that a 30-gram soil sample is extracted and analyzed for Semi-Volatile Organic compounds. The submitted sample weighs only 10 grams. The analyst notes in the logbook that the minimum amount of sample was not available for analysis. The customer agrees that the sample can be analyzed as submitted. The final reporting limit for this sample will be elevated due to limited sample size.

3. DOCUMENT CONTROL

All internal and external documents that form STAT Analysis Management System are tracked by the QA Director. Internal documents are assigned a unique document number, revision and effective date. Controlled documents (SOPs) are tracked by listing the location of each document as well as all individuals who have been issued these documents (including external customers.)

The procedure to maintain and control laboratory documents is outlined in SOP 005 Document Control. Controlled copies of the SOPs, Quality Manual and other documents are located in a controlled binder of the laboratory for personnel to use. The documents referenced in SOP 005 include software (e.g. excel spreadsheets and reporting templates, instrument operating software), instrument operation manuals, and other internal and external source documents. Lists of internal and external source documents, software, and instruction manuals are updated, if necessary, following annual review or following purchase of new equipment. As these documents are updated and revised, the QA department will replace each controlled copy with the revision in the controlled binders. The original hardcopy document is archived and all superceded controlled copies are destroyed (see SOP 240 Archiving). The computer file is archived via the computer network and will include all the changes to the document. Spreadsheets and other STAT generated electronic documents are tracked through the Master Document Spreadsheet List which is located in \\Harrison\d\Quality Control\Tracking\Tracking-Master Document List, which contains spreadsheet title and revision number. All laboratory notebooks are considered to be controlled documents.

4. GENERAL LABORATORY PRACTICES

All aspects of laboratory operations are documented in Standard Operating Procedures (SOPs) or Standard Administrative Procedures (SAP) . Each page of these documents will contain 1) Document Number, 2) Revision Number, 3) Effective Date, and 4) current page number of the total number of pages in the document. This is described in SOP 100, SOP on SOPs.

4.1 Introduction

Intrinsic to the production of quality analytical data is the quality of laboratory services available to the analyst. Without adequate quality control being exercised with regard to facilities, services, laboratory environment, instrumentation, and laboratory supplies, an analyst cannot be expected to produce reliable analytical data.

Access to the laboratory is restricted to STAT employees only, unless accompanied by a STAT employee. Recognizing the necessity of maintaining control over general laboratory operation, the subsequent sections outline provisions for maintaining the quality laboratory support services.

4.2 Laboratory Apparatus and Instruments

All support equipment is maintained in proper working order. All water baths, refrigerators, freezers, ovens, balances, pH meters, thermometers, mechanical pipettes, and the conductivity meter must be verified in accordance with SOP 1040 General Laboratory Practices (GLP) and/or the analytical SOP. Where possible, calibration and reference standards, traceable to national standards of measurement, are used in the laboratory to calibrate and/or verify the test equipment. These calibration and reference standards are only used for calibration and/or verification purposes. The laboratory uses an independent calibration service to perform an annual check of the balances and an annual check of the mechanical pipettes. In addition, an independent calibration service is used to perform a calibration check of the NIST reference thermometer at least every five years or as required by the manufacturer or calibration certificate. Vendors and service suppliers need to provide traceability of their products to NIST or to another recognized national standard of measurement. Criteria for identifying valid service suppliers and vendors and determining valid products are discussed in Section 4.5 and in SOP 1330, Purchasing .

Instructions for support equipment operations are found in STAT SOP 1040 General Laboratory Procedures.

4.2.1 Water baths
4.2.2 Refrigerators and freezers
4.2.3 Ovens
4.2.4 Balances
4.2.5 pH meters

4.2.6 Thermometers
Unless otherwise specified by regulatory methodology, it is the policy of STAT to use only non-mercury containing thermometers in all laboratory operations.
4.2.7 Mechanical Pipettes .
4.2.8 Plastic Tubes

4.2.9 Weights
4.2.10 Conductivity meter
4.2.9 4.2.11 Incubators
4.2.12 Autoclaves
Record temperature, pressure, and time maintained during each autoclave use per SOP 1130.

4.3 Laboratory Supplies

4.3.1 Glassware

Glassware used in general laboratory operations must be of high quality borosilicate glass. Volumetric glassware must be of Class "A" quality, except where the method specifies plastic volumetric flasks.

Procedures for cleaning laboratory glassware are described in STAT SOP 1020 Laboratory Glassware Cleaning.

4.3.2 Chemicals, Reagents, Solvents and Gases

The quality of chemicals, reagents, solvents, standards and gases used in the laboratory is determined by the sensitivity and specificity of the analytical techniques being used. Reagents of lesser purity than specified by a method will not be used.

Reagents, chemicals, solvents, and standard reference materials (excluding high-demand items) should be purchased in quantities to minimize extended shelf storage.

All reagents, chemicals, solvents, and standard reference materials are initialed and dated when received, when opened or prepared, and discard when outdated, or when evidence of discoloration or deterioration is detected (STAT SOP 1010 Analytical Standards and Reagents Receipt and Preparation).

4.3.3 Laboratory Reagent Water

The laboratory reagent water system is tap water that is processed through a carbon-filtering tank and two mixed-beds ion exchange tanks. This water is checked daily to ensure that it has at least 1 megohm-cm resistivity (= 1 umhos/cm conductivity) at 25^{o}C and recorded in conductivity logbook (STAT SOP 4200 Conductivity and SOP 1040

General Laboratory Practices**)**. Reagent water blanks are performed with each water batch to monitor for potential contamination.

4.4 Laboratory Hazardous Wastes Handling and Disposal Procedures

It is the policy of STAT Analysis to collect, store, package, label, ship and dispose of hazardous wastes in a manner which ensures compliance with all Federal, State and local laws, regulations, and ordinances. These procedures are designed to minimize employee exposure to hazards associated with laboratory-generated hazardous wastes and to afford maximum environmental protection (STAT SOP 1130 Waste Disposal).

4.5 Selection and Purchasing of Services and Supplies

Goods and services are purchased from qualified companies and individuals. The purchased items may be chemicals, consumable items, equipment, calibration services, repair services, sub-contract laboratory services, consultant services, and building and environmental services. The laboratory maintains a list of qualified and approved vendors, suppliers, sub-contractors, consultants, and contractors. Service suppliers are deemed qualified if they have ISO 17025 accreditation in combination with ISO Guide 34 and a certificate bearing the seal of accreditation from an ILAC signatory. Purchased supplies and reagents and consumable materials that affect the quality of tests and/or calibrations are not used until they have been inspected or otherwise verified as complying with ISO 17025 accreditation. Actions taken to check compliance are documented. A sub-contractor, usually a testing laboratory, provides test reports to STAT that is used to supplement the information sent to STAT's customers. A sub-contractor may perform test methods that are not currently being performed at STAT, or may serve as an adjunct to the testing methodology already in place at STAT. Sub-contractors are deemed qualified if they possess accreditation from the National Environmental Laboratory Accreditation Program (NELAP), American Industrial Hygiene Association (AIHA-LAP, LLC), Environmental Laboratory Accreditation Program (ELAP), National Voluntary Laboratory Accreditation Program (NVLAP), American Association for Laboratory Accreditation (A2LA), or from some other nationally recognized accreditation body. If there is no independent means to qualify a potential vendor or supplier, the following procedure is used: Obtain qualification statements, obtain a list of references or customers, and send inquiries to these parties to obtain written information concerning the quality of materials and services rendered. Contact the Better Business Bureau (BBB) to determine if any complaints have been filed. A request or a purchase order may be made to a vendor to supply a small lot of material to be qualified using STAT in-house test methodology. A request or a purchase order may be made to a supplier to perform a service that will be independently verified by an already approved supplier. If this qualifications procedure is deemed successful, the vendor or supplier may be added to the approved list. The results of this evaluation is recorded on the Vendor Evaluation Form (SOP 1330 Purchasing, Form #3) STAT will determine the best value for its expenditures if two equally qualified and approved vendors or suppliers offer the same materials or services.

5. VERIFICATION PROCEDURES

5.1 Introduction

It is the objective of STAT to provide our customers with data that is of known and documented quality consistent with the analytical methods and SOPs listed in Appendix 3. This is accomplished with the use of traceable calibrations and documentation of this traceability with external reference samples.

Where possible, calibration and reference standards, traceable to national standards of measurement, are used in the laboratory to calibrate and/or verify the test equipment. These calibration and reference standards are only used for calibration and/or verification purposes.

5.2 Traceability of Calibrations

Each analytical process undergoes the following to document calibrations used in the laboratory:

5.2.1 Initial Demonstration of Capability: Each analyst analyzes a series of laboratory control standards to demonstrate precision and accuracy, and determines the range of instrument operation, if applicable. This study is signed by the analyst, Department Supervisor, the QA Director, and the Technical Manager. See the specific requirements in SOP 1230 Training and analytical SOPs.

5.2.2 Initial Calibration Determination: Based on the Initial Demonstration of Capability (IDOC), an initial calibration is performed. The ICAL determination must meet the criteria specified in the analytical SOP.

If the regulatory limit is stated or defined for a particular analysis or test parameter, the laboratory's policy is to perform the analysis using a calibration standard at or below the defined regulatory limit.

5.2.3 Initial Calibration Verification: The Initial Calibration Verification is performed immediately after the initial instrument calibration to determine the validity of the initial calibration. This standard is from a second source, if available. Concentrations and acceptance criteria are specified in the relevant analytical SOP.

5.2.4 Method Detection Limit Study: The laboratory performs an MDL study prior to instituting a new procedure/analysis and a LOD/LOQ study yearly thereafter. MDL study is not applicable for some tests, e.g., pH, odor, temperature, etc. These procedures are outlined in STAT SOP 1210 Method Detection Limits, Limits of Detection, Limits of Quantitation.

5.2.5 Quality Control Check Sample: External reference standards that are analyzed as an unknown by the analyst. This provides an independent check of the analytical process.

These results may be placed in the analysts' training file. See section 5.3.2.2 for more details.

The laboratory maintains a reference slide and spore collection of each microbiological sample identified. Because microbiological analyses measures constantly changing, living organisms, these organisms are inherently variable.

5.2.6 Continuing Calibration Verification: A calibration standard is prepared and analyzed when an initial calibration is not performed. At a minimum, a calibration check is analyzed at the beginning and at the end of each analytical batch. Organic internal standard methods are an exception where the calibration check is analyzed only at the beginning of the analytical sequence. Refer to the analytical SOPs for frequency and acceptance criteria. If a calibration check fails the appropriate SOP stated criteria, and routine corrective action fails to produce a second calibration check within acceptance criteria, then the initial calibration and initial calibration verification is performed. All samples analyzed since the last calibration check was in control will be re-analyzed, except in those instances where the calibration check was exceeded high (high bias) and there are non-detect results for the corresponding analyte in the samples associated with the calibration check. Those non-detects may be reported.

5.2.7 Method Blank Determination: A method blank is performed once per preparation batch per matrix type. The method blank is a negative control. A method blank is acceptable if it does not contain an analyte of interest at a concentration greater than the highest of the following: the reporting limit, 10% of the regulatory limit for that analyte, or 10% of the measure concentration for that analyte in any environmental sample in the batch. Some approved test methods do not require method blanks (e.g., pH, temperature, conductivity, etc.) Refer to the individual analytical SOP for acceptance criteria.

5.2.8 Analytical Reagent Blank: Analytical reagents, without media, shall be prepared and analyzed, when applicable, with each batch of samples, using the same procedure that is used for field samples.

5.2.9 Field Blank: It is recommended that customers of the laboratory supply blank sampling media from the same source lot as was used for collecting the field samples. A field blank from this source lot can help determine possible contamination of an analyte during handling and shipping procedures.

5.2.10 Continuing Calibration Blank (Inorganic): Inorganic SOPs require continuing calibration blanks analyzed each time a calibration check is analyzed. The same criteria are used as specified for method blanks (5.2.7). All samples analyzed since the last continuing calibration blank that was in control will be re-analyzed, except in those instances where there are non-detected results for the corresponding analyte in the samples associated with the continuing calibration blank. Those non-detected results may be reported.

5.2.11 Interference Check Standards (ICS): ICSs used in ICP-MS analysis checks for metal complex interferents (e.g. Ar, C, Cl, etc) with a similar mass of low concentration analytes. The appropriate analytical SOP contains specific instructions for analysis of these standards.

5.2.12 System Tuning Verification (GC/MS and ICP/MS): The GC/MS is hardware tuned before performing the initial and continuing calibrations. Refer to the individual analytical SOP for acceptance criteria.

5.2.13 Internal Standard Area Monitoring (GC/MS and ICP/MS): Internal standards are monitored to determine the quality of the injection process. Criteria are in the appropriate analytical SOP with corrective action specified.

5.2.14 Laboratory Control Standard: Laboratory Control Standard (or Sample) (LCS) is performed at least once per preparation batch per matrix. The LCS and MS/MSD are positive controls that measure the percent recovery (5.5) of the analytes added prior to preparation/analysis. They provide the assurance that the analytical system is capable of measuring the analytes specified. If the LCS does not meet control limits specified in the SOP, analysis is halted and corrective action taken to bring the system under control, including re-preparation of all samples in the batch associated with the out-of-control LCS. LCS is not performed when spiking solutions are not available, e.g., color, odor, temperature, dissolved oxygen, or turbidity.

5.2.15 Surrogate Compounds (Organic): Surrogate compounds are added to most organic chromatography methods. Surrogates indicate that sample preparation and analysis are within the appropriate method SOP criteria. Specific SOPs have procedures handling out-of-control situations, including sample re-extraction/re-analysis.

5.2.16 Matrix Spike/Matrix Spike Duplicate: Matrix Spike/Matrix Spike Duplicate analysis is similar to LCS analysis (5.2.14) except it is performed on customer samples. The MS/MSD shall be prepared once per preparation batch of 20 or less samples per matrix type. If more than 20 samples are prepared a second MS/MSD shall be prepared after the twentieth sample.. Samples specified for MS/MSD analysis by customers will be selected if so indicated. MS/MSDs indicate the effect of the sample matrix on the precision and accuracy of the results generated using the selected method. This information does not determine the validity of the entire batch. For cases where the sample cannot be divided (e.g., wipes, air samples, not enough sample provided by customer) and thus a MS/MSD pair cannot be prepared for the preparation batch, an LCS/LCSD pair is analyzed to measure precision.

5.2.17 The laboratory will maintain a reference slide collection of asbestos types with various asbestos concentrations from previous NIST Proficiency Analytical Testing rounds. Standard Reference Materials (SRMs) are purchased from NIST for calibrations.

5.2.18 Duplicate Analysis (for analyses not suitable for spiking): Samples that are not suitable for MS/MSD analysis will be analyzed in duplicate. A Laboratory Control Standard Duplicate (LCSD) will also be performed for tests not suitable for matrix spike analysis or duplicate analysis (e.g. wipes, air samples, etc.). Relative Percent Difference (5.4) is calculated and compared to control criteria listed in the approved method SOP.

5.2.19 The laboratory maintains performance records to document the quality of data that is generated. Method accuracy for samples is assessed and records maintained. STAT generates in-house acceptance limits and compares method performance data to the reference method criteria. The in-house control limits are generated based on a minimum of 20 data points. Parameters for which control limits are generated include, but not limited to, LCS, Surrogate recovery, and MS/MSD recoveries. Acceptance limits are developed based on three standard deviations from the average recovery and warning limits are developed based on two standard deviation from the average recovery.

Control limits for the method parameters are generated by the QA Director in consultation with the Technical Manager, Laboratory Director, and Department Manager. Control limits are distributed to the analysts via updates to the LIMS control charts. The control limits are calculated based on in-house performance data.

In-house generated data is compared to the specifications of the reference method. If the in-house limits are within the specifications of the reference method, the control limits are updated in LIMS. If the in-house limits are not within specifications, an investigation is performed to determine the cause(s) of the problem and a corrective action is completed. The analysis may continue until enough data points are collected to regenerate new control limits. Any QC data generated outside of reference method limits during that time frame, is flagged.

5.3 Performance Testing Samples

5.3.1 Introduction

As part of the laboratory's Quality Assurance program, an independent means of assessing laboratory accuracy for its performance in the various test methodologies has been developed. The Performance Testing Program analyzes Performance Testing (PT) samples on a routine basis. These samples, are of an unknown concentration to the analyst who performs the test. The purpose of analyzing these samples is to determine whether the analyst/laboratory can produce analytical results within specified acceptance criteria.

For analysis of all PT samples, with the exception of the EMPAT fungal direct examination program, the laboratory's procedure is as follows:

- Upon receipt, the Performance Testing Samples are treated as any other sample submitted to the laboratory. They are logged into the system and assigned a unique laboratory number. A LIMS work order is generated and samples are distributed to the analysts. The samples are then prepared and analyzed in the same manner as any other

submitted samples using the same procedures, equipment, and laboratory personnel. After the data review process, test results are recorded in the LIMS. A final report is generated and results are reported to the Technical Manager, Quality Assurance Director and Laboratory Director. Depending upon the type of PT sample, the final report is then submitted to the PT provider or evaluated in-house. After evaluation, either by the PT provider or by the QA Manager, the report is filed in the QA Manager's office.

- For PT sample studies that are used for accreditation purposes, the evaluation report, copies of the PT study report forms, copies of all support documentation, and copies of any corrective action investigations and resolutions, are kept in the QA Manager's files. This allows easy reconstruction and review of this data by the accrediting authority during on-site audits. This data, along with any electronic records, is kept at a minimum of five years from the date of the evaluation report received from the PT provider. This time frame may be increased to comply with any additional regulatory program requirements.
- All analysts participate in the PT process. Successful analyses are used to obtain accreditation or to maintain the laboratory's current scope of accreditation. They may also be used to update employee-training records (continuing DOC), or to demonstrate to customers or other interested third parties that the laboratory is capable of producing quality data.
- For unacceptable results, or results that are in-control but are continually statistically biased high or low, corrective action must be taken to determine the cause of the problem. This is accomplished by the corrective action process (SOP QA 230 Corrective Action). For PT sample studies that are used for accreditation purposes, copies of any corrective action investigations and resolutions are available to accrediting authorities.
- For the EMPAT fungal direct examination program, the analyst views and identifies the unknown samples on-line. On a quarterly basis, the laboratory has access to 20 different digital images for identification of spores.

The laboratory has established policies in reference to the analysis of PT samples. They are as follows:

- PT samples are treated and analyzed in the same manner as other sample submitted to the laboratory.
- The laboratory does not send any PT sample, or portion of a PT sample, for which it seeks to obtain accreditation or maintain its current accreditation to another laboratory for analysis.
- The laboratory does not knowingly accept PT samples or portions of PT samples from other laboratories for any analyses for which the sending laboratory seeks accreditation or is accredited.
- Laboratory personnel do not communicate with any other individuals from any other laboratories concerning PT samples.
- Laboratory personnel do not attempt to obtain the assigned value or analyte concentration of any PT sample from the PT provider.

5.3.2 TNI Performance Samples

The PT program is divided into two sections.

5.3.2.1 External Evaluation of Performance Sample

The first section of the program is dedicated to the analysis of PT samples for compliance with accreditation programs such as TNI. The PT samples for this section of the program are of an unknown concentration to all laboratory personnel (blind to the laboratory). At a minimum of two times per year (approximately every six months), PT samples for each field of testing (each analyte/method/matrix) are purchased from a Proficiency Testing Oversight Body/Proficiency Testing Provider Accreditor (PTOB/PTPA) approved PT provider, when available. After analysis, a report is submitted to the PT provider for evaluation. The Technical Manager, Quality Assurance Director and Laboratory Director are responsible for the accuracy and the format of the report submitted to the PT provider. In order to initially obtain and to currently maintain accreditation, the laboratory must be successful in the analysis of these samples in two of the three most recent rounds of testing. If there is a failure to successfully analyze a particular analyte or supplemental testing is warranted, the laboratory must wait at least 30 days before analyzing additional samples. To maintain accreditation, the laboratory will continue to analyze samples at the prescribed frequency (two PT studies for each PT field of testing per year) unless there is a change in the program or in the environmental regulations. It will maintain a history of at least two acceptable PT studies for each PT field of testing out of the most recent three studies. The laboratory authorizes the PT provider to release the results of the laboratory's performance (sample results and acceptable/not acceptable status) on any of the PT samples directly to any accrediting authority, NELAP, and the PTOB/PTPA.

5.3.2.2 In-House Evaluation of Performance Samples

The second section of the program is for in-house evaluation of analyst performance. The PT samples for this section of the program are of an unknown concentration to the analyst performing the test (blind to the analyst). The QA Manager purchases these samples that include the true analyte concentration and performance acceptance limits. The QA Manager does not divulge this information to any of the laboratory personnel. PT samples are purchased from a PTOB/PTPA approved PT provider or another provider that can provide samples that are traceable to NIST, when available. After analysis, a report is submitted to the QA Manager for evaluation. The successful analyses of these samples may be used as documentation for the analysts continuing Demonstration of Capability in the applicable test methods.

5.3.3 AIHA-LAP LLC - Performance Samples

For purposes of this program, an industrial hygiene laboratory is defined as a laboratory that analyzes samples or materials for the purpose of evaluating occupational exposure or

contamination resulting from occupational activities. The laboratory participates in three programs for accreditation: 1) the AIHA-LAP, LLC Industrial Hygiene Laboratory Accreditation Program (IHLAP) for accreditation of industrial hygiene laboratories; 2) the AIHA-LAP, LLC, Environmental Lead Laboratory Accreditation Program (ELLAP) for accreditation of laboratories performing lead analysis and, the AIHA-LAP, LLC Environmental Microbiology Laboratory Accreditation Program (EMLAP). For the ELLAP program, the laboratory analyzes PAT samples in the following Fields of Testing: airborne particulates, dust wipes, paint chips and soil. The purpose of the PAT program is to ensure that the laboratory meets established performance criteria for the analysis of industrial hygiene samples.

This laboratory chooses to participate in the four rounds of performance samples per year. AIHA-PAT, LLC programs are performance based and the programs do not specify the use of any particular analytical method when analyzing PT samples, except for asbestos by PCM. Proficiency testing samples shall be analyzed using the same analytical procedure used to test customer samples.

The laboratory shall be responsible for the timely and proper submission of all PT sample results to the AIHA-PAT, LLC. The laboratory shall submit data using the AIHA-PAT, LLC Data Entry Portal on the AIHA-LAP, LLC web site. The data must be entered into the system by the specified deadline. An unreported result is classified as an outlier unless the AIHA-PAT, LLC has pre-approved nonparticipation. The AIHA-PAT, LLC shall provide the PT reports to each participating laboratory forty-five days after the close of the PT round. Accredited laboratories shall maintain these records for use during the assessment process. The laboratory is responsible for notifying the AIHA-PAT LLC of any changes in laboratory status that may affect the receipt of PT samples/information, such as a change in address or named recipient.

A result that is outside the statistical control limits determined for the Industrial Hygiene Performance Analytical Testing (IHPAT) or Environmental Lead Performance Analytical Testing (ELPAT) Environmental Microbiology Performance Analytical Testing (EMPAT) round is classified as nonconforming work.

5.3.3.1 IHPAT Round Performance Samples

Proficiency is determined Field of Testing by Field of Testing and round by round. A laboratory is rated proficient for a given round for the applicable Field of Testing (FoT) if there is not more than twenty-five (25) percent deficiency for a given Field of Testing for that round. A laboratory is rated as proficient for the FoT if it passes two out of three consecutive test rounds. The laboratory shall have participated in at least two (2) PT rounds to be considered for accreditation. When PT samples are analyzed by more than one analyst averaging the results for reporting is not permitted. A single analyst's results are reported.

5.3.3.2 ELPAT Round Performance Samples

A laboratory is rated proficient for the applicable FoT if there are not more than 25% cumulative outliers reported in the last four consecutive PT rounds in which the laboratory has participated at the time of accreditation or no outliers reported in the last

two consecutive PT rounds. The laboratory shall have participated in at least two (2) PT rounds to be considered for accreditation.

5.3.3.3 EMPAT Round Performance Samples
In order to maintain accreditation, the laboratory must be 85 % successful in the analysis of microbiology samples in the three most recent rounds of testing. To maintain accreditation, the laboratory will continue to analyze samples at the prescribed frequency (three PT studies for each PT field of testing per year) unless there is a change in the program or in the environmental regulations. It will maintain a history of at least 85 % acceptable PT studies for each PT field of testing out of the most recent three studies.

5.3.3.4 In-house PT (Demonstration of Competency, DOC) for Fields of Testing not covered by AIHA-PAT, LLC

Twice a year a set of four media will be spiked at various levels by the QA director or designee. Spike levels will be given to the Department Manager. The blind samples will be run by the analyst and results evaluated against current in house limits for LCS recovery. The PT round will be considered passing for the FoT consisting of a single analyte if at least three out of four samples meet the LCS recovery acceptance limits. For FoTs containing multiple analytes, a sample is considered passing if 75% of the analytes meet the LCS recovery acceptance limits. Seventy-five percent of the samples must pass for the round to be considered passing. Results are evaluated by the QA Director for continuance of the FoT. Results are kept on file with the Department Manager. If a round fails, the round must be retested, four new samples are prepared/analyzed for each analyte and reevaluated. A laboratory is rated as proficient for the FoT if it passes two out of three consecutive test rounds. The laboratory shall have participated in at least two (2) PT rounds to be considered for accreditation. The laboratory will notify AIHA-LAP, LLC if it fails two out of three consecutive rounds and follow AIHA-LAP, LLC's instruction for further action.

Further details for each FoT are included in corresponding SOPs.

5.3.3.5 Each year STAT Analysis Corp participates in two EMPAT Air, Spore Trap Analysis Round Robins meeting the requirements of AIHA-LAP, LLC Policy 6.5.1.

5.3.4 NVLAP Performance Samples

The PT program is divided into two sections.

The first section of the program is dedicated to the analysis of PT samples for compliance with accreditation programs such as NIST/NVLAP. The PT samples for this section of the program are of an unknown concentration to all laboratory personnel (blind to the laboratory). PT samples for each field of testing are provided by NVLAP, generally, at a frequency of two times per year (approximately every six months). After analysis, a report is submitted to the PT provider for evaluation. The analysts, Technical Manager, Quality Assurance Director and

Laboratory Director are responsible for the accuracy and the format of the report submitted to the PT provider. In order to initially obtain and to currently maintain accreditation, the laboratory must score less than 150 points on two out of the last three consecutive proficiency-testing rounds. To maintain accreditation, the laboratory will continue to analyze samples at the prescribed frequency (two PT studies for each PT field of testing per year) unless there is a change in the program or in the environmental regulations. The laboratory authorizes the PT provider to the release the results of the laboratory's performance (sample results and acceptable/not acceptable status) on any of the PT samples directly to the NIST/NVLAP.

The second section of the program is for in-house evaluation of analyst performance. This is accomplished by a round-robin program. Asbestos samples are distributed to numerous laboratories and analysis is summarized and distributed to all participants. After analysis, a report is submitted to the QA Manager for evaluation. The successful analyses of these samples may be used as documentation for the analysts continuing Demonstration of Capability in the applicable test methods.

5.4 Precision

Precision is expressed as percent relative standard deviation and is calculated by the formula:

$$\% \text{ RSD} = \frac{S \times 100}{X}$$

Where: S = Standard Deviation
X = Mean

Precision can also be expressed as relative percent difference and is calculated by the formula:

$$\% \text{ RPD} = \frac{D \times 100}{X}$$

Where: D = Difference between measurements
X = Mean

Percent difference is calculated by the formula:

$$\%D = \frac{(X-Y) \times 100}{X}$$

Where: X = Initial Measurement
Y = Comparison Measurement

5.5 Accuracy

Accuracy is expressed as percent recovery and calculated by the formula:

$(Y - X)/Z \times 100 = \%$ Recovery

Where: X = concentration in unspiked sample.
Y = concentration in spiked sample.
Z = theoretical spike concentration

5.6 Analytical Performance Summary

Quality control data are reviewed on a continuous basis. During the review, percent RSD, percent RPD, upper warning and control limits of precision data and percent recovery of accuracy data are evaluated against established control limits. If a statistically significant trend is observed, then warning and control limits may, after investigation, be updated, and documented in Addendum to the SOP.

Annually, a summary report of the laboratory's analytical performance is prepared. Contained in this report are: the precision data (average percent RSD or RPD, upper warning and control limits), and accuracy data (average total percent recovery of spiked samples, reference samples, and performance audit samples). The Quality Assurance Director prepares this summary and it is reviewed by the Technical and the Laboratory Director prior to distribution for use.

6. METHODOLOGY

Test method SOPs are based upon nationally recognized test method references such as the United States Environmental Protection Agency (USEPA), National Institute for Occupation Safety and Health (NIOSH), NIST/NVLAP, Standard Methods (American Public Health Association, American Water Works Association, Water Environment Federation), CPSC and American Society for Testing and Materials (ASTM). These test methods are used for sample analyses, and the related sample handling and storage activities are appropriate and consistent with the required quality and accuracy deemed necessary for customers and their decision-making processes concerning environmental regulations and compliance. The laboratory uses the most stringent standard as stated in the reference test method or as specified in the applicable regulation.

Appendix 3 contains a table of the laboratory’s scope of test methods and SOPs.

7. PHYSICAL FACILITIES AND EQUIPMENT

7.1 Facilities

STAT has over 12,000 square feet of state-of-the-art laboratory facilities. An electronic key-punch provides limited access to this building. The laboratory space and ventilation system was specifically refurbished to achieve the critical needs of an environmental laboratory. For example, laboratories for air toxics and volatiles analyses are positively pressurized and are supplied with fresh air that is carbon filtered. Environmental lead is digested and analyzed in a laboratory separate from bulk lead samples (paint chips, dust, etc) to prevent cross contamination. Separate laboratories are provided for microbiology, optical microscopy and electron microscopy. The organic extraction laboratories occupy nearly 1400 square feet of space and allow for extraction of air, water and soil with room for further expansion. A facility lay-out is provided in Appendix 4.

There is no other testing facility being utilized other than the permanent lab premises. The rooms are dedicated to specific laboratory testing departments and administrative offices. The physical environment (temperature, humidity, lighting, and ventilation) is adequate to perform all testing methodologies. Temperature is monitored and controlled by individual thermostats in each room. Ventilation hoods are monitored as part of the laboratory safety program. Any problems encountered with the physical accommodations are immediately brought to the attention of the Technical Manager or the Laboratory Director. The building engineer is then notified to take immediate corrective action to remedy any problems.

As part of the Internal Audit Process (SOP 1220 Internal Quality Assurance Audit), the QA Manager is required to monitor the laboratory's facilities to ensure that the facilities are adequate and that personnel are in compliance with laboratory policies. Those areas audited include the following:

- Ventilation: hoods checked and tagged per the Chemical Hygiene Plan
- Room temperature: monitor the TCLP extraction area
- Voltage surge suppressors to protect computer network and critical instrumentation
- Separation of incompatible areas is maintained
- Personnel movement is limited to prevent cross-contamination
- Good housekeeping practiced - items reviewed: benches, floors, hood used properly, clutter, glassware cleaning space and storage, bottle/container storage
- Waste storage area is reviewed to ensure safe practices
- Air Monitoring for Spores in Microbiology Laboratory: Background contamination is to be checked periodically (once every Quarter). If growth of Aggressive spores is observed, all areas of the laboratory are cleaned. The air system is checked, and if necessary, filter is replaced. Cleaning will continue until no background contamination is detected.
- Air Monitoring for Asbestos: Background contamination is to be checked periodically (once every Quarter) by taking air samples from areas where asbestos is handled, such as sample receiving, bulk asbestos analysis Laboratory, and PCM and Transmission Electron Microscopy (TEM) Laboratory. Samples are analyzed by TEM. If presence of

asbestos is confirmed, all areas of the laboratory are cleaned. Cleaning will continue until no background contamination is detected.

- Background Monitoring for Lead in Lead Laboratory: Background contamination is to be checked periodically (once every Quarter). If lead is observed, all areas of the laboratory are cleaned. Cleaning will continue until no background contamination is detected.

7.2 Equipment

The major equipment in use at STAT Analysis Laboratory is listed in Appendix 4. The equipment list is under the control of the Quality Assurance Director . The list is updated as required whenever new equipment is purchased or current equipment is permanently removed from service.

7.3 Equipment Maintenance Program

Proper maintenance of laboratory instrumentation is a key to longevity of the instrumentation, as well as providing the analyst with equipment capable of producing reliable analyses. The analysts and on occasion, vendor specialists, share the responsibility for maintenance and repair of all STAT Analysis Laboratory equipment. Specific maintenance requirements are found in the analytical SOPs. The primary elements of the equipment maintenance program include:

- All major equipment receives a daily check for such things as: cooling fan operation, pump operation, indicator readings, mechanical checks, clean air filters, etc.
- Service schedules are established for performing routine preventative maintenance on all major equipment items.
- Records are maintained for all instrument repairs (See individual instrument maintenance logbooks).
- A conservative inventory of critical spare parts is maintained for high-use instrumentation.
- Vendor operation and maintenance manuals are maintained for laboratory instrumentation.

Any equipment that is found to be defective is taken out of service. The equipment is tagged by the person making the judgment and marked “Out of Service;” the person applies their initials and dates the tag. This action is noted in the maintenance logbook. The department supervisor is notified of this action. If deemed necessary, a corrective action report is initiated to determine if the malfunctioning equipment has potentially generated data that is suspect. The equipment is not put back into service until repairs are made and the equipment is shown to be performing properly after calibration and/or verification procedures have been successfully completed and documented in the maintenance logbook.

8. SAMPLE RECEIPT and ACCEPTANCE

8.1 Introduction

Complete documentation of the sample collection and handling process is an extremely important aspect of a regulatory monitoring effort. Formal chain-of-custody procedures provide a written record of sample traceability, accountability and serve to validate sample integrity. All samples received by STAT Analysis are controlled by these procedures. For more information see STAT SOP 300 (Sample Receiving and Login Procedure).

Appendix 5 contains a table of acceptable sample containers with sample preservation requirements for analyses listed in section 6.

Sample collection is typically a function of our customer's activities. STAT does not provide sampling services. STAT's customers deliver samples to the laboratory for testing. However, STAT will attempt to ensure compliance with all applicable ISO/IEC 17025, NIST/NVLAP, AIHA-LAP, LLC and TNI requirements. STAT requests customers to submit field blanks with their samples, where applicable. A summary of STAT's written sample acceptance policy will be made available to sample collectors. Data from samples that do not meet the sample acceptance criteria will be unambiguously flagged to define the nature of the variance. Sampling procedures for collection of subsamples are described within each method's Standard Operating Procedure (SOP).
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8.2 Sample Acceptance Policy

Please refer to Appendix 6 for a detailed description of STAT's Sample Acceptance Policy. It becomes the customer's responsibility to distribute the sample acceptance policy to all field collection personnel.

STAT Analysis Corp endeavors not to reject samples for analysis that it is accredited to perform except for reasons of safety, radioactivity or the requirement to maintain a legal Chain of Custody.

NOTE: STAT Analyses will not accept samples that require legal Chain-of-Custody.

8.3 Sample Acceptance Policy Differences

8.3.1 Additional Requirements for TNI Samples :

8.3.1.1.1 Aqueous Samples for volatiles are checked for headspace according to SOP 300 Sample Receiving, Section 14.10.2

8.4 Chain-of Custody Form

A Chain-of Custody (COC) should accompany every sample that is received for analysis by STAT Analysis. If the COC is not present, the customer will be notified and the exception

noted on the Sample Log and Checklist/Receipt Form (Sample Receiving and Login Procedure). (Attachments 2-5 list examples of COC forms.)

8.5 Standard Operating Procedure – Sample Receipt/Custody

The sample custodian or a designated alternate receives samples. Receiving and Login Procedure. STAT accepts samples between the hours of 8 AM to 8 PM, Monday through Friday. STAT has a secured sample drop box outside the building for samples that do not require preservation and can fit inside the drop box. For samples that arrive after hours, the sample custodian will receive the samples the next business day.

8.5.1 For specific details refer to SOP 300 Sample Receiving.

8.6 Policy for Disposal of Laboratory Samples

Samples and their extracts will normally be disposed of within (STAT SOP 1130 Waste Disposal) 90 days from receipt of samples or in accordance with individual SOPs. The exception to this will be when a sample hold request is implemented. Refer to STAT SOP 1130 Waste Disposal for specific procedures

9. SAMPLE RECORDS, DATA REVIEW AND DATA HANDLING

Sample accountability through the analytical process can be divided into five major elements: (1) initial sample logging, (2) sample preparation, (3) data acquisition, (4) data review, and (5) documentation/storage. The location of the sample and data records is discussed in SOP 1000 Control and Use of Laboratory Notebooks and in SOP 240 Archiving. Sample records must be able to reproduce the resultant analytical data. It is management's responsibility to ensure that all analytical and operational activities of the laboratory are properly and sufficiently documented. This is accomplished through the periodic audit and review processes as outlined in SOP 1220 Internal Quality Assurance Audit and SOP 006 Management Review of the Quality System. All data, whether manually generated or electronically generated, and final reports are available to the accrediting authority (TNI, AIHA-LAP, LLC, etc.).

The following sections outline current sample and data documentation and review procedures.

9.1 Sample Logging

Samples received at STAT with accompanying identification and COC are logged into the Laboratory Information Management System. The sample custodian, or designate, signs the laboratory receipt section of the COC. Each sample, and each sub-sample appropriately preserved, is assigned a unique sample ID.

9.2 Analytical Data Review and Handling

All raw analytical and instrument control data generated in the laboratory are either entered into bound data books or kept as strip charts, or in instruments computer hardcopy, tape, CD-ROM, or disk. The analyst reviews the data initially and all data entries checked 100% and then the data under goes a second review by a technical peer or supervisor. Errors, or potential errors, are investigated and corrected as necessary. The analytical section manager, Project Manager, Technical Manager, or Laboratory Director, for consistency of data and for assuring customer's needs are met, performs final review. Refer to STAT SOP 1250 Data Review.

Information contained in these data logbooks includes the following: Work Order Number, Sample number, parameter, date of preparation or analysis, analyst, and all pertinent instrument identification with analytical conditions. For non-computerized instruments all calibration data, all readout data, calculations, final concentration, and quality control data should be recorded in the logbook.

9.3 Computerized Analytical Data System

9.3.1 All sample results are entered into the STAT Analysis Laboratory Information management System (LIMS). Sample preparation, as appropriate, will also be entered in LIMS.

9.3.2 For TNI and IH/Lead samples, all appropriate Quality Control data associated with these results are entered into the LIMS, including, but not limited to, Initial Calibration, Initial Calibration Verification, Continuing Calibration Verification, Continuing Calibration Blank, Method Blanks, Laboratory Control Standards, Matrix Spike/Matrix Spike Duplicate, Internal Standard Recoveries, and Surrogate Recoveries.

9.3.3 For all other samples, the quality control information is entered into a separate database or spreadsheet. The information is stored under a unique batch identification number. This information may include: Initial Calibration, Initial Calibration Verification, Continuing Calibration Verification, Continuing Calibration Blank, Method Blanks, Laboratory Control Standards, and Matrix Spike/Matrix Spike Duplicate recoveries as applicable.

9.3.4 Analytical Data Processing. All final analytical results are calculated after entry into the analytical results database.

9.3.5 Analytical Backlogs can be generated through the LIMS system. Samples that are complete will no longer appear on an analytical backlog report. The work order will only be available for Final Report after all sample results have been calculated and subjected to the Quality Control Validation Process.

9.4 Reporting

Final results of all analyses are provided in a standard computerized report format and forwarded to the requester (customer) with cover memorandum. Remarks should be used with reported data to alert the user to some specific conditions that affects the data (e.g., holding times missed, samples diluted to remove interferences, etc.).

Exceptions to this report format must be noted and have approval of the Technical Manager or Laboratory Director.

For modified methods, reports are generated by appending an "M" to the method identifier. Amendments or corrections to the issued test report are only made in the form of a revised document that includes the statement "This report is revised to reflect changes made after the last report revision" in the cover letter or in the case narrative.

Customers are notified immediately, in writing, of any event that cast doubt on the correctness or validity of the laboratory's calibrations, or test results given in any test report or amendment to a report. Such events might include: identification of defective measuring, identification of defective test equipment, or audit findings.

Test results are certified to meet all requirements of TNI, NVLAP, ISO 17025 and AIHA-LAP, LLC standards, or reasons are stated if they do not meet these standards. Sample results are, generally, not blank corrected. Readers are referred to the specific analytical SOPs for details regarding blank correction. If analysis requires blank correction, then the blank used for correction, as well as its value, are noted in the case narrative.

In addition to the items mentioned, below, in 9.4.1 (7), the analytical report will make the following statements:

1. The report shall not be reproduced except in its entirety, unless written approval has been obtained from the laboratory.
2. The results of this report relate only to the samples tested.
3. The laboratory certifies that the test results meet all requirements of IEPA code, Title 35, Subtitle: A, NELAP/Part 186 or NIST Handbook 150 (2006 Edition) or the AIHA-LAP, LLC Policy Document, current revision.
4. Accredited and non-accredited analyses will be distinguished.

9.4.1 Reporting Requirements

The Analytical Report will only be issued in its entirety. The Report will include:

1. A Title, e.g.: Analytical Report, STAT Work Order # or STAT Batch #.
2. Date, name and address of laboratory, phone number and name of contact person (with signature) and laboratory accreditation number. The person signing the report is accepting responsibility for the content of the report;

3. A unique Work Order Number and the total number of pages in the report, with all pages sequentially numbered;
4. Name and address of customer and project identification;
5. Description and unambiguous identification of the sample(s) including the customer identification code, date of sample receipt, date and time of sample collection;
6. Clear identification (including lab name and accreditation number) of any sample results that were generated by a subcontracted laboratory;
7. Case Narrative outlining any sample acceptance outliers and /or sample results with any failures or deviations from approved SOPs including the use and definitions of data qualifiers; as well as reporting uncertainties as required.
8. Identification of approved test method with date of sample preparation, sample preparation method, and/or analysis;
9. Identification of reporting units, e.g., mg/L, mg/Kg, mg/Kg–dry, ppbv, µg/filter µg/wipe, mg, µg, wt. %, or $\mu g/m^3$, etc;
10. Measurements, examinations and derived results, supported by tables, graphs, sketches and photographs as appropriate, and any failures identified;
11. A statement to the effect that sample results relate only to the analytes of interest tested or to the sample as received by the laboratory;
12. Reference to sampling procedures if performed by the laboratory;
13. Identification of analytical methods, including "M" for modified methods, to reflect the methods listed in STAT's FoTs from various accrediting agencies.

9.4.2 Reporting Differences

9.4.2.1 TNI Differences

9.4.2.2 Clear identification of numerical results with values outside the quantitation limits.

10. CORRECTIVE AND PREVENTIVE ACTIONS

Non-conforming work arises out of the analytical process. Corrective and Preventive actions are mechanisms for identifying and correcting Nonconforming work. Quality control data are evaluated, and if data are found to be outside control limits, corrective actions are taken to correct the problem and to prevent incorrect data from being reported. Non-routine Corrective/Preventive actions are tracked through LIMS in the same manner.

10.1 Corrective Action

Routine corrective action will be taken at any time during the analytical process as outlined in the quality control sections of each SOP. These types of out-of-control situations include such things as: instrument calibration outliers, blank contamination, poor laboratory control standard recovery, poor surrogate recovery, poor matrix spike/ matrix spike duplicate recovery or RPD, etc. These situations require immediate corrective action. These required actions are specified in each analytical SOP. All routine corrective actions taken are documented by the analyst on

the raw data or appropriate checklist including their initials and date, to assure traceability of corrective actions performed. All nonconforming data are recorded in a database in a way that they can be reviewed and assessed for recurrence. The database documents all nonconforming and conforming events, which can be reviewed to identify incidences of warning limit and control limit exceedances. Multiple exceedances of warning limits may trigger preventive action. Similarly, multiple exceedances of control limits will trigger corrective action. When instances arise that are not covered by the routine corrective action procedures in the applicable analytical SOP, the analyst must bring the issue to the attention of the Department and the QA Manager. The issues will be discussed with the appropriate staff, the best corrective action determined, performed, documented in the raw data and reported to the customer in a case narrative.

Some out-of-control situations require a more formal corrective action process. They may be the result of internal or external audits, out-of-control proficiency testing analysis, continuing control chart outliers, or even the inability to produce analytical results on time. These situations require a more stringent process. This process may involve technicians, analysts, and laboratory management. The Quality Assurance Director monitors this process (STAT SOP QA 230 Corrective Action). Essential steps in this process include documentation of the following:

- Identification of the problem.
- Assigning a tracking number to the Corrective Action.
- Assigning personnel to investigate the problem.
- Uncovering the root cause of the problem.
- Correcting the problem.
- Monitoring the corrective action.
- Documentation of the corrective action.

Corrective Actions are resolved in a time frame relative to the severity of the defined problem. Some corrective actions may need to be immediately implemented in order for production to continue. Other corrective actions may require a certain amount of time in order to complete a full investigation. An appropriate time frame for completion of the corrective action is discussed with the affected parties. All corrective action investigations are to be completed within a two-week time frame unless unusual circumstances are documented that would extend this deadline. Corrective Actions investigations involve assigning an individual to investigate and determine the cause of the problem.

10.2 Preventive Action

Preventive actions are pro-active processes to identify opportunities for improvement rather than a reaction to the identification of problems. Preventive actions will be taken upon identification of needed improvements and potential sources of nonconformity. Action plans will be developed, implemented, and monitored to reduce the likelihood of the occurrence of such nonconformities and to improve on existing procedures. As part of the preventive action, operational procedures will be reviewed. Data review may also be conducted that include trend and risk analyses and proficiency-testing results.

Steps in the preventive action process may include:

- Identification of the source of potential nonconformity or needed improvements.
- Assigning a tracking number to the Preventive Action
- Assigning personnel to investigate
- Reviewing operational procedures.
- Implementing needed improvements or procedure to avoid potential nonconformity.
- Monitoring the preventive action.
- Documentation of the preventive action.

11. QUALITY EXCEPTION REPORT/CASE NARRATIVE

Some out-of-control situations are not correctable (e.g., silver matrix recovery when certain levels of chloride are present or VOA system monitoring compound recoveries on samples containing activated carbon). The Quality Exception report is executed and included in the case narrative of the analytical final report (STAT SOP QA 230 Corrective and Preventive Action).

12. COMPLAINT

Customer complaints are logged and resolved by project managers as outlined in STAT SOP 220 Customer Service. STAT seeks feedback from its customers so that improvements can be made to the management system, testing and calibration activities, and customer service.

13. CONFIDENTIALITY

All customers, including government entities, are entitled to all aspects of their project to be considered confidential. To protect national security concerns and proprietary rights, STAT Analysis will ensure customer confidentiality. No aspects of customer project can be released to others without the expressed written consent of the customer. All data, electronic media, and reports are considered confidential

A Notice of Confidentiality is affixed to outgoing e-mails and facsimiles transmittals. Examples of these can be viewed in Attachments 6 and 7, respectively.

14. INTERNAL AUDITS

The Laboratory will undergo an annual internal audit, or more frequently if warranted. The Quality Assurance Director will take the lead in this activity. If the Quality Assurance Director is responsible for analytical activity, another member of the management team will audit that area. These activities are outlined in STAT SOP 1220 Internal Quality Assurance Audit. As part of the internal audit, STAT will keep abreast of policy revisions issued by accrediting agencies and to implement changes within a reasonable time frame by revising this QAM and other appropriate SOPs in order to be compliant with existing accrediting agency policies. STAT will contact the accrediting authorities to acquire the current checklist prior to conducting the internal audit.

15. MANAGEMENT REVIEW of the QUALITY SYSTEM

STAT strives continually to improve the effectiveness of its management system through the use of the quality policy, quality objectives, audit results, data analysis, corrective and preventive actions, and management review. This document, and the entire Quality Systems, is reviewed yearly. This process and procedures for development and submittal of quality assurance reports to management are outlined in STAT SOP 006 Management Review of Quality Systems. In addition to the annual report, quarterly quality assurance reports are developed and submitted to management. Finding from management reviews include recommended actions for improvement and the actions are carried out within a reasonable time frame and documented.

Changes made to appendices or attachments of this document will not constitute a revision to this Quality Assurance Manual.

16. TRAINING

STAT ensures that all employees will have proper training for their job. A training file is maintained for each employee (STAT SOP 1230 Training (for TNI/AIHA-LAP, LLC)). It is the responsibility of STAT Management to ensure all employees are educated on ethical and legal responsibilities, as well as, the punishment and penalties for improper, unethical, or illegal actions. Every employee is expected to read, understand, and sign a code of ethics statement.

The need for training beyond initial training on analytical SOPs will be assessed on a case-by-case basis. The department manager and laboratory director will determine if additional training is needed. The introduction of a new technique is an example of the need for additional training. The effectiveness of the training actions is evaluated by the trainer.

17. DATA INTEGRITY

STAT's management is committed to support and implement specific requirements of the data integrity program. STAT's procedures ensure that management and personnel are free from any undue internal and external commercial, financial, and other pressures and influences that may adversely affect the quality of their work. STAT promotes a culture of receptive environment where all employees can privately discuss ethical issues or report items of ethical concern. Such discussions are kept confidential, if need to be. The data integrity system includes four elements discussed below.

- Data Integrity Training: STAT has a training program in place for new employee orientation and on an annual basis for all employees to prevent breaches of ethical behavior. Written training material includes Appendix 7. Topics include:
    - Discussion regarding all data integrity procedures, data integrity training documentation, data integrity monitoring, and procedure documentation.

- Employees are trained on STAT's responsibility to produce data that is scientifically valid, defensible, and of known and documented quality in accordance with all applicable federal, State, and local laws and regulations consistent with accepted professional and analytical practices in a manner that justifies the public trust. The employees are required to understand the critical need for honesty and full disclosure in all analytical reporting.
- Employees are provided specific examples of unethical behavior including improper data manipulations, adjustment of instrument time clocks, and inappropriate changes in samples, software, analytical conditions or concentrations of standards.
- Personnel are trained to inform STAT of any accidental or intentional reporting of non-authentic data by the employee or other employees. Employees are trained not to comply with instructions, requests, or direction by any manager or representative of management to perform any improper laboratory practices. Employees are trained to immediately report such event to all appropriate members of management including department manager, the Laboratory Director, the QA Manager and President/CEO, excluding such individuals who participated in such perceived improper instruction, request, or directive.
- Employees are required to understand that any infractions to the data integrity procedures will result in a detailed investigation. Any allegation of misconduct will be promptly investigated in an unbiased and confidential manner by an investigative team designated by the President. Investigation could lead to very serious consequences for the employee including immediate termination. The investigation, including any supporting documentation, actions and resolution, will be recorded and archived by the QA Director.
- Analysts are trained on proper documentation in Case Narratives where analytical data may be useful, but are partially deficient.

- Signed data integrity documentation for all employees: The initial data integrity training and the annual refresher training have a space for employee signature to verify that the employee has participated in the training and understands his or her obligations related to data integrity issues (see Appendix 7: Ethics Policy and Data Integrity Agreement.).

- In-depth periodic monitoring of data integrity: STAT is committed to document all activities associated with generating valid data. All tasks from sample receipt to issue of analytical reports are tracked and reviewed. Some examples of data monitoring activities include:
  - Documentation and secondary review of sample log-in
  - Documentation and review of all sample preparation activities in specific logbooks
  - Primary and secondary review of all analytical data
  - Primary and secondary review of all manual integration
  - Further review of all of the above steps by project manager and/or Quality Manager

- Calibration of measuring devices, such as thermometers, balances, weights, and pipettes.

- Data Integrity Procedure documentation: All aspects of the data integrity procedures are documented. These include documenting all data monitoring activities. All customer communications are recorded. As discussed above, data integrity training material are developed and documented. Actions arising from data integrity issues, whether technical or ethical in nature, are documented.

18. SUB-CONTRACTING

Any sub-contracting of accredited analytical work must be to another TNI, ISO 17025, NVLAP or AIHA-LAP, LLC (or other ILAC signatory) accredited laboratory with the appropriate fields of testing, approved test methods and analytes. STAT retains on file a copy of the certificates issued to the sub-contracting laboratory. The customer will be notified in writing of the intention to sub-contract analytical work. The analytical report contains the name and accreditation number of the sub-contracted laboratory. STAT maintains a record of all laboratories to which we subcontract analytical work. See STAT SOP 220 Customer Service for additional information.

19. LABORATORY SAFETY

19.1 Introduction

All STAT employees must accept the responsibility for acting in accordance with safety rules and practices and for reporting any observed safety hazard. This section highlights some general guidelines and rules that specifically apply to the analytical laboratory. Therefore, in addition to adhering to guidelines, each person is trained in, and expected to read, understand, and follow STAT SAP 003 Chemical Hygiene Plan.

19.2 General (additional requirements are detailed in STAT SAP 003 Chemical Hygiene Plan)

- Lab coats and safety glasses should be worn at all times in the laboratory. The only exception to this is when personnel are working at computer terminals or microscopes. Lab coats are left in the laboratory. Latex or nitrile gloves are worn when chemical or samples are handled.

- When working in any of the laboratories, it is recommended that all jewelry be removed and that personnel wash their hands frequently. Always wash hands thoroughly when leaving the laboratory.

- All containers should be labeled as to contents, with particular care to note corrosive or hazardous materials.

- There will be no eating, drinking, or smoking in any of the laboratories.
- An inventory of all chemicals used in the laboratory will be maintained.
- The Safety Officer will conduct a quarterly safety inspection of the laboratory.
- All work areas should be cleaned at the end of each workday. Spills should be cleaned up immediately.
- Samples should be in laboratories only during preparation and analysis; other wise keep them in the storage area.
- New personnel must be familiarized with safety practices, location of safety equipment, and made aware of possible hazards in the areas in which they will be working.
- Use safety guards where appropriate when using electrical equipment or ventilation/fume hood systems.

19.3 Sample Receiving and Login

When possible, determine the source of the samples and any special hazards that might be associated with them.

Some samples, when sealed in containers will build up pressure. Samples that indicate pressure should be brought to the attention of the Safety Officer or Laboratory Management.

20. DEFINITIONS

Acceptance Criteria: specified limits placed on characteristics of an item, process, or service defined in requirement documents. (NELAP). Specified limits placed on characteristics of an item, process or service (TNI).
Acceptance Limits: Established mathematical data quality limits for analytical method performance. (AIHA-LAP, LLC)
Accreditation: the process by which an agency or organization evaluates and recognizes a laboratory as meeting certain predetermined qualifications or standards, thereby accrediting the laboratory. (TNI)
Accreditation: A third party attestation related to a conformity assessment body conveying formal demonstration of its competence to carry out specific conformity assessment tasks. (AIHA-LAP, LLC). The process by which an agency or organization evaluates and recognizes a laboratory as meeting certain predetermined qualifications or standard, thereby accrediting the laboratory. (TNI).
Accreditation Body: The territorial, state, or federal agency having responsibility and accountability for environmental laboratory accreditation and which grants accreditation. (TNI)

Accredited Laboratory: A testing laboratory that has been evaluated and granted accreditation covering a specific type of measurement or task, usually for a specific property or analyte, and for a specified period of time. (AIHA-LAP, LLC)
Accrediting Authority: The Territorial, State, or federal agency having responsibility and accountability for environmental laboratory accreditation and which grants accreditation (NELAC, 2003)[1.5.2.3]
Accrediting Authority Review Board (AARB): five voting members from Federal and State Accrediting Authorities and one non-voting member from USEPA, appointed by the NELAP Director, in consultation with the NELAC Board of Directors, for the purposes stated in 1.6.3.e. (NELAC, 2003)
Accreditation Field of proficiency Testing: Same as "Field of Proficiency Testing." (TNI)
Accuracy: Closeness of agreement between a measured quantity value and a true quantity value of a measurand. (AIHA-LAP, LLC). The degree of agreement between an observed value and a reference value. Accuracy includes a combination of random error (Precision)and systematic error (bias) components that are due to sampling and analytical operations; a data quality indicator. I(TNI)
Addendum: Attachment to a document that contains new or altered text.
AIHA: American Industrial Hygiene Association
Aliquot See "Subsample" (AIHA-LAP, LLC)
Analysis: The qualitative or quantitative determination of a property or analyte in a substance or material. (AIHA-LAP, LLC)
Analysis Date: The calendar date of analysis associated with the analytical result reported for an accreditation or experimental field of proficiency testing.(TNI)
Analyst: the designated individual who performs the "hands-on" analytical methods and associated techniques and who is the one responsible for applying required laboratory practices and other pertinent quality controls to meet the required level of quality. (TNI)
Analytical Sensitivity: Quotient of the chance in an indication of a measuring system and the corresponding change in a value of a quantity being measured (e.g., for methods involving a count the analytical sensitivity equals 1 raw count per amount or portion of the sample analyzed, calculated and expressed in the final reporting units). AIHA-LAP, LLC.
Analytical Uncertainty: a subset of Measurement Uncertainty that includes all laboratory activities performed as part of the analysis (TNI).
Analytical Run: For chemical analyses, an analytical run consists of all samples processed continuously using an item of instrumentation or equipment. Samples in one analytical run are analyzed using the same set of standard calibration data. (AIHA-LAP, LLC)
Analytical Uncertainty: A subset of measurement uncertainty that includes all laboratory activities performed as part of the analysis. (NELAP)
Applicant Laboratory or **Applicant:** the laboratory or organization applying for NELAP accreditation. (NELAC, 2003)
Approved Signatory: Person who is recognized by a laboratory as competent and authorized by the laboratory management to sign test reports. (AIHA-LAP, LLC)
Asbestos: A commercial term applied to the asbestiform varieties of six different minerals. The asbestos types are chrysotile, amosite, crocidolite, and asbestiform anthophyllite, asbestiform tremolite, and asbestiform actinolite. The properties of asbestos that caused it to be widely used commercially are: 1) its ability to be separated into long, thin, flexible fibers; 2) high tensile strength; 3) low thermal and electrical conductivity; 4) high chemical and mechanical durability; and 5) high heat resistance.

Assessment: the evaluation process used to measure or establish the performance, effectiveness, and conformance of an organization and/or its systems to defined criteria (to the standards and requirements of laboratory accreditation. (TNI)

Assessment Criteria: the measures established by TNI and applied in establishing the extent to which an applicant is in conformance with TNI requirements. (TNI)

Assessment Team: the group of people authorized to perform the on-site inspection and proficiency testing data evaluation required to establish whether an applicant meets the criteria for NELAP accreditation. (NELAC, 2003)

Assessor: One who performs on-site assessments of accrediting authorities and laboratories' capability and capacity for meeting NELAC requirements by examining the records and other physical evidence for each one of the tests for which accreditation has been requested. (NELAC, 2003)

Assessor: An individual assigned by an accreditation body to perform, alone or as part of an assessment team, an assessment of a CAB. AIHA-LAP, LLC

Assessor Body: the organization that actually executes the accreditation process, i.e., receives and reviews accreditation applications, reviews QA documents, reviews proficiency testing results, performs on-site assessments, etc., whether EPA, the State, or contracted private party. (NELAC, 2003)

ASTM: American Society for Testing and Materials

Audit: a systematic and independent examination of facilities, equipment, personnel, training, procedures, record-keeping, data validation, data management, and reporting aspects of a system to determine whether QA/QC and technical activities are being conducted as planned and whether these activities will effectively achieve quality objectives. (TNI)

Batch: Environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A **preparation batch** is composed of one to 20 environmental samples of the same TNI-defined matrix, meeting the above-mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An **analytical batch** is composed of prepared environmental samples (extracts, digestates or concentrates) that are analyzed together as a group. An analytical batch can include prepared samples originating from various environmental matrices and can exceed 20 samples. (TNI)

Batch: A group of samples that are processed in one operation: considered to be a uniform, discrete unit. (AIHA-LAP, LLC)

Bias: An estimate of a systematic measurement error. (AIHA-LAP, LLC)

Bias: The systemic or persistent distortion of a measurement process, which causes errors in one direction (i.e. the expected sample measurement is different from the sample's true value). (TNI)

Blank: a sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage or analysis. The blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results. Blanks include:

Field Blank: blank prepared in the field by filling a clean container with pure de-ionized water and appropriate preservative, if any, for the specific sampling activity being undertaken. (EPA OSWER)

Instrument Blank: a clean sample (e.g., distilled water) processed through the instrumental steps of the measurement process; used to determine instrument contamination. (EPA-QAD)

Method Blank: a sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analyses. (TNI)

Reagent Blank: (method reagent blank): a sample consisting of reagent(s), without the target analyte or sample matrix, introduced into the analytical procedure at the appropriate point and carried through all subsequent steps to determine the contribution of the reagents and of the involved analytical steps. (QAMS)

Blind Sample: a sub-sample for analysis with a composition known to the submitter. The analyst/laboratory may know the identity of the sample but not its composition. It is used to test the analyst or laboratory's proficiency in the execution of the measurement process. (NELAC, 2003)

A sample submitted for analysis with a composition and identity known to the submitter, but unknown to the analyst, and used to evaluate proficiency in the execution of the measurement process. (AIHA-LAP, LLC)

Calibration: 1) Process used to establish a relationship, with determined uncertainty, between analyte concentration and instrument response.

2) An operation that, under specified conditions, in a first step, establishes a relation between the quantity values with measurement uncertainties provided by measurement standards and corresponding indications with associated measurement uncertainties and, in a second step, uses this information to establish a relation for obtaining a measurement result from an indication. (VIM 2.39 JCGM 200:2012). (AIHA-LAP, LLC)

Calibration: A set of operations that establish, under specified conditions, the relationship between values of quantities indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material, and the corresponding values realized by standards. (1) In calibration of support equipment, the values realized by standards are established through the use of reference standards that are traceable to the International system of units (SI). (2) In calibration according to methods, the values realized by standards are typically established through the use of reference materials that are either purchased by the laboratory with a certificate of analysis or purity, or prepared by the laboratory using support equipment that has been calibrated or verified to meet specifications. (TNI)

Calibration Curve: Expression of the relation between indication and corresponding measured quantity value. A calibration curve expresses a one-to-one relation that does not supply a measurement result as it bears no information about the measurement uncertainty. (AIHA-LAP, LLC). The mathematical relationship between the known values, such as concentrations, or a series of calibration standards and their instrument response (TNI)

Calibration Method: a defined technical procedure for performing a calibration. (TNI)

Calibration Standard: a substance or reference material used for calibration (TNI)

Certification: Third-party attestation related to products, processes, systems or persons. Certification is applicable to all objects of conformity assessment except for conformity assessment bodies themselves, to which accreditation is applicable. (AIHA-LAP, LLC)

Certified Reference Material (CRM): Reference material accompanied by a certificate, having a value, measurement uncertainty, and stated metrological traceability chain to a national metrology institute.. (TNI)

Certified Reference Material (CRM): A reference material, accompanied by documentation issued by an authoritative body and providing one or more specified property values with associated uncertainties and traceabilities, using valid procedures (VIM 5.14 JCGM 200:2012 (AIHA-LAP, LLC)

Chain-of-Custody: Definitive evidence (a record) of the persons who had possession or custody of the sample(s) for all periods of time, as it moved from the point of collection to the final analytical result. (AIHA-LAP, LLC)

Chain-of-Custody Form: Record that documents the possession of the samples from the time of collection to receipt in the laboratory. This record generally includes: the number and types of containers, the mode of collection; the collector; time of collection; preservation; and requested analyses.(TNI)

Check Sample: An uncontaminated sample matrix spiked with a known amount of analyte, usually from the same source as the calibration standard. It is generally used to establish the stability of the analytical system, but also may be used to assess the performance of all or a portion 2 of the measurement system. (AIHA-LAP, LLC)

Clean Air Act: the enabling legislation in 42 U.S.C. 7401 *et seq.*, Public Law 91-604, 84 Stat. 1676 Pub. L. 95-95, 91 Stat., 685 and Pub. L. 95-190, 91 Stat., 1399, as amended, empowering EPA to promulgate air quality standards, monitor and to enforce them. (NELAC, 2003)

Client: See Customer.

Comparability: Refers to the ability to compare data from different sources with a degree of confidence.

Competent Reference Material Supplier: an NMI or an accredited reference material producer (RMP) that conforms to ISO Guide 34 in combination with ISO/IEC 17025. (AIHA-LAP, LLC)

Completeness: Refers to the amount of data that is successfully collected with respect to that amount intended in the study design.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA/Superfund): the enabling legislation in 42 U.S.C. 9601-9675 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. 9601et seq., to eliminate the health and environmental threats posed by hazardous waste sites. (NELAC, 2003)

Confidential Business Information (CBI): information that an organization designates as having the potential of providing a competitor with inappropriate insight into its management, operation or products. NELAC, 2003 and its representatives agree to safeguard identified CBI and to maintain all information identified as such in full confidentiality.

Confirmation: verification of the identity of a component through the use of an approach with a different scientific principle from the original method. These may include, but are not limited to:

Second column confirmation
Alternate wavelength
Derivatization
Mass spectral interpretation
Alternative detectors or
Additional cleanup procedures. (TNI)

Conformance: an affirmative indication or judgment that a product or service has met the requirements of the relevant specifications, contract, or regulation; also the state of meeting the requirements. (ANSI/ASQC E4-1994)

Contributor: a participant in NELAC, 2003 who is not a Voting Member. Contributors include representatives of laboratories, manufacturers, industry, business, consumers, academia, laboratory associations, laboratory accreditation associations, counties, municipalities, and other political subdivisions, other federal and state officials not engaged in environmental activities, and other persons who are interested in the objectives and activities of NELAC. (NELAC, 2003)[Art III, Const]

Control Chart: A graph or database showing measurement responses over time or sequence of sampling, together with acceptance and warning limit(s). Control Charts are used to monitor the validity of test results and trends of successive test results. (AIHA-LAP, LLC)

Corrective Action: the action taken to eliminate the causes of an existing nonconformity, defect or other undesirable situation in order to prevent recurrence. (ISO 8402)
Corrective Action: All activities taken, whether successful or not, to eliminate the cause(s) of an existing nonconformity or deficiency in order to prevent recurrence. See "Deficiency" and "Technical Systems Audit" (AIHA-LAP, LLC)
Customer: Any person or organization that engages the services of a laboratory. Used interchangeably with "client" in this and other quality system documents.
Data Audit: a qualitative and quantitative evaluation of the documentation and procedures associated with environmental measurements to verify that the resulting data are of acceptable quality (i.e., that they meet specified acceptance criteria). (TNI)
Data Reduction: the process of transforming raw data by arithmetic or statistical calculations, standard curves, concentration factors, etc., and collation into a more useable form. (TNI)
Deficiency: A failure to comply with the requirements of the AIHA-LAP, LLC accreditation program(s), ISO/IEC 117025 or the laboratory's own stated management system requirements. (AIHA-LAP, LLC)
Delegate: any environmental official of the States or the Federal government not sitting in the House of Representatives, who is eligible to vote in the House of Delegates. (NELAC, 2003)
Demonstration of Capability: a procedure to establish the ability of the analyst to generate analytical results of acceptable accuracy and precision. (TNI)
Denial: The decision not to grant a laboratory initial accreditation. (AIHA-LAP, LLC.)
Detection Limit: the lowest concentration or amount of the target analyte that can be identified, measured, and reported with confidence that the analyte concentration is not a false positive value. See Method Detection Limit. (NELAC, 2003)
Deviation (Procedural): A departure from written procedures, test methods, contracts or any other standard operating procedure that is part of the laboratory Quality Assurance System. May or may not be considered a nonconformity. (AIHA-LAP, LLC)
Document Control: the act of ensuring that documents (and revisions thereto) are proposed, reviewed for accuracy, approved for release by authorized personnel, distributed properly and controlled to ensure use of the correct version at the location where the prescribed activity is performed. (ASQC)
Duplicate Samples: Two samples taken from and representative of the same population and carried through all steps of the sampling and analytical procedures in an identical manner. Duplicate samples are used to assess variance of the total method including sampling and analysis. (AIHA-LAP, LLC)
Environmental Laboratory Advisory Board (ELAB): a Federal Advisory Committee, with members appointed by EPA and composed of a balance of non-state, non-federal representatives, from the environmental laboratory community, and chaired by an ELAB member. (NELAC, 2003 [1.6.2]
Environmental Lead Laboratory Accreditation Program (ELLAP):
The AIHA-LAP, LLC accreditation program, complying with the requirements of the EPA National Lead Laboratory Accreditation Program (NLLAP) Laboratory Quality System Requirements (LQSR), AIHA-LAP, LLC requirements and the ISO/IEC 17025 Standard and ISO/IEC 17011 requirements (AIHA-LAP, LLC)
Environmental Lead Proficiency Analytical Testing (ELPAT): AIHA-LAP, LLC proficiency testing program for environmental lead laboratories (AIHA-LAP, LLC)
Environmental Microbiology Laboratory Accreditation Program (EMLAP): This AIHA-LAP, LLC accreditation program intended for the accreditation of environmental microbiology laboratories.

This program complies with AIHA-LAP, LLC requirements and the ISO/IEC 17025 Standard and ISO/IEC 17011 requirements. (AIHA-LAP, LLC)

Environmental Microbiology Proficiency Analytical Testing (EMPAT): AIHA-LAP, LLC Program, proficiency testing program for environmental microbiology laboratories. (AIHA-LAP, LLC)

Environmental Monitoring Management Council (EMMC): an EPA Committee consisting of EPA managers and scientists, organized into a Policy Council, a Steering Group, *ad hoc* Panels, and work groups addressing specific objectives, established to address EPA-wide monitoring issues. (NELAC, 2003)

Equipment: All physical items (including software and instruments) in the facility used in the performance of analytical testing. (AIHA-LAP, LLC)

Equipment Log: A chronological record of preventive and emergency maintenance performed on any equipment. The logs include a record of calls, service technician summaries, records of calibration by the manufacturer, routine user maintenance, and other information as required by these policies. (AIHA-LAP, LLC)

Experimental Field of Proficiency Testing (Experimental FoPT): Analytes for which a laboratory is required to analyze a PT sample if they seek or maintain accreditation for the field of accreditation but for which successful analysis is not required in order to obtain or maintain accreditation. (TNI)

Federal Insecticide, Fungicide and Rodenticide Act (FIFRA): the enabling legislation under 7 U.S.C. 135 *et seq.*, as amended, that empowers the EPA to register insecticides, fungicides, and rodenticides. (NELAC, 2003)

Federal Water Pollution Control Act (Clean Water Act, CWA): the enabling legislation under 33 U.S.C. 1251 *et seq.*, Public Law 92-50086 Stat. 816, that empowers EPA to set discharge limitations, write discharge permits, monitor, and bring enforcement action for non-compliance. (NELAC, 2003)

Field Blank: An analyte-free matrix carried to the sampling site, exposed to the sampling conditions (e.g., media unsealed and re-sealed), returned to the laboratory, treated as a sample, and carried through all steps of the analysis. For example, a clean culture media plate, sorbent tube, or a clean filter could be used as a field blank. The field blank, which should be treated just like the sample, evaluates possible effects attributable to shipping and field handling procedures. (AIHA-LAP, LLC)

Field of Accreditation: Those matrix, technology/method, and analyte combinations for which the accreditation body offers accreditation. (TNI)

Field of Proficiency Testing (FoPT): Analysis for which a laboratory is required to successfully analyze a PT sample in order to obtain or maintain accreditation, collectively defined as: matrix, technology/method, analyte.

FoT: Field of Testing (AIHA-LAP, LLC)

Finding: an assessment conclusion referenced to a laboratory accreditation standard and supported by objective evidence that identifies a deviation from a laboratory accreditation standard requirement. (TNI)

Governmental Laboratory: as used in these standards, a laboratory owned by a Federal, state, or tribal government; includes government-owned contractor-operated laboratories. (NELAC, 2003)

Holding Times (Maximum Allowable Holding Times): The maximum times that samples may be held prior to analysis and still be considered valid or not compromised. (40 CFR Part 136)
The maximum time that can elapse between two specified activities. (TNI)

Inspection: an activity such as measuring, examining, testing, or gauging one or more characteristics of an entity and comparing the results with specified requirements in order to establish whether conformance is achieved for each characteristic. (ANSI/ASQC E4-1994)

Industrial Hygiene Proficiency Analytical Testing (IHPAT): AIHA-LAP Program, LLC proficiency testing program for industrial hygiene laboratories. (AIHA-LAP, LLC)

Initial Calibration Verification (ICV): A standard solution (or set of solutions) used to verify calibration standard levels. The ICV shall be prepared independently from the calibration standards (from a stock solution having a different manufacturer or different manufacturer's lot identification or as an independent preparation from a neat material). (AIHA-LAP, LLC)

Interim Accreditation: temporary accreditation status for a laboratory that has met all accreditation criteria except for a pending on-site assessment which has been delayed for reasons beyond the control of the laboratory. (NELAC, 2003)

Inter-laboratory Comparisons: Evaluation of tests on the same or similar items by two or more laboratories. (AIHA-LAP, LLC)

Internal Quality Control: Routine activities and checks, such as periodic calibrations, duplicate analyses and matrix spikes that are included in routine internal procedures to control the accuracy and precision of measurements.

Internal Standard: A known amount of standard added to a test portion of a sample as a reference for evaluating and controlling the precision and bias of the applied analytical method. (TNI)

Laboratory: a body that calibrates and/or tests. (ISO 25)

Laboratory: An entity that tests, either at a fixed site, mobile facility or field operations facility. Also referred to as a CAB. (AIHA-LAP, LLC)

Laboratory Assessment: An onsite evaluation of a laboratory for the purpose of conducting a technical systems audit to assess compliance with AIHA accreditation requirements and technical competence to perform the testing for which the Lab is seeking accreditation. (AIHA-LAP, LLC)

Laboratory Control Sample (however named, such as laboratory fortified blank, spiked blank, or QC check sample): Laboratory Control Sample (LCS)/Method Spike Sample: A matrix-based reference material with an established concentration obtained from a source traceable to NIST or other similar reference materials. The LCS is carried through the entire procedure from sample preparation through analysis as if it were a field sample. The purpose of the LCS is to evaluate bias of the method. (AIHA-LAP, LLC)

Laboratory Control Sample (however named, such as laboratory fortified blank, spiked blank, or QC check sample): Laboratory Control Sample (LCS)/Method Spike Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes and taken through all sample preparation and analytical steps of the procedure unless otherwise noted in a reference method. It is generally used to establish intra-laboratory or analyst specific precision and bias to assess the performance of all or portion of the measurement system. (TNI)

Laboratory Control Sample Duplicate (LCSD)/Method Spike Sample Duplicate: A duplicate of the LCS. (AIHA-LAP, LLC)

Laboratory Duplicate: aliquots of a sample taken from the same container under laboratory conditions and processed and analyzed independently. (TNI)

Legal Chain-of-Custody Protocols: procedures employed to record the possession of samples from the time of sampling through the retention time specified by the customer or program. These procedures are performed at the special request of the customer and include the use of a Chain of Custody Form that documents the collection, transport, and receipt of compliance samples by the laboratory. In addition, these protocols document all handling of the samples within the laboratory. (TNI)

Limit(s) of Detection (LOD): A laboratory's estimate of the minimum amount of an analyte in a given matrix that an analytical procedure can reliably detect in their facility. (NELAP)

Limit(s) of Quantitation (LOQ): The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specific degree of confidence. (TNI)

Manager (however named): the individual designated as being responsible for the overall operation, all personnel, and the physical plant of the environmental laboratory. A supervisor may report to the manager. In some cases, the supervisor and the manager may be the same individual. (NELAC, 2003)

Matrix: the substrate of a test sample. (TNI)

Field of Accreditation Matrix. (TNI): these matrix definitions shall be used when accrediting a laboratory (see Field of Accreditation).

Drinking Water: any aqueous sample that has been designated a potable or potential potable water source.

Non-Potable Water: any aqueous sample excluded from the definition of Drinking Water matrix; includes surface water, groundwater, effluents, water treatment chemicals, and TCLP or other extracts.

Solid and Chemical Materials: includes soils, sediments, sludges, products and by-products of an industrial process that results in a matrix not previously defined.

Biological Tissue: any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.

Air and Emissions: whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbent tube, impinger solution, filter, or other device.

Quality System Matrix. (TNI): These matrix definitions are an expansion of the field of accreditation matrices and shall be used for purposes of batch and quality control requirements. These matrix distinctions shall be used:

Aqueous: any aqueous sample excluded from the definition of Drinking Water matrix or Saline/Estuarine source; includes surface water, groundwater, effluents, and TCLP or other extracts.

Drinking Water: any aqueous sample that has been designated a potable or potential potable water source.

Saline/Estuarine: any aqueous sample from an ocean or estuary, or other salt-water source such as the Great Salt Lake.

Non-aqueous Liquid: any organic liquid with <15% settleable solids.

Biological Tissue: any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.

Solids: includes soils, sediments, sludges and other matrices with >15% settleable solids.

Chemical Waste: a product or by-product of an industrial process that results in a matrix not previously defined.

Air and Emissions: whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbent tube, impinger solution, filter, or other device

Matrix: The component or substrate (e.g., soil, air or charcoal tube) that contains the analyte of interest. (AIHA-LAP, LLC)

Matrix Duplicate: A replicate matrix prepared in the laboratory and analyzed to obtain a measure of precision. (TNI)

Matrix Spike (spiked sample or fortified sample): a sample prepared, taken through all sample preparation and analytical steps of the procedure unless otherwise noted in a reference method, by adding a known amount of target analyte to a specified amount of matrix sample for which an independent test result of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency. (TNI)
Matrix Spike (spiked sample or fortified sample): An aliquot of sample, or sample media, spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. (AIHA-LAP, LLC)
Matrix Spike Duplicate (spiked sample or fortified sample duplicate): A replicate matrix spike prepared in the laboratory and analyzed to obtain a measure of the precision of the recovery for each analyte. (TNI)
May: denotes permitted action, but not required action.
Measurement Quality Objectives (MQOs): The desired sensitivity, range, precision, and bias of a measurement.
Measurement System: A method, as implemented at a particular laboratory, and which includes the equipment used to perform the test and the operator(s). (TNI)
Method: An orderly arrangement of steps to describe a process for accomplishing something, whether samples analysis or an administrative operation, (AIHA-LAP, LLC). A body or procedures and techniques for performing an activity (e.g., sampling, chemical analysis, quantification), systematically presented in the order in which they are to be executed. (TNI)
Method Blank: An unexposed sampling media or reagent(s), not taken to the field or shipped, but carried through the complete sample preparation and analytical procedure. The blank is used to assess possible background contamination from the analytical process. This blank may also be referred to as a laboratory blank. (AIHA-LAP, LLC)
Method Detection Limit (MDL): the minimum concentration of a substance (an analyte) that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte. (40 CFR Part 136, Appendix B)
Method Detection Limit (MDL): The minimum concentration of an analyte that, in a given matrix and with a specific method, has a 99 percent probability of being identified, qualitatively or quantitatively measured, and reported to be greater than zero. (AIHA-LAP, LLC)
Method Performance: A general term used to document the characteristics of a method. These characteristics usually include method detection limits, linearity, precision, accuracy and bias and uncertainty of measurement. See Acceptance Limits. (AIHA-LAP, LLC)
Mobile Laboratory: A portable enclosed structure with necessary and appropriate accommodation and environmental conditions for a laboratory, within which testing is performed by analysts. Examples include but are not limited to trailers, vans and skid-mounted structures configured to house testing equipment and personnel. (TNI)
Must: denotes a requirement that must be met. (Random House College Dictionary)
National Accreditation Database: the publicly accessible database listing the accreditation status of all laboratories participating in NELAP. (TNI)
National Institute of Standards and Technology (NIST): A federal agency of the US Department of Commerce's Technology Administration that is designed as the United States national metrology institute (NMI). (TNI)

National Environmental Laboratory Accreditation Conference (NELAC): a voluntary organization of State and Federal environmental officials and interest groups purposed primarily to establish mutually acceptable standards for accrediting environmental laboratories. A subset of NELAP. (NELAC, 2003)

National Environmental Laboratory Accreditation Program (NELAP): the overall National Environmental Laboratory Accreditation Program of which NELAC is a part. (TNI)

National Voluntary Laboratory Accreditation Program (NVLAP): a program administered by NIST that is used by providers of proficiency testing to gain accreditation for all compounds/matrices for which NVLAP accreditation is available, and for which the provider intends to provide NELAP PT samples. (NELAC, 2003)

Negative Control: measures taken to ensure that a test, its components, or the environment do not cause undesired effects, or produce incorrect test results. (NELAC, 2003)

NELAC Standards: the plan of procedures for consistently evaluating and documenting the ability of laboratories performing environmental measurements to meet nationally defined standards established by the National Environmental Laboratory Accreditation Conference. (NELAC, 2003)

NELAP Recognition: the determination by the NELAP Director that an accrediting authority meets the requirements of the NELAP and is authorized to grant NELAP accreditation to laboratories. (NELAC, 2003)

Nonconformity: A failure to comply with a requirement of the AIHA-LAP, LLC accreditation program(s) requirements, ISO/IEC 17025 or a laboratory's own stated management system requirements. (AIHA-LAP, LLC)

Non-governmental Laboratory: any laboratory not meeting the definition of the governmental laboratory. (NELAC, 2003)

Performance Audit: the routine comparison of independently obtained qualitative and quantitative measurement system data with routinely obtained data in order to evaluate the proficiency of an analyst or laboratory. (NELAC, 2003)

Performance Based Measurement System (PBMS): a set of processes wherein the data quality needs, mandates or limitations of a program or project are specified and serve as criteria for selecting measurement processes which will meet those needs in a cost-effective manner. (NELAC, 2003)

Policy: An organization's written statement of commitment to implement a management program element. (AIHA-LAP, LLC)

Positive Control: measures taken to ensure that a test and/or its components are working properly and producing correct or expected results from positive test subjects. (NELAC, 2003)

Precision: The degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves; a data quality indicator. Precision is usually expressed as standard deviation, variance or range, in either absolute or relative terms. (TNI)

Precision: Closeness of agreement between indications or measured quality values obtained by replicate measurement on the same or similar objects under specified conditions. Measurement precision is usually expressed numerically by measures of imprecision, such as standard deviation, variance or coefficient of variation under the specified condition of measurement (AIHA-LAP, LLC)

Preventive Action: A proactive planned activity to identify, recognize and control potential sources of nonconformity and to introduce needed improvements. (AIHA-LAP, LLC)

Primary Accreditation Body (Primary AB): The accreditation body responsible for assessing a laboratory's total quality system, and PT performance tracking for fields of accreditation.

Procedure: A written set of instructions that describe how to implement a policy requirement, or how to carry out a specific task. (AIHA-LAP, LLC)
Procedure: A specified way to carry out an activity or process. Procedures can be documented or not. (TNI)
Preservation: Any condition under which a sample must be kept in order to maintain the chemical and/or biological integrity prior to analysis. (TNI)
Primary Accreditation Body (Primary AB): The accreditation body responsible for assessing a laboratory's total quality system, on-site assessment, and PT performance tracking for fields of accreditation. (TNI)
Procedure:A specified way to carry out an activity or process. Procedures can be documented or not. (TNI)
Proficiency Analytical Testing (PAT): A program for determining the ongoing acceptable performance of a laboratory in performing specified tests or analyses. PT samples may be obtained from an approved PT Provider or prepared internally as described in AIHA-LAP, LLC policies. (AIHA-LAP, LLC)
Proficiency Testing (PT): A means to evaluate a laboratory's performance under controlled conditions relative to a given set of criteria, through analysis of unknown samples provided by an external source. (TNI)
Proficiency Testing Oversight Body/Proficiency Testing Provider Accreditor (PTOB/PTPA): an organization with technical expertise, administrative capacity and financial resources sufficient to implement and operate a national program of PT provider evaluation and oversight that meets the responsibilities and requirements established), such as the programs established under the Analytical Quality Programs. (AIHA-LAP, LLC)
Proficiency Testing Program (PT Program): the aggregate of providing rigorously controlled and standardized environmental samples to a laboratory for analysis, reporting of results, statistical evaluation of the results and the collective demographics and results summary of all participating laboratories. (TNI)
Proficiency Testing Provider (PTP): A person or organization accredited by the TNI-approved Proficiency Testing Provider Accreditor to operate a TNI-compliant PT program. (TNI)
Proficiency Testing Provider Accreditor (PTPA): An organization that is approved by TNI to accredit and monitor the performance of proficiency testing providers. (TNI)
Proficiency Testing Sample (PT Sample): A sample, the composition of which is unknown to the laboratory and is provided to test whether the laboratory can produce analytical results within the specified acceptance criteria. (TNI)
Proficiency Testing Study (PT Study): A single complete sequence of circulation of proficiency testing samples to all participants in a proficiency test program.
Protocol: A detailed written procedure for field and/or laboratory operation. (TNI) (e.g., sampling or analysis which must be strictly followed.
PT Study Opening Date: The calendar date that a PT sample is first made available to any laboratory by a PT provider.(TNI)
PT Study Closing Date: The calendar date for which analytical results for a PT sample shall be received by the PT provider from the laboratory. (TNI)
Protocol: a detailed written procedure for field and/or laboratory operation (e.g., sampling, analysis) that must be strictly followed. (TNI)
Quality: The suitability of a product or service for use, as perceived by the user. (AIHA-LAP, LLC)

Quality Assurance: An integrated system of management activities involving planning, implementation, assessment, reporting and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the customer. (TNI)

Quality Assurance: An integrated system of activities involving planning, quality control, quality assessment, reporting, and quality improvement to ensure a product or service meets defined standards of quality within a stated level of confidence. (AIHA-LAP, LLC)

Quality Assurance [Project] Plan (QAPP): a formal document describing the detailed quality control procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved. (EPA-QAD)

Quality Control: The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements for quality; also the system of activities and checks used to ensure that measurement systems are maintained within prescribed limits, providing protection against "out of control" conditions and ensuring that the results are of acceptable quality.. (TNI)

Quality Control: Technical activities whose purpose is to measure and control the quality of a product or service so that it meets the needs of users. The aim is to provide quality that is satisfactory, adequate, dependable and economical. (AIHA-LAP, LLC)

Quality Control Sample: A sample used to assess the performance of all or a portion of the measurement system. One of any number of samples, such as CRM, a quality system matrix fortified by spiking, or actual samples fortified by spiking, intended to demonstrate that a measurement system or activity is in control. (TNI)

Quality Manager: An employee of an accredited laboratory, having quality assurance responsibilities. Responsibilities required for accreditation by AIHA-LAP, LLC are given in AIHA-LAP, LLC policies 2A.5.2.1.2). (AIHA-LAP, LLC)

Quality Management System: System to establish a quality policy and quality objectives and to achieve those objectives.

Quality Manual: a document stating the management policies, objectives, principles, organizational structure and authority, responsibilities, accountability, and implementation of an agency, organization, or laboratory, to ensure the quality of its product and the utility of its product to its users. (TNI)

Quality Manual: A document stating the quality policy, quality system and internal quality control procedures of the laboratory. (AIHA-LAP, LLC)

Quality System: a structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required QA and QC activities. (TNI)

Quality System Matrix: These matrix definitions are to be used for purposes of batch and quality control requirements (TNI):

> *Air and Emissions:* Whole gas or vapor samples including those contained in flexible or rigid wall containers
> and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbant tube,
> impinger solution, filter, or other device.

Aqueous: Any aqueous sample excluded from the definition of Drinking Water or Saline/Estuarine. Includes
surface water, ground water effluents, and TCLP or other extracts.
Biological Tissue: Any sample of a biological origin such as fish tissue, shellfish, or plant material. Such
samples shall be grouped according to origin.
Chemical Waste: A product or by-product of an industrial process that results in a matrix not previously
defined.
Drinking Water: Any aqueous sample that has been designated a potable or potential potable water source.
Non-Aqueous Liquid: Any organic liquid with <15% settleable solids.
Saline/Estuarine: Any aqueous sample from an ocean or estuary, or other salt water source such as the Great
Salt Lake.
Solids: Includes soils, sediments, sludges and other matrices with >15% settleable solids.

Quantitation Limits: levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported at a specified degree of confidence. (TNI)
Range: the difference between the minimum and the maximum of a set of values. (EPA-QAD)
Raw Data: The documentation generated during sampling and analysis. This documentation includes, but not limited to, field notes, electronic data, magnetic tapes, untabulated sample results, QC sample results, print outs of chromatograms, instrument outputs, and handwritten records. (TNI)
Reference Material: Material or substance one or more of whose property values are sufficiently homogeneous and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials. (TNI)
Reference Material: A material, sufficiently homogeneous and stable with reference to specified properties, which has been established to be fit for its intended use in measurement or in examination of nominal properties. When possible, the material must be a SRM or a material obtained from an accredited Reference Material Producer (RMP) or other Competent Reference Material Supplier. (AIHA-LAP, LLC)
Reference Method: a method of known and documented accuracy and precision issued by an organization recognized as competent to do so. (TNI)
Reference Standard: Standard used for the calibration of working measurement standards in a given organization or at a given location. (TNI)

1) An object that has a measured physical property or attribute related to a physical attribute (e.g., mass, length, temperature) determined to a stated uncertainty. Reference standards shall be NIST traceable or equivalent.
2) Measurement standard designated for the calibration of other measurement standards for quantities of a given kind in a given organization or at a given location.
3) supported by a certificate showing analysis in accordance with ISO/IEC 17025. (AIHA-LAP, LLC)

Reference Toxicant: the toxicant used in performing toxicity tests to indicate the sensitivity of a test organism and to demonstrate the laboratory's ability to perform the test correctly and obtain consistent results (see Chapter 5, Appendix D, section 2.1f). (TNI)

Relative Percent Difference (RPD): A term defined as RPD = ((R1 – R2)/R) x 100 where R1 – R2 represents the absolute difference of two (2) values and R represents the average of the two (2) values. (AIHA-LAP, LLC)

Relevant Degree: A program of collegiate study that is appropriate to the applicable accreditation program. (AIHA-LAP, LLC)

Replicate Analyses: the measurements of the variable of interest performed identically on two or more sub-samples of the same sample within a short time interval. (TNI)

Reporting Limit: The lowest concentration of analyte in a sample that can be reported with a defined, reproducible level of certainty. This value may be based on the low standard used for instrument calibration. For environmental lead analyses, the reporting limit must be at least twice the MDL. (AIHA-LAP, LLC)

Representativeness: Refers to the degree to which the data collected accurately reflect the population, group or medium being sampled.

Requirement: denotes a mandatory specification; often designated by the term "shall". (TNI)

Requirement: An essential criterion necessary for accreditation. (AIHA-LAP, LLC)

Resource Conservation and Recovery Act (RCRA): the enabling legislation under 42 USC 321 *et seq.* (1976), that gives EPA the authority to control hazardous waste from the "cradle-to-grave", including its generation, transportation, treatment, storage, and disposal. (NELAC, 2003)

Revocation: the total or partial withdrawal of a laboratory's accreditation by an accreditation body. (TNI)

Revocation: The formal, permanent removal of a laboratory's accreditation for noncompliance with AIHA-LAP, LLC accreditation requirements. (AIHA-LAP, LLC)

Revocation: Removal of the accredited status of a laboratory if the laboratory is found to have violated the conditions for accreditation. (NIST)

Run: A set of consecutive measurements performed on different samples. (AIHA-LAP, LLC)

Safe Drinking Water Act (SDWA): the enabling legislation, 42 USC 300f *et seq.* (1974), (Public Law 93-523), that requires the EPA to protect the quality of drinking water in the U.S. by setting maximum allowable contaminant levels, monitoring, and enforcing violations. (NELAC, 2003)

Sample: for instrumental analyses, a sample is defined as an analytical determination. Thus a Continuing Calibration Verification Standard (CCV) is analyzed after every ten determinations, regardless of the type of sample (QC sample or test sample). For those test methods that require the analysis of an Initial or Continuing Calibration Blank (ICB or CCB) after the ICV or CCV analysis, the ICB or CCB is not counted as a determination. In addition, if a reagent/solvent blank analysis (rinse blank) is performed to ensure that carryover from a highly concentrated sample has not contaminated the system, this is not counted as a determination. For certain analyses (i.e., GC/MS), the requirement to analyze a CCV is per number of hours, not per number of determinations.

Sample Tracking: procedures employed to record the possession of the samples from the time of sampling until analysis, reporting, and archiving. These procedures include the use of a Chain of Custody Form that documents the collection, transport, and receipt of compliance samples to the laboratory. In addition, access to the laboratory is limited and controlled to protect the integrity of the samples. (NELAC, 2003)

Sample Tracking: A documentation system of following a sample from receipt at the laboratory, through sample processing and analysis, to final reporting. The system includes unique numbering, or bar coding labels for samples. (AIHA-LAP, LLC)
Sampling: Activity related to obtaining a representative sample of the object of conformity assessment, according to a procedure. (TNI)
Secondary Accrediting Authority: the Territorial, State or federal agency that grants NELAC accreditation to laboratories, based upon their accreditation by a NELAP-recognized Primary Accrediting Authority. See also **Recognition** and **Primary Accrediting Authority**. (NELAC, 2003)[1.5.2.3]
Selectivity: The ability to analyze, distinguish, and determine a specific analyte or parameter from another component that may be a potential or that may behave similarly to the target analyte or parameter within the measurement system. (TNI)
Sensitivity: the capability of a method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. (TNI)
Shall: denotes a requirement that is mandatory whenever the criterion for conformance with the specification requires that there is no deviation. This does not prohibit the use of alternative approaches or methods for implementing the specification so long as the requirement is fulfilled. (ANSI)
Should: denotes a guideline or recommendation whenever noncompliance with the specification is permissible. (ANSI)
Spike: a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery efficiency or for other quality control purposes. (TNI)
SRM (NIST Standard Reference material): A reference material certified and distributed by the National Institute of Standards and Technology.
Standard: The document describing the elements of laboratory accreditation that has been developed and established within the consensus principles of standard setting and meets the approval requirements of standard adoption organization's procedures and policies. (TNI)
Standard: A substance or material with properties believed to be known with sufficient accuracy to permit its use to evaluate the same property of another substance or material. In chemical measurements, it often describes a solution or substance commonly prepared by the analyst to establish a calibration curve or the analytical response function of an instrument. (AIHA-LAP, LLC)
Standard Administrative Procedure (SAP): a written procedure that details administrative operations that thoroughly prescribes actions to be taken
Standard Operating Procedures (SOPs): A written document which details the method for an operation, analysis, or action, with thoroughly prescribed techniques and steps. SOPs are officially as the methods for performing certain routine or repetitive tasks. (TNI)
Standard Operating Procedures (SOPs): A written document that details the procedures of an operation; an analysis or action whose techniques and procedures are thoroughly prescribed, and which are accepted as the procedure for performing certain routine or repetitive tasks. (AIHA-LAP, LLC)
Standard Reference Material (SRM): a certified reference material produced by the U.S. National Institute of Standards and Technology or other equivalent organization and characterized for absolute content, independent of analytical method. (EPA-QAD)
Standard Reference Material (SRM): A certified reference material produced by the U.S. National Institute of Standards and Technology (NIST), or other national metrology organization and characterized for absolute content independent of analytical method. It is accompanied by a certificate that reports the results of the characterization and the intended use of the material. (AIHA-LAP, LLC)

Standardization: The process of establishing the quantitative relationship between a known mass of target material and the measurement system (example, instrument response). See Calibration and Calibration curve. The term may also refer to activities that establish provisions for common and repeated use of accreditation policies to achieve an optimum level of conformity. (AIHA-LAP, LLC)

Statistical Minimum Significant Difference (SMSD): the minimum difference between the control and a test concentration that is statistically significant; a measure of test sensitivity or power. The power of a test depends in part on the number of replicates per concentration; the significance level selected, e.g., 0.05, and the type of statistical analysis. If the variability remains constant, the sensitivity of the test increases as the number of replicates is increased. (TNI)

Stock Solution: A concentrated solution of analyte(s) or reagent(s) prepared and verified by prescribed procedure(s), and used for preparing calibration standards. See Calibration Standard. (AIHA-LAP, LLC)

Study: This term refers to a PT study or supplemental PT study. (TNI)

Supplemental Proficiency Testing Study (Supplemental PT Study): A PT sample that may be from a lot previously released by a PT provider that meets the requirements for supplemental PT samples given in Volume 3 of this Standard but that does not have a pre-determined opening date and closing date. (TNI)

Subsample: A representative portion of a sample; in analytical chemistry, an "aliquot." Not the same as a *duplicate* sample (AIHA-LAP, LLC)

Suggestion: Suggested activity or advice for improving laboratory performance often made during a site assessment. A suggestion is not a requirement. (AIHA-LAP, LLC)

Supervisor (however named): the individual(s) designated as being responsible for a particular area or category of scientific analysis. This responsibility includes direct day-to-day supervision of technical employees, supply and instrument adequacy and upkeep, quality assurance/quality control duties and ascertaining that technical employees have the required balance of education, training and experience to perform the required analyses. (NELAC, 2003)

Surrogate: a substance with properties that mimic the analyte of interest. It is unlikely to be found in environment samples and is added to them for quality control purposes. (QAMS)

Suspension: the temporary removal of a laboratory's accreditation for a defined period of time, which shall not exceed six (6) months or the period of accreditation, whichever is longer, in order to allow the laboratory time to correct deficiencies or area of nonconformance with the Standard. (TNI)

Suspension: A temporary removal of the accredited status of a laboratory when it is found to be out of compliance with specific program requirements. (AIHA-LAP, LLC)

Technical Director: individual(s) who has overall responsibility for the technical operation of the environmental testing laboratory. (NELAC, 2003)

Technical Systems Audit: A thorough, systematic, onsite, qualitative evaluation of facilities, equipment, personnel, training, procedures, record keeping, data validation, data management and reporting aspects of a total quality system. See also Site Assessment (AIHA-LAP, LLC)

Technology: A specific arrangement of analytical instruments, detection systems, and/or preparation techniques. (TNI)

Test: a technical operation that consists of the determination of one or more characteristics or performance of a given product, material, equipment, organism, physical phenomenon, process or service according to a specified procedure. The result of a test is normally recorded in a document sometimes called a test report or a test certificate. (ISO/IEC Guide 2-12.1, amended)

Test: A technical operation that consists of determining one or more properties or constituents in a sample according to a specified procedure. (AIHA-LAP, LLC)
Test Method: Specified technical procedure for performing a test. See Standard Operating Procedure (AIHA-LAP, LLC)
Test Method: A body of procedures and techniques for performing an activity (e.g., sampling, chemical analysis, quantification), systematically presented in the order in which they are to be executed. (TNI).
Testing Laboratory: a laboratory that performs tests. (ISO/IEC Guide 2-12.4)
Test Sensitivity/Power: the minimum significant difference (MSD) between the control and test concentration that is statistically significant. It is dependent on the number of replicates per concentration, the selected significance level, and the type of statistical analysis (see Chapter 5, Appendix D, section 2.4.a). (TNI)
TNI PT Board: A board consisting of TNI members or affiliates, appointed by the TNI Board of Directors, which is responsible for the successful implementation and operation of the TNI Proficiency Testing Program. The duties of the TNI PT Board are defined in the TNI PT Board Charter.(TNI)
Tolerance Chart: A chart in which the plotted quality control data is assessed via a tolerance level (e.g. +/- 10% of a mean) based on the precision level judged acceptable to meet overall quality/data use requirements instead of a statistical acceptance criteria (e.g. +/- 3 sigma) (applies to radiobioassay laboratories). (ANSI)
Toxic Substances Control Act (TSCA): the enabling legislation in 15 USC 2601 *et seq.*, (1976), that provides for testing, regulating, and screening all chemicals produced or imported into the United States for possible toxic effects prior to commercial manufacture. (TNI)
Traceability: The ability to trace the history, application, or location of an entity by means of recorded identifications. In a calibration sense, traceability relates measuring equipment to national or international standards, primary standards, basic physical constants or properties, or reference materials. In a data collection sense, it relates calculations and data generated throughout the project back to the requirements for the quality of the project. (TNI)
Traceability: Property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually international or national standards, through an unbroken chain of comparisons all having stated uncertainties. (NIST)
Traceability: The process of documenting the value of a reference material or standard as related to SI or NIST standards or equivalent through an unbroken chain of comparisons with stated uncertainties. (AIHA-LAP, LLC)
Uncertainty of Measurement: Result of the evaluation aimed at characterizing the range within which the true value of a test result is estimated to lie, generally within a given likelihood.
Non-negative parameter characterizing the dispersion of the quantity values being attributed to a measurand, based on the information used. (AIHA-LAP, LLC)
Uncertainty of Measurement: Parameter, associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurand. (NIST)
United States Environmental Protection Agency (EPA): the federal governmental agency with responsibility for protecting public health and safeguarding and improving the natural environment (i.e., the air, water, and land) upon which human life depends. (US-EPA)
Validation: the process of substantiating specified performance criteria. (EPA-QAD)
Validation: The process of confirming specified method performance criteria. (AIHA-LAP, LLC)

Verification: confirmation by examination and objective evidence that specified requirements have been met. (TNI)

NOTE: In connection with the management of measuring equipment, verification provides a means for checking that the deviations between values indicated by a measuring instrument and corresponding known values of a measured quantity are consistently smaller than the maximum allowable error defined in a standard, regulation or specification peculiar to the management of the measuring equipment.

Verification: Provision of objective evidence that a given item fulfils specified requirements. For example – Confirmation that a given reference material as claimed is homogeneous for the quantity value and measurement procedure concerned. (AIHA-LAP, LLC)

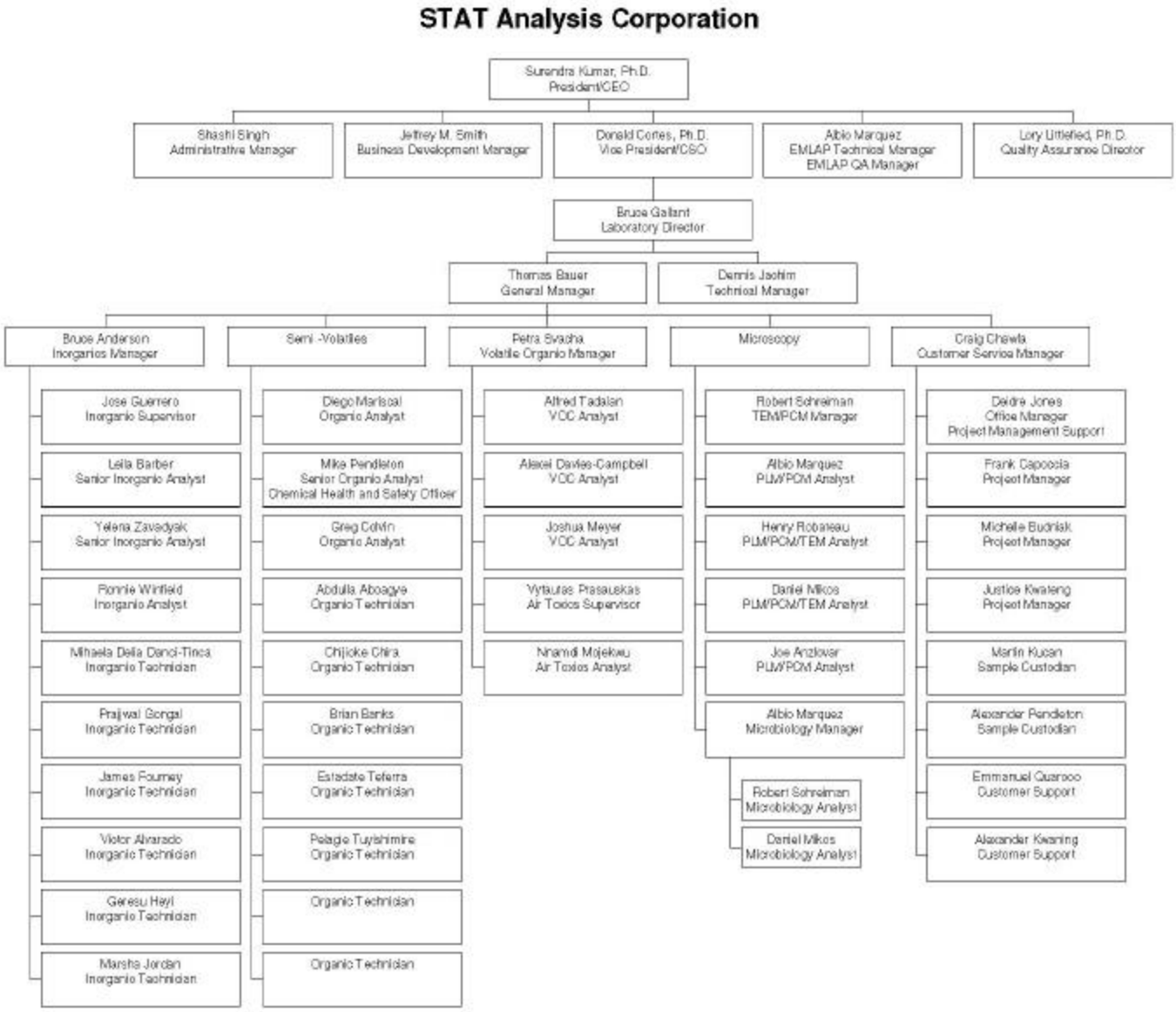
Voting Member: officials in the employ of the Government of the United States, and the States, the Territories, the Possessions of the United States, or the District of Columbia and who are actively engaged in environmental regulatory programs or accreditation of environmental laboratories. (NELAC, 2003)

Appendix 1

Summary of Changes from Rev 14

- Definitions updated, where needed, to reflect changes in AIHA-LAP, LLC policy
- Definitions updated, where needed to reflect the 2009 TNI Standard
- Added position of Vice President/CSO to Section 2 Staff Qualifications and Responsibilities
- Minor Editorial Changes
- Appendix 2 Organizational Chart — Updated to reflect personnel changes
- Appendix 3 STAT SOPs — Updated to reflect addition of new SOPs
- Appendix 4 Instrumentation — Updated to reflect changes since last revision
- Attachment 2 - — New NELAC COC
- Attachment 3- — New Pb in Air COC
- Attachment 4 - — New Asbestos COC
- Attachment 5 - — New Micro COC
- Attachment 7 - — New Confidential Facsimile Cover Page

APPENDIX 2: Organizational Chart



APPENDIX 3: STAT SOPs

ADMINISTRATIVE SOPs

SOP Number	STAT SOP
ADMINISTRATIVE PROCEDURES	
005	SOP 005 Document Control
006	SOP 006 Management Review of Quality System
100	SOP 100 SOP on SOPs
230	SOP QA 230 Corrective and Preventive Action
1000	SOP 1000Control and Use of Laboratory Notebooks
1010	SOP 1010 Analytical Standards and Reagents Receipt and Preparation
1020	SOP QA 1020 Laboratory Glassware Cleaning
1040	SOP 1040 General Laboratory Practices
1210	SOP 1210 Method Detection Limits, Limits of Detection, Limits of Quantitation
1220	SOP 1220 Internal Quality Assurance Audit
1230	SOP 1230 Training
1250	SOP 1250 Data Review
1255	SOP 1255 Manual Integration
1270	SOP 1270 Uncertainty
SAFETY DEPARTMENT	
003	QA 003 Chemical Hygiene Plan
1130	SOP 1130 Waste Disposal
CUSTOMER SERVICE DEPARTMENT	
220	SOP 220 Customer Service
300	SOP 300 Sample Receiving and Login Procedures
1330	SOP 1330 Purchasing
INFORMATION TECHNOLOGY DEPARTMENT	
1400	SOP 1400 LIMS
1500	SOP 1500 Computer Network

APPENDIX 3 (cont.'d)

ENVIRONMENTAL TEST METHODS

Laboratory Test Method	STAT SOP
SW846 9095A	SOP 2010 Paint Filter Liquids Test by EPA Method 9095A
SW846 1311	SOP 2125 Leaching Procedures (Toxicity Characteristic Leaching Procedure (EPA Method 1311))
SW846 1312	SOP 2125 Leaching Procedures (Synthetic Precipitation Leaching Procedure (EPA Method 1312))
SW846 3005A	SOP 3005 SW848 3005 and EPA CWA 200.2, 200.8 Acid Digestion of Waters for Total Recoverable or Dissolved Metals for Analysis by FLAA, ICP, or ICP-MS
SW846 3620B	SOP 3060 Florisil Clean up for PCBs and Pesticides (EPA Method 3620B)
SW846 3660B	SOP 3070 Sulfur & Sulfuric Acid/Permanganate Cleanup for PCBs and Pesticides (EPA Method 3660B & 3665A)
SW846 3665A	SOP 3070 Sulfur & Sulfuric Acid/Permanganate Cleanup for PCBs and Pesticides (EPA Method 3660B & 3665A)
SW846 3050B	SOP 3110 SW846 3050B Acid Digestion of Sediment, Sludges, and Soils for Metals Analysis by FLAA, ICP, or ICP-MS
SW846 3630C	SOP 3330 Silica Gel Cleanup for Semi-Volatile Organics (EPA Method 3630C)
SW846 3510C	SOP 3500 Extractions of Samples for Semi-Volatile Organic Analyses (EPA Methods 3510C, 3520C, 3540, 3545, 3550B, 3580A, 8151A)
SW846 3540	SOP 3500 Soxhlet Extraction: Extractions of Samples for Volatile and Semi-Volatile Organics (EPA Methods 3510C, 3520C, 3540, 3545, 3550B, 3580A, 8151A)

APPENDIX 3 (cont.'d)

ENVIRONMENTAL TEST METHODS

Laboratory Test Method	STAT SOP
SW846 3545	SOP 3500 Pressurized Fluid Extraction: Extractions of water nonsoluble or slightly soluble Semi-Volatile Organics (EPA Methods 3510C, 3520C, 3540, 3545, 3550B, 3580A, 8151A) (CWA Method 608, 625)
SW846 3550B	SOP 3500 Pressurized Fluid Extraction: Extractions of water nonsoluble or slightly soluble Semi-Volatile Organics (EPA Methods 3510C, 3520C, 3540, 3545, 3550B, 3580A, 8151A) (CWA Method 608, 625)
SW846 3580A	SOP 3500 Pressurized Fluid Extraction: Extractions of water nonsoluble or slightly soluble Semi-Volatile Organics (EPA Methods 3510C, 3520C, 3540, 3545, 3550B, 3580A, 8151A) (CWA Method 608, 625)
SW846 8151A	SOP 3500 Pressurized Fluid Extraction: Extractions of water nonsoluble or slightly soluble Semi-Volatile Organics (EPA Methods 3510C, 3520C, 3540, 3545, 3550B, 3580A, 8151A) (CWA Method 608, 625)
SW846 9012A	SOP 3610 Total and Amenable Cyanide: Distillation by EPA SW 846 9012A, 9012B and SM 4500CN-C
SW846 9065	SOP 3620 Phenolics: Distillation by EPA 9065.
SW846 8260B	SOP 4000 Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS) (EPA Methods 5030B/5035/ 8260B) (EPA 624)
SW846 8270C	SOP 4020 Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS) (EPA Method 8270C)

APPENDIX 3 (cont.'d)

ENVIRONMENTAL TEST METHODS

Laboratory Test Method	STAT SOP
SW846 8270D	SOP 4021 Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS) (EPA Method 8270D) (EPA Method 625)
SW846 8081A	SOP 4050 Organochlorine Pesticides & PolyChlorinated Biphenyl by Gas Chromatography/Electron Capture Detector (EPA Methods 8081A/8082)(EPA 8082/8082A)(EPA 68)
SW846 8082	SOP 4050 Organochlorine Pesticides & PolyChlorinated Biphenyl by Gas Chromatography/Electron Capture Detector (EPA Methods 8081A/8082)(EPA 8082/8082A)(EPA 68)
ASTM Method D-4059	SOP 4051 PolyChlorinated Biphenyl by Gas Chromatography/Electron Capture Detector (ASTM Method D-4059)
SW846 8321A	SOP 4080 ChloroPhenoxy Herbicides by HPLC (EPA Method 8321A)
SW846 8015M	SOP 4090 Total Petroleum Hydrocarbons by GC/FID (EPA Method 8015B)
SW846 1010	SOP 4105 Ignitibility by EPA 1010/ ASTM D93-02 Pensky-Martens Closed Cup and ASTM D1310 Tag Open Cup
SW846 9040B	SOP 4210 pH of Aqueous, Soil and Waste Samples by EPA Method 9045C, EPA 150.1, 9045C, 9045C and SM4500H-B
SW846 9045C	SOP 4210 pH of Aqueous, Soil and Waste Samples by EPA Method 9045C, EPA 150.2, 9045B, 9045C and SM4500H-B

APPENDIX 3 (cont.'d)

ENVIRONMENTAL TEST METHODS

Laboratory Test Method	STAT SOP
SW846 8270C SIM	SOP 4500 Polynuclear Aromatic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS) with Selective Ion Monitoring (SIM) (EPA Method 8270C SIM)
SW846 6020	SOP 4510 Metals Analysis by Inductively Coupled Plasma- Mass Spectrometry (EPA Method 6020, EPA CWA 200.8 and EPA Method IO-3.5)
SW846 7470A	SOP 4530 Mercury in Water, Solid or Semisolid Water (Manual Digestion/Automated Analysis Cold-Vapor Technique (EPA Method 7470A & 7471A/7471B, EPA CWA Method 245.2 Rev. 3.0)
SW846 7471A	SOP 4530 Mercury in Water, Solid or Semisolid Water (Manual Digestion/Automated Analysis Cold-Vapor Technique (EPA Method 7470A & 7471A/7471B, EPA CWA Method 245.2 Rev. 3.0)
SW846 3060A	SOP 4600 Automated Hexavalent Chromium Analysis by EPA Method 7196A and 3060A, SM 3500 Cr-B
SW846 7196A	SOP 4600 Automated Hexavalent Chromium Analysis by EPA Method 7196A and 3060A, SM 3500 Cr-B
SW846 9012A	SOP 3610 Total and Amenable Cyanide: Distillation by EPA SW 846 9012A, 9012B and SM 4500CN-C
SW846 Chapter 7.3.3.2	SOP 3615 Reactive Cyanide and Sulfide: Distillation by SW 846, Chapter 7.
SW846 9065	SOP 3620 Phenolics 4AAP: Distillation by EPA 9065
EPA 415.1	SOP 4630 Total Organic Carbon By EPA 415.1
SW846 9012A	SOP 4710 Automated Cyanide Analysis by EPA 9012A, 9012B and SM4500 CN-E

APPENDIX 3 (cont.'d)

ENVIRONMENTAL TEST METHODS

Laboratory Test Method	STAT SOP
SW846 9066	SOP 4715 Automated Phenols – Analysis by EPA 9066
846 9034	SOP 4725 Automated Sulfide Analysis by EPA 376.2 and EPA 9034
EPA 410.4	SOP 4260 Chemical Oxygen Demand by EPA 410.4
SW846 9023	TOX, EOX in Soils and Waters by SW846 9023 and 9020-DRAFT
ASTM E1664	SOP 4100 Total Recoverable Oil & Grease by ASTM E1664 and EPA 9071B and EPA 9071B
SW846 9071B	SOP 4100 Total Recoverable Oil & Grease by ASTM E1664 and EPA 9071B
EPA Method 9071B	SOP 4110 n-Hexane Extractable Material for Sludge, Sediment and Solid Samples (HEM) EPA Method 9071B
ATSM D4979	SOP 2040 Color, Order, Physical Description by ASTM D4979 – DRAFT
ASTM 5058-90	SOP 2080 Compatibility of Screening Analysis - DRAFT
ASTM 3987-85	SOP 2125 Leaching Procedures (ASTM D3987-85 Leaching Procedure) (EPA 1311. 1312)
EPA350.1	SOP 3250 Ammonia Distillation by EPA 350.1
ASTM D93-80	SOP 4105 Ignitibility by EPA 1010 Pensky-Martens Closed Cup and ASTM D93-80 Open Cup – DRAFT
SW846 9050A	SOP 4200 Conductivity (Specific Conductance) By EPA CWA 120.1, EPA SW 946 9050A and SM 2510B
EPA 150.2	SOP 4210 pH of Aqueous, Soil and Waste Samples (EPA Method 9040C, 9045C, 150.2)

APPENDIX 3 (cont.'d)

ENVIRONMENTAL TEST METHODS

Laboratory Test Method	STAT SOP
SM 4500	SOP 4250 Ammonia as N in Soil and Water by SM 4500 NH3 –H, -C
EPA 410.4	SOP 4260 Chemical Oxygen Demand by EPA 410.4
SM 5210B	SOP 4300 Biological Oxygen Demand (BOD) and Carbonaceous BOD (CBOD) by SM5210B
SM 45001	SOP 4420 Nitrate/Nitrite, Nitrite and Nitrate Analysis by SM45800NO3 –I, - F and EPA 353.2
EPA 353.2	SOP 4420 Nitrate/Nitrite, Nitrite and Nitrate Analysis by SM45800NO3 –I, - F and EPA 353.2
SM 2320B	SOP 4430 Alkalinity Analysis by SM 2320B 1.d
SM 2310B	SOP 4435 Acidity Analysis by SM 2310B
EPA 365.2	SOP 4450 Ortho-phosphate in Soils and Waters by EPA 365.2 - DRAFT
EPA 160.4	SOP 4480 Gravimetric Determinations for Moisture, Solids, Ash and Fractional Organic Carbon (FOC) by EPA 160.4, ASTM D2974, ASTM D2216, and ASTM 3550B
ASTM D2974	SOP 4480 Gravimetric Determinations for Moisture, Solids, Ash and Fractional Organic Carbon (FOC) by EPA 160.4, ASTM D2974, ASTM D2216, and ASTM 3550B
ASTM D2216	SOP 4480 Gravimetric Determinations for Moisture, Solids, Ash and Fractional Organic Carbon (FOC) by EPA 160.4, ASTM D2974, ASTM D2216, and ASTM 3550B–
ASTM 3550B	SOP 4480 Gravimetric Determinations for Moisture, Solids, Ash and Fractional Organic Carbon (FOC) by EPA 160.4, ASTM D2974, ASTM D2216, and ASTM 3550B

APPENDIX 3 (cont.'d)

ENVIRONMENTAL TEST METHODS

Laboratory Test Method	STAT SOP
EPA 160.1	SOP 4482 Total Dissolved, Total Settleable Solids, and Total Solids by EPA 160.1 EPA 160.2, and SM 2540 B-G
EPA 160.2	SOP 4482 Total Dissolved, Total Settleable Solids, and Total Solids by EPA 160.1 EPA 160.2, and SM 2540 B-G.
SM 2540 B-G	SOP 4482 Total Dissolved, Total Settleable Solids, and Total Solids by EPA 160.1 EPA 160.2, and SM 2540 B-G.
EPA 376.2	SOP 4725 Automated Sulfide Analysis by EPA 376.2 and EPA 9034

APPENDIX 3 (cont.'d)

AMBIENT AIR TEST METHODS (ORDEQ/NELAC)

Laboratory Test Method	STAT SOP
EPA IO-3.1	SOP 3115 Extraction of High Volume Filters
SW846 3510, 3550B, 3580A	SOP 3500 Extractions of Samples for Semi-Volatile Organic Analyses (EPA Methods 3510C, 3520C, 3550B, 3580A, 8151A)
EPA TO-14A/15	SOP 4010 Volatile Organic Compounds in Ambient Air by 2-Stage Thermal Desorption/Gas Chromatography/Mass Spectrometry (GC/MS) (EPA Method TO-14A/TO-15)
EPA TO-14A/15	SOP 4011 Flow Calibration of Passive Air Sampling Equipment
EPA TO-13A	SOP 4030 Determination of Polycyclic Aromatic Hydrocarbons in Ambient Air Using Gas Chromatography/ Mass Spectrometry by EPA TO-13A
EPA IO-3.1	SOP 4040 Sampling And Analysis of Ambient Air for Total Suspended Particulate Matter (SPM) And PM_{10} Using High Volume (HV) Sampler
EPA IO-3.5	SOP 4510 Metals Analysis by Inductively Coupled Plasma- Mass Spectrometry (EPA Method 6020 AND EPA Method IO-3.5)
IO-3.2, EPA 7420	SOP 4550 Analysis of Lead by Atomic Absorption Direct Aspiration (NIOSH 7082, EPA IO-3.2, and EPA 7420)
EPA Method 3C	SOP 4060Determination of Carbon Dioxide, Methane, Nitrogen and Oxygen in Air by GC with Thermal Conductivity Detection
EPA Method 25C	SOP 4070 Determination of Low Concentration Non-Methane Organic Compounds(GC-FID) EPA Method 25C

APPENDIX 3 (cont.'d)

NIST/NVLAP TEST METHODS

Laboratory Test Method	STAT SOP
Asbestos	SOP 5200 Polarized Light Microscopy (PLM) Analysis
Asbestos	SOP 5300 Transmission Electron Microscopy (TEM) Sample

PRODUCT SAFETY TESTING METHODS

Laboratory Test Method	STAT SOP
CPSC –CH-CH1001-093.1	SOP 4022 Phthalates by GC/MS by CPSC –CH-CH1001-093.1
CPSC-CH-E1001-08.3 CPSC-CH-E1002-08.33 CPSC-CH-E1003-09.1	SOP 3120 Standard Operating Procedure for Digestions

APPENDIX 3 (cont'd)
INDUSTRIAL HYGIENE TEST METHODS

Laboratory Test Method	STAT SOP
NIOSH 7300	SOP 4515 Elements by ICP-MS by NIOSH 7300 -DRAFT
NIOSH 6009	SOP 4535 Mercury in Air Monitoring Cartridges by -NIOSH 6009
NIOSH 7082	SOP 4550 Lead Analysis of Lead by Atomic Absorption Direct Aspiration (NIOSH 7082, EPA IO-3.2, and EPA 7420/7000B)
OSHA 07, NIOSH (5515, 1400, 1501, 1500, 2000,	SOP 4700 Organic Vapors in Air Monitoring Cartridges by Gas Chromatography
NIOSH 7400	SOP 5100 Asbestos and Other Fibers by PCM
NIOSH 5515	SOP 4701 Polynuclear Aromatic Hydrocarbon in Air Monitoring Cartridges by GC/MS with Selective Ion Monitoring
NIOSH 5503	SOP 4702. Polychlorinated biphenyls in Air Monitoring Cartridges by Gas Chromatography.
OSHA 0500, 0600	SOP 4040 Sampling And Analysis of Ambient Air for Total Suspended Particulate Matter (SPM) And PM_{10} Using High Volume (HV) Sampler
SOP 6110	SOP 6110 Analysis of Non-Viable Microbiological Air Samples
SOP 6120	SOP 6120 Analysis of Viable Microbiological Air Samples
SOP 6210	SOP 6210 Analysis of Non-Viable Microbiological Samples by Direct Examination
SOP 6220	SOP 6220 Analysis of Viable Microbiological Swab and Bulk Samples
SOP 6310	Preparation of Media and Sterile Water

APPENDIX 4: INSTRUMENTATION

Equipment	Manufacturer	Model #	Serial #	Dept.
GC/MS (SVOC-2)	Agilent	6890N GC	US00033560	SVOC
		5973N MSD	US9014004	
		7683N AS	US95310985	
GC/MS (SVOC-4)	Agilent	6890N GC	US00042823	SVOC
		5973N MSD	US10440761	
		7683N AS	US11618674	
GC/MS (SVOC-5)	Agilent	6890N GC	CN52734690	SVOC
		5975N MSD	US52430277	
		7683N AS	CN5272615	
GC/MS (SVOC-7)	Agilent	7890C	UC11207507	SV OC
		5975C MSD	US11207504	
		7693 AS	CN11420164	
GC/MS (SVOC-8)	Agilent	7890B GC	CN14503239	SVOC
		5977A MSD	US1514L425	
		7693A AS	CN14530104	
GC/MS (SVOC-9	Agilent	7890B GC	CN14513072	SVOC
		5977A MSD	US1504L412	
		7693A AS	CN15020087	
GC/FID	Hewlett Packard	5890 Series II GC	3140A39325	SVOC
		6890 AS	3113G06781-3	
GC/FID2	Agilent	7890A GC; 7683B AS	CN10724063/CN83250636	SVOC
GC/ECD PCB1	Agilent	6890N GC 7683N AS	US00034720 US00411387	Pest/PCB
GC/ECD PCB2	Agilent	6890N GC 7683N AS	CN10445022 CN44731379	Pest/PCB
GC/ECD PCB3	Agilent	6890N GC 7683 AS	CN10606009 CN62239870	Pest /PCB
GC/MS (VOC-1)	Hewlett Packard	6890 GC	US00023185	VOC
		5973 MSD	US82311186	
	Varian	ARCHON	13553	
	Tekmar	3100	US01107031	
GC/MS (VOC-2)	Hewlett Packard	5890 Series Plus GC	2939A08878	VOC
		5971 MSD	3050A01916	
	Varian	ARCHON	13037	
	Tekmar	3100	00347008R	

APPENDIX 4: INSTRUMENTATION

Equipment	Manufacturer	Model #	Serial #	Dept.
GC/MS (VOC-3)	Agilent	6890N GC	US00033670	VOC
		5973N	US0334080	
		4660 Eclipse	A505410367	
	OI International	4100	A505410367	
GC/MS (VOC-4)	Agilent	6890N GC	US00042820	VOC
		5973N MSD	US10440768	
	OI Analytical	4660	K525466907	
GC/MS (VOC-5)	Agilent	6890 GC	CN10516053	Air Toxics
	Agilent	5973 MSD	US44621448	
	Tekmar	14-ACAN-000 AS	US05130007	
GC/MS (VOC-6)	Agilent	6890 GC	CN 10716027	Air Toxics
		5975C MS	US 71235770	
		Autocan 12	US 07100004	
VOA-7	Agilent	6890 GC 5973 MSD	US00001664 US41720770	Air Toxics
	Tekmar	14-3100-OEL	241003	
	Varian	4604	K5234	
GCFID	HP	5890	3033A31565	
HPLC-1	Agilent	G1322A Degasser	JP05033152	SVOC
		G1311A Quat Pump	DE14917955	
		G1313S ALS	DE149119403	
		G1316A Oven	DE14926184	
		G1314A VWD	JP11616431	
HPLC 2	Waters	600 Controller	SX5MM0449M	SVOC
		Pump	MX5KM3223M	
		717 Autosampler	MX5EM4621M	
HPLC-MS-1-2	Agilent 1100	G1379A Degasser	JP40719195	SVOC
		G1312A Prim ary Pump	VD75201272	
		G1329A ALS	DE91603353	
		G1316A Oven	DE1421261	
		G1315A DAD	US74902181	
		G1946A MSD	US80100565	
HPLC 3	Agilent 1100	G1322A Degasser	JP73016497	SVOC
		G1311A Quat Pump	US53600534	
		G1329A ALS	DE43615733	
		G1316A Oven	US5400712	
		G1315A DAD	DE61800798	
		G1330 ALS Therm	DE13211194	
HPLC 4	Agilent 1100	G1379A Degasser	JP40723470	SVOC
		G1312S Binary Pump	DE43618630	
		G1316A Oven	DE43645285	
		G1315B DAD	DE43625887	

APPENDIX 4: INSTRUMENTATION

Equipment	Manufacturer	Model #	Serial #	Dept.
		G1330B ALS Therm	DE13212198	
		G1367A ALS	DE50404993	
Hot Plate	VWR	Dynatherm	33918	ASB
Purified HEPA Filter Enclosure	Labconoco	3730000	02022032A-31	ASB
Sonicator	Branson	2510	RLA1203942170	ASB
Balance-2	Mettler Toledo	B303	1114032438	Micro
Analytical Balance-6	Mettler	AE160	B81560	LEAD
Autosampler	Perkin-Elmer	AS90	507910 (8621)	LEAD
Block Digestors	CPI	05 C0530	293	LEAD
Pyromultimagnestir	Labline	1268	058950057	LEAD
Analytical Balance-10	Mettler	AB104-S	1128422933	METALS
Autosampler on ICP-MS1	CETAC	ASX510	090007A5X5	METALS
Autosampler on ICP-MS3	Agilient	ASX 500	US 11142A520	METALS
Block Digestors	CPI Int.	-	A	METALS
Block Digestors	CPI Int.	-	B	METALS
Chiller on ICP-MS1	Neslab	M75	102025049	METALS
Chiller on ICP-MS3	Neslab	CFT-100	10017503 5	METALS
Kwikool AC	Kwikool	SWAC 2411	4480	METALS
High Vacuum Pump	Edwards	E2M5	17915F	METALS
ICP-MS-1	Agilent	7500i	JP93200201	METALS
ICP-MS-3	Agilent	7900	JP 14410475	METALS
Class Safety Enclosure	Labconoco	3730001	020220239A	MICRO
Colony Counter	Leica	3327	0002411463YPO003	MICRO
Conductivity Meter	VWR	61161-362	230355432	MICRO
Crystal Panel Viewer	Becken-Dickison	BD-BBL	050604-1499	MICRO
Fluorescence Analysis Chamber	Spectriline	CM-10	147858	MICRO
Fluorescence Analysis Chamber	UVP	CC-10	95-00724	MICRO
Fume Enclosure	Mystaire	100		MICRO
Fume Enclosure	Mystaire	FE100		MICRO
Furnace	Thermolyne	48000	480911020760	MICRO
Hot plate	VWR	Dynatherm	0687	MICRO

APPENDIX 4: INSTRUMENTATION

Equipment	Manufacturer	Model #	Serial #	Dept.
Hot plate	VWR	Dynatherm	0686	MICRO
Hot Plate/ Stirrer	VWR	371	2258	MICRO
Incubator (I-1)	VWR	1510E	120060-2	MICRO
Incubator (I-2)	VWR	1516E	04070804	MICRO
Microscope	Olympus	CX31	RBSFA 2M03757	MICRO
Microscope	Olympus	CH2	7L0064	MICRO
Microscope	Olympus	BH-2	223905	MICRO
Microscope	Olympus	BH-2	221905	MICRO
Microscope	Olympus	BH-2	217318	MICRO
Mini Vortex	VWR	945300	14263	MICRO
pH /Temp. Meter 340	Beckman	511210	4585	MICRO
Sealer Index	Quanti-Tray	89-10894-02	3510R	MICRO
Smart Cycler II	Cephid	900-0057	200306	MICRO
Refrigerator #3	NORPOLE	NPGR2	6437 31170040	RECEIVE
Refrigerator #6	Jordan	AB-4-6	PR52857-99H	RECEIVE
Refrigerator #7	NORPOLE	NPGR2		RECEIVE
Refrigerator #8	Jordan	AB-4-6	PR5381-00A	VOC
Autosampler	Varian	8200	8200-09311	STORAGE
Autosampler	Varian	SPS-5	95061148	STORAGE
Autosampler (VOC1)	Varian	Archon	13037	STORAGE
FLAA	Varian	SpectrAA 200	31-100838-00	STORAGE
Hot plate	Thermolyne	Cimarec-3	66196070461	STORAGE
HPLC Pump	Hewlett Packard	1050		STORAGE
Power Pack	Varian	SIPS/PP1	94111272	STORAGE
Purge & Trap (VOC2)	HP	1909	3432A10143	STORAGE
Sample introduction	Varian	SIPS 1	95021096	STORAGE
Sonicator	Branson	450	BI0009670	STORAGE
Spect 20	Baush & Lomb	33.31.72	1152868	STORAGE
TCLP tumblers	Millipore	Agitator 10	455VS4045	STORAGE
TCLP tumblers	Millipore	Agitator 10	455VS4049	STORAGE
Water Bath	Precision Scientific	180	26AX-6	STORAGE
Desktop Centrifuge	Becton-Dickinson	Compact II	31000253	SVOC
Fume enclosure	Labconco	69000	020697466M	SVOC

APPENDIX 4: INSTRUMENTATION

Equipment	Manufacturer	Model #	Serial #	Dept.
Fume enclosure	Labconco	69000	020697440M	SVOC
Heaters	Glas Col	TM106	158714a to 29A	SVOC
Mini Vortex	VWR	1945300	23007	SVOC
N2 Solvent Concentrator	Labconco	79100-00	991292324C	SVOC
N2 Solvent Concentrator	Labconco	79100-00	000593233D	SVOC
N2 Solvent Concentrator	Labconco	79100-00	000893763E	SVOC
N2 Solvent Concentrator	Labconco	79100-00	000893764E	SVOC
Refrigerator #78	GE	TAX4DNCAWH	32373	SVOC
Refrigerator 13	Kenmore	253.6072101	WA2001629	SVOC
Sonicator	Branson	450	BI120061	SVOC
Sonicator	Branson	450	BI30158	SVOC
Sonicator	Branson	450	BI99063085	SVOC
Top Loading Balance-4	Mettler Toledo	PM300/49	F64687	SVOC
Flow Meter	Agilent	ADM 1000	US06L31632	VOC
Freezer #0	GE	FUM5SAARWH	H2115897	VOC
Freezer #12	Kenmore	253.234.24101	WB32231534	VOC
Freezer #9	GE	FUM5SAARWH	V21100784	VOC
Fume enclosure	Labconco	6900000	020697464M	VOC
Purge & Trap (VOC1)	Tekmar	3100	US 01107031	VOC
Refrigerator #14	Kenmore	56491601100	30200594	VOC
Sonicator	Branson	2510	RLA070151006D	VOC
Balance-1	Mettler Toledo	PB403-S	1128192065	VOC
Gas leak detector	GPW-MAC	21-070	S20308	Air Tox
Gas leak detector	GPW-MAC	21-050	J47706	VOC
Dessicator (D-1)	Nalgene	5317-0180	Cat. 24987-056	WET
Analytical Balance-9	Mettler-Toledo	AB304-S	1125191416	Metals
Box Furnace	Lindberg Blue	BF51828C-1	009L-516875-OL	WET
COD Reactor	Hach	4500	0107000022043	WET
Conductivity Meter	VWR	61161-362	230109686	WET
Digital Hygrometer/Thermometer	Control Company	35519-049	240130982	WET
Digital Hygrometer/Thermometer	Control Company	35519-049	240160719	WET
Environ Chamber	SPX	CEO908-4	100320	WET

APPENDIX 4: INSTRUMENTATION

Equipment	Manufacturer	Model #	Serial #	Dept.
Flash Point	Precision	74537	S03198	WET
Hot Plate/ Stirrer	VWR	325	0868	WET
Hot Plate/ Stirrer	VWR	325	0869	WET
Magnetic stirrer	VWR	VWR 200	58940-158	WET
Mini-Cyanide Distillation System	RGW Instruments	R-3166MS-100	2	WET
pH/mV/Temp Meter Series 20	Cole Palmer	570002-30	EP20/18094	WET
Phi240 pH/Temp Meter	Beckman	Phi-340	3532	WET
QuickChem FIA	Lachat	8000	A83000-1663	WET
Spect 20	Baush & Lomb	33.31.72	0115280	WET
Stirrer	VWR	205	7251	WET
Stirrer	VWR	941006	6090	WET
Stirrer	VWR	941006	6096	WET
Stirrer	VWR	941006	6097	WET
Stirrer	VWR	941006	6085	WET
Stirrer	VWR	941006	6093	WET
Stirrer	VWR	941006	6094	WET
TCLP tumblers	Analytical Technologies	42RBFC1-E3	0685CPF0018	WET
TCLP tumblers	Millipore	Agitator 10	455RY4029	WET
TOC/TOX	Euroglass	TOC 1200	2000.137	WET
Balance-12	Mettler	PB1502-S	1126341459	WET
Top Loading Balance-7	Mettler	BD202	4846	WET
Top Loading Balance-8	Mettler	PB602	1113242526	WET
Balance-11	Mettler-Toledo		1129140668	SVOC
Balance-13	Mettler	PB403	1129262406	Air Tox
Ba;ance 14	Mettle-Toledo	AG-204	1118121901	WET
Transite Oven	Blue M	11TA	S3585	WET
XYZ Autosampler	Lachat	ASX 500	020122 ASX	WET
Refri/Freezer 17	Kenmore			WET
Refrigerator 16	ABSOCOLD			SVOC
Refrigerator 18	Kenmore			SVOC
Refri/Freezer 19	Kenmore			SVOC
Refri/Freezer 20	Kenmore			SVOC
Refri/Freezer 21	Kenmore			Hallway
Refrigerator 22	Kenmore			Micro

APPENDIX 4: INSTRUMENTATION

Equipment	Manufacturer	Model #	Serial #	Dept.
Refri/Freezer 23	Kenmore			Air Tox
Refri/Freezer R12	Kenmore			Micro
BOD Incubator	VWR			Micro
Walk -in room				
Microscope	Olympus	CX31	2M03757	Micro
Microscope	Olympus	CX21	4J00403	Micro
Ultrasonic Bath	Bransonic	2210R-MT	RLA94060-072C	ABS
Electron Microscope	JEOL	JEM-100CX II	EM156150-260	ABS
Vacuum Evaporator	Vacuum Evaporator	JEE-4X	EM300059-376	ABS
Ladd	JEOL	30285	89-01-014	ABS
Microscope	Olympus	CH-2	9H0036	ABS
PLM scope	Olympus	BH-2	H62105-00214	ABS
PLM scope	Olympus	BH-2	HS2805-2000	ABS
Stereoscope	Olympus		399597	ABS
Stereoscope	Olympus	SZX2	344125	ABS
Plasma Asher	SPI	11005	1586	ABS
Muffle Furnace	Thermolyne	48000	480911020760	ABS
PCM Microscope	Olympus	CH-2	H92607-0318	ABS
PCM filter fixer	Oxford	QuickFix	10931	ABS
Hot plate / Stirrer	VWR	371	2258	ABS
Hotplate	VWR	Dylatherm	33918432 (cat.#)	ABS
Hotplate	VWR	Dylatherm	33918432 (cat.#)	ABS
Mini Vortex	VWR	945300	14203	ABS
Water Bath	VWR	1203	1103897	ABS
Incubator 1	VWR	NA	1200602	Micro
Incubator 2	VWR	NA	04070804	Micro
Incubator 3	VWR	NA	04007056	Micro
High Vacuum Pump	Edwards	E2M5	17915F	ABS

APPENDIX 4: INSTRUMENTATION

Equipment	Manufacturer	Model #	Serial #	Dept.
Furnace	Thermolyne	48000	480911020760	ABS
Microwave Oven	CEM MARS	R907501	MD1078	Metals
Freezer Mill	SPEX CertiPrep	6850-115	02021	Metals
SHAKER WATERBATH	HAAKE	SWB20	920057	Metals
Dissolved Oxygen Meter	YSI	10D	100381	Metals
Hotplate	Cimarec	HP131535	1757090481029	Metals
Hotplate	VWR	VWR 97042-654	110510001	Metals
BOD Incubator	VWR	Model 2020	08006510	Metals
Pensky-Martin Flashpoint Tester	Koehler Instuments	K 16200	R 07002782B	TCLP Prep
CETAC-2	CETAC	M-7600	04130Q76	Metals
FLAA	Perkin-Elmer	Analyst 400	0415S9110115	Wet Chem
Analytical Balance	Mettler	AG 204	111812191	Metals Prep
TOC Analyzer	Schmadzu	TOC 5000A	3291019	Wet Chem
48 Place Mod	CPI International	Model # 48	Serial # A	Metals Prep
48 Place Mod	CPI International	Model # 48	Serial # B	Metals Prep
Analytical Balance 15	Sartorius	Entris 224-1S	31905876	P-moist
Analytical Balance 14	Sartorius	Entris 224-1S	31906173	Metals Prep
Mine Stirring Hot-Plate RV-1	VWR	NA	150512003	Metals Prep
Mine Stirring Hot-Plate RV-1	VWR	NA	150831001	Metals Prep

APPENDIX 5
Sample Bottles and Preservation

WATER

METALS

Parameter	Container	Preservative	Holding Time
General, dissolved	Plastic (500 mL)	Filtered on site, HNO_3 to pH<2	6 months
General, total	Plastic	HNO_3 to pH<2	6 months
Chromium, hexavalent	Plastic	Cool 4°C	24 hours
Mercury	Plastic	HNO_3 to pH<2	28 days

CONVENTIONAL PARAMETERS

Parameter	Container	Preservative	Holding Time
Acidity	Plastic	Cool 4°C	14 days
Alkalinity	Plastic	Cool 4°C	14 days
Ammonia	Plastic	H_2SO_4 to pH<2, Cool 4°C	28 days
BOD	Plastic	Cool 4°C	48 hours
Bromide	Plastic	None	28 days
Chloride	Plastic	None	28 days
Chlorine	Plastic	Cool 4°C	Analyze Immediately
Chromium	Plastic	Cool 4°C	24 hours

COD	Plastic	H_2SO_4 to pH<2, Cool 4°C	28 days

APPENDIX 5 (cont'd)
Sample Bottles and Preservation

CONVENTIONAL PARAMETERS

Parameter	Container	Preservative	Holding Time
Color	Plastic	Cool 4°C	48 hours
Conductivity	Plastic	Cool 4°C	28 days
Cyanide, Total or Amenable	Plastic	NaOH to pH>12, Cool 4°C	14 days
Cyanide, Reactive	Plastic	NaOH to pH>12, Cool 4°C	14 days
Fluoride	Plastic	None	28 days
Hardness, Total	Plastic	$HN0_3$ to pH<2	6 months
Nitrate/Nitrite	Plastic	H_2S0_4 to pH<2, Cool 4°C	28 days
Nitrate	Plastic	Cool, 4°C	48 hours
Nitrite	Plastic	Cool, 4°C	48 hours
Oil & Grease	Glass	H_2SO_4 to pH<2, Cool 4°C	28 days
pH	Plastic	None	Analyze Immediately
Phenols	Glass	H_2S0_4 to pH<2, Cool 4°C	28 days
Phosphorus, Ortho	Plastic	Cool 4°C	48 hours
Phosphorus, Total	Plastic	H_2S0_4 to pH<2, Cool 4°C	28 days
Silica	Plastic	Cool 4°C	28 days
Solids, Dissolved	Plastic	Cool 4°C	7 days
Solids, Suspended	Plastic	Cool 4°C	7 days
Solids, Total	Plastic	Cool 4°C	7 days
Solids, Settleable	Plastic	Cool 4°C	48 hours

APPENDIX 5 (cont'd)
Sample Bottles and Preservation

CONVENTIONAL PARAMETERS

Parameter	Container	Preservative	Holding Time
Solids, Volatile	Plastic	Cool 4°C	7 days
Sulfate	Plastic	Cool 4°C	28 days
Sulfide	Plastic	NaOH to pH>9, Cool 4°C	7 days
Sulfide, Reactive	Plastic	NaOH to pH>9, Cool 4°C	7 days
Sulfite	Plastic	None	Analyze Immediately
Surfactants, MBAS	Plastic	Cool 4°C	48 hours
Turbidity	Plastic	Cool 4°C	48 hours
Total Organic Carbon (TOC)	Plastic	H_2S0_4 to pH<2, Cool 4°C	28 days
Total Organic Halogens (TOX)	Glass	H_2S0_4 to pH<2, Cool 4°C	28 days

ORGANICS

Parameter	Container	Preservative	Holding Time
HPLC Pesticides (Aldicarb / Carbonfuran)	Glass vial	1.2 mL Chloroacetic acid Cool 4°C	28 Days
EDB/DBCP	Glass vial	Cool 4°C	28 Days
Endothall	Glass	Cool 4°C	7 days extraction 1-day analysis
Pesticides and PCBs	Glass	Cool 4°C	7 days extraction 40 days analysis
Petroleum Hydrocarbons	Glass	H_2S0_4 to pH<2, Cool 4°C	28 days

APPENDIX 5 (cont'd)
Sample Bottles and Preservation

ORGANICS

Parameter	Container	Preservative	Holding Time
Phenoxyacid Herbicides	Glass	Cool 4°C	7 days extraction 40 days analysis
Phthalate Esters	Glass	Cool 4°C	7 days extraction 40 days analysis
Polynuclear Aromatic Hydrocarbons	Glass	Cool 4°C	7 days extraction 40 days analysis
GC/MS Semivolatiles	Glass	Cool 4°C	7 days extraction 40 days analysis
Total Petroleum Hydrocarbons	Glass	Cool 4°C	7 days extraction 40 days analysis
Volatile Organics	40 ml Glass	HCl to pH<2	14 days

SOIL

ALL PARAMETERS

Parameter	Container	Preservative	Holding Time
All except VOA	2, 4, 8 or 32 oz Glass	Cool 4°C	See individual SOP
Volatile Organics	ENCORE*	Cool 4°C	48 Hours
Volatile Organics	$NaHSO_4$/ Methanol	Cool 4°C	14 Days

*Or equivalent

Appendix 6: STAT
Analysis Sample Acceptance Policy

Chain of Custody Requirements: All samples must be submitted with a completed Chain-of-Custody (COC) form filled out in ink. Please print legibly. The following information should be included:

1) Client Information: Company name and contact information.
2) Client Project Name or Number.
3) Sampler's name.
4) Sample identification or location.
5) Date and Time of collection.
6) Matrix type.
7) Preservation type: Including chemical preservation as well as thermal preservation. Environmental samples require thermal preservation and the temperature requirement for shipment/storage is 0.1-6ºC.
8) Total number of containers.
9) Requested analyses or reference to quote or other documentation specifying analysis.
10) Turn Around Time.
11) Special remarks: Includes any additional sample analysis requirements such as reporting limits, if the samples are considered hazardous or contaminated, etc.
12) Signatures including date/time of all persons who have handled or possessed the samples.
13) If applicable, Purchase Order number, quote or other billing information.

Sampling/Container Requirements:

1) All samples must be labeled properly with unique identification in indelible ink, on water-resistant labels and correspond with the information on the COC. Date and time of sampling and preservation type should also be present on the label. Deviations between the sample number on the COC and sample containers will be noted o the sample receipt checklist.
2) All samples must be received in appropriate containers required by the analytical test methods and be received good condition without any signs of damage or contamination. If the sampler suspects the outside of the container has been contaminated, it is imperative to notify the laboratory so that appropriate action can be take to prevent cross contamination of samples.
3) Containers must have sufficient sample volume for analysis, with proper preservation. If QC is required (MS/MSD), additional sample must be submitted. Chemical preservation (pH) is checked at log in or by the analyst. Insufficient volume and improper preservation will be noted on the sample receipt checklist. Please s attachment for container and volume requirements.
4) All samples should be received within the analytical test method specified holding times. Hold time violations will be noted in the analytical report. For analysis with short hold time, please submit the sample with adequat time for analysis and notify your project manager when the sample will be arriving.

   If a sample must be analyzed on a rush basis in order to meet hold time, additional rush surcharges may be applied.

NOTE: Sample containers provided by STAT Analysis may contain small amounts of chemical preservatives as requi by the analytical test method and labeled as such. Please take necessary precautions when using these sample bottles. sure to cap bottles tightly before shipment.

When shipping samples to STAT Analysis:

1) Enclose completed COC form in sealed zip-lock bag in order to prevent water damage from melting ice.
2) Ensure that the sample cooler is sealed properly with tape to avoid opening while in transit.
3) Ensure that there is enough ice or cooling material (ice is preferred over 'Blue Ice') in order to maintain required temperature preservation (0.1-6ºC). Samples received out of temperature compliance will be noted on the COC or sample receipt checklist.
4) Ensure that there is enough packing material in cooler to prevent damage to sample containers while in transit. Fill empty space in the cooler with bubble wrap or other packing material.
5) Be sure that samples containers are properly sealed so that water from melting ice does not enter the sample container. Shipping sample containers in sealed zip-lock bags can help prevent this.
6) Use extra packing material when shipping water samples. It is best to individually wrap glass water containers with bubble wrap or packing paper and then place in zip-lock bags.

NOTE: Samples that do not meet the above criteria will be flagged in an unambiguous manner defining the nature and substance of the variation. This will be noted on the final report.

Appendix 7
Ethics Policy and Data Integrity Agreement

Ethics Policy and Data Integrity Agreement

It is STAT Analysis Corporation's responsibility to produce data that is scientifically valid, defensible, and of known a documented quality in accordance with all applicable federal, State, and local laws and regulations consistent with accepted professional and analytical practices in a manner that justifies the public trust. STAT Analysis Corporation conducts all business with integrity and in an ethical manner. It is the responsibility of each staff member, manager, director, and owner to perform their duties with the highest ethical standards and professional conduct to ensure compliance with this Quality Manual and related documentation.

The STAT Analysis Corporation laboratory has a Quality Assurance Manual designed to insure that work performed in the laboratory is accurate, precise, complete, comprehensive, reproducible and reflects the need of the customer/client while satisfying the requirements of appropriate State and Federal regulations. STAT Analysis Corporation will not of any analysis for which we cannot demonstrate consistent quality and defensible analyses.

Any allegation of misconduct will be promptly investigated in an unbiased and confidential manner by an investigative team designated by the President/CEO. The investigation including any supporting documentation, actions and resolution will be recorded and archived by the QA Manager.

I. I understand the high standards of integrity required of me with regard to the duties I perform and the data I report in connection with my employment at STAT Analysis Corporation.

II. I state that I am free from any commercial, financial or other pressures and do not have any conflicts of interests, which might adversely affect my duties at STAT Analysis Corporation. Laboratory analysts will not have any direct customer contact except with the approval of laboratory management, this includes but is not limited to telephone calls, emails, facsimiles, audits, etc.

III. I agree that in the performance of my duties at STAT Analysis Corporation:
   a. I agree to read, understand, sign and comply with all the policies and procedures detailed in the latest revisions of the Quality Assurance Plan and SOPs at all times;
   b. I will not intentionally report data that are not the actual values obtained without collaborating data acceptable to the laboratory's Standard Operating Procedures. All modifications will be properly documented;
   c. I will not invent data (dry lab) this includes raw data, support equipment calibrations; quantitative reports, LIMS etc.
   d. I will not adjust the area of a peak in chromatography to bypass QC criteria (peak shaving or adding);
   e. I shall not intentionally report the dates and times of data analyses that are not the actual dates and times of data analyses (time traveling);
   f. I shall not intentionally represent another individual's work as my own;
   g. I understand that if my job includes supervisory responsibilities, I shall not instruct, request, or direct any subordinate to perform any laboratory practice, which is unethical or improper.

IV. I will not compare or disclose results for any Performance Testing (PT) sample, or other similar QA or QC requirements, with any employee of any other laboratory, prior to the required submission date of the results to the person, organization, or entity supplying the PT sample.

V. I will not divulge customer names or their results outside of the company except to those parties designated as an approved customer representative.

VI. I agree to inform STAT Analysis Corporation of any accidental or intentional reporting of non-authentic data by other employees or by myself in a timely manner. I understand that if any manager or representative of management instructs, requests, or directs me to perform any of the aforementioned improper laboratory practices (I – V), or if I am in doubt or uncertain as to whether or not such laboratory practices are proper, I will not comply, but I must immediately report such event to all appropriate members of management including my manager, the Laboratory Director, the QA Manager and President/CEO, excluding such individuals who participated in such perceived improper instruction, request, or directive.

I understand that failure to follow company policies and procedures, and failure to follow federal, State and local law, may result in discipline, up to and including termination. If I have knowledge of a non-compliant incident and do not report it, I will be subject to disciplinary measures up to and including termination. If I retaliate or in any way punished another employee for reporting a violation, I will be subject to discipline, up to and including termination.

_____

(Employee's Signature) (Dated)

_____

(Print Name)

_____

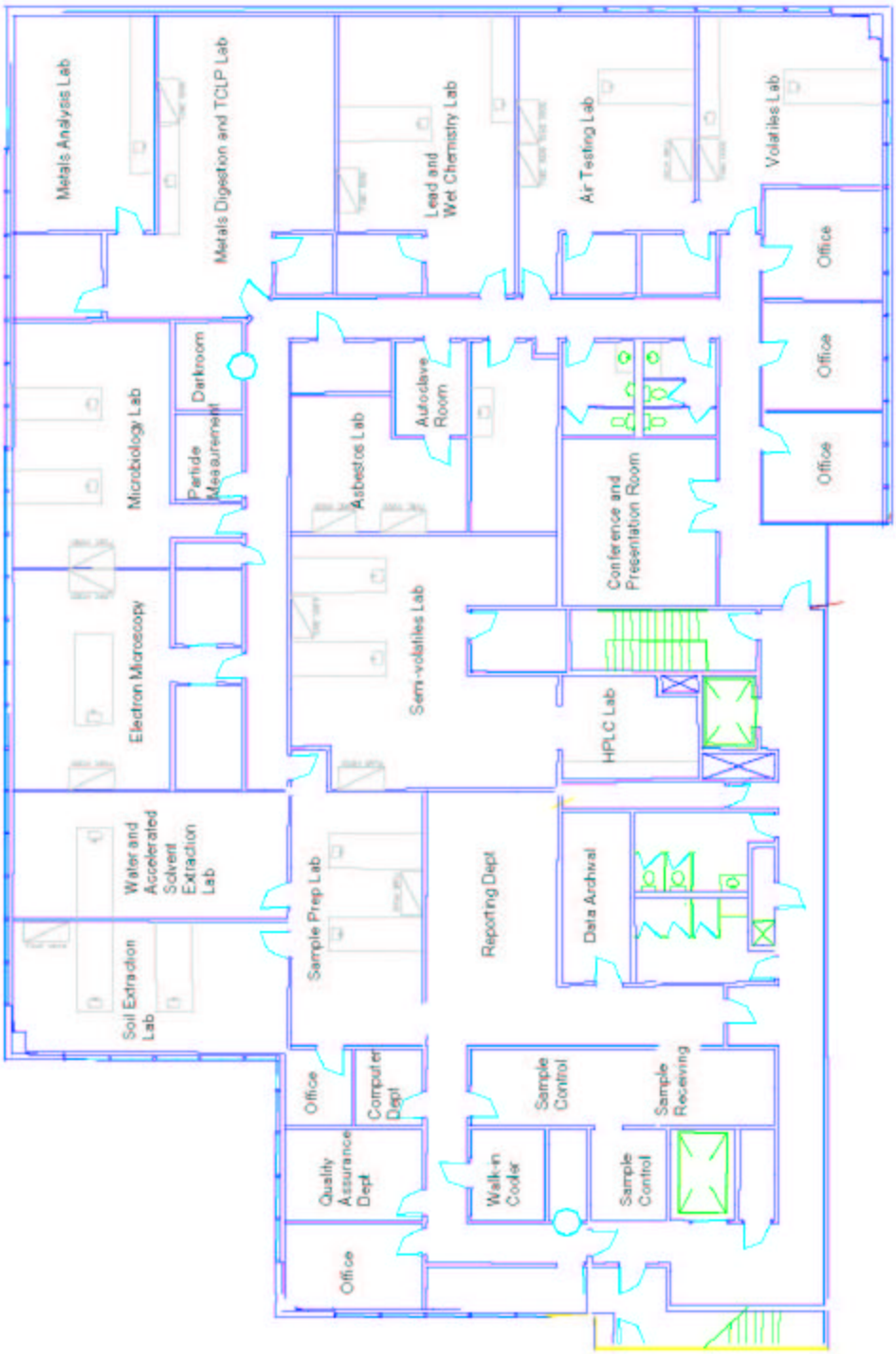
(Witness Signature) (Dated)

_____

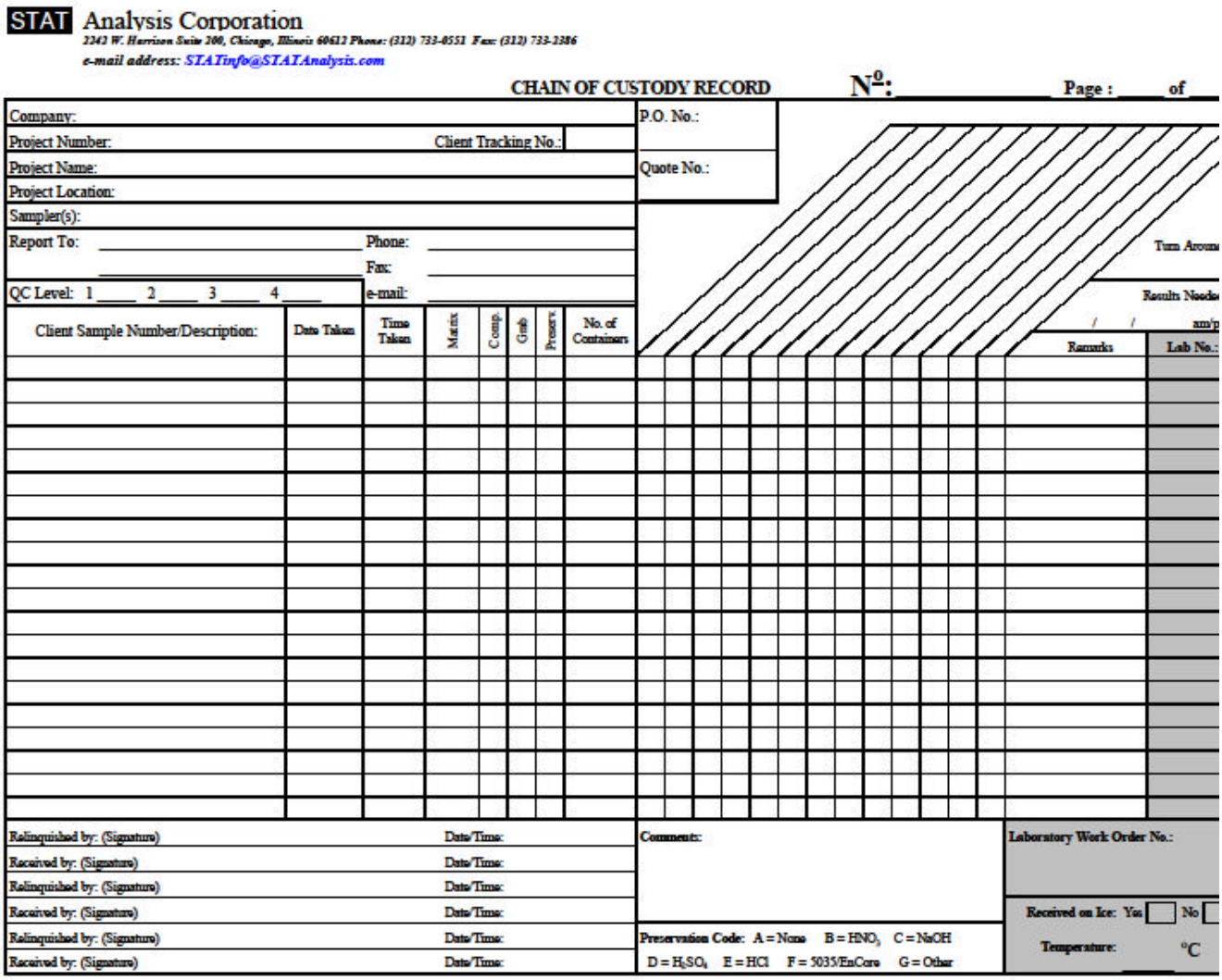
(Print Name)

NOTE: This Ethics Policy/Data Integrity Agreement must be signed at the time of hire and re-signed between January 1 and January 15 of every year. Such signature is a condition of continued employment and failure to sign will result in immediate termination of employment.

ATTACHMENT 1
Facility Diagram



ATTACHMENT 2
Example Chain of Custody for NELAC Samples



STAT Analysis Corporation
2242 W. Harrison Suite 200, Chicago, Illinois 60612 Phone: (312) 733-0551 Fax: (312) 733-2386
e-mail address: STATinfo@STATAnalysis.com

CHAIN OF CUSTODY RECORD No: _____ Page : ____ of ____

Company:
Project Number: Client Tracking No.:
Project Name:
Project Location:
Sampler(s):
Report To: Phone:
Fax:
QC Level: 1 ____ 2 ____ 3 ____ 4 ____ e-mail:
P.O. No.:
Quote No.:
Turn Around
Results Needed
Remarks
Lab No.:

Client Sample Number/Description:	Date Taken	Time Taken	Matrix	Comp.	Grab	Preserv.	No. of Containers

Relinquished by: (Signature) Date/Time:
Received by: (Signature) Date/Time:
Relinquished by: (Signature) Date/Time:
Received by: (Signature) Date/Time:
Relinquished by: (Signature) Date/Time:
Received by: (Signature) Date/Time:

Comments:

Preservation Code: A = None B = HNO_3 C = NaOH
D = H_2SO_4 E = HCl F = 5035/EnCore G = Other

Laboratory Work Order No.:

Received on Ice: Yes ☐ No ☐
Temperature: °C

ATTACHMENT 3
Example Chain of Custody for Environmental Lead Samples

STAT Analysis Corporation
2242 W. Harrison, Suite 200, Chicago, Illinois 60612 Phone: (312) 733-0551 Fax: (312) 733-2386
e-mail address: STATinfo@STATAnalysis.com

CHAIN OF CUSTODY RECORD Page : _____ of _____

Client: _____
Street Address: _____
City, State, Zip: _____
Phone: _____
Fax: _____
e-mail/Alt. Fax: _____
Project Number: _____
Project Name: _____
Project Location: _____
Project Manager: _____
P.O. Number: _____

Turn Around: 4 Hrs: ☐ 8 Hrs: ☐ 24 Hrs: ☐ 1 Day: ☐ 2 Days: ☐ 3 Days: ☐ 5 Days: ☐
Date Due: _____ Time Due: _____ Note: Not all turn around times are available for all analysis.

OFFICE USE ONLY BELOW:
Batch No.:
Samples Acceptable: Yes: ☐ No: ☐
Checked by (Initial/Date): _____
QC by (Initial/Date): _____
Reported By (Initial/Date/Time/Method): _____
Comments: _____

Relinquished by: _____ Date/Time: _____
Received by: _____ Date/Time: _____
Relinquished by: _____ Date/Time: _____
Received by: _____ Date/Time: _____
Relinquished by: _____ Date/Time: _____
Received by: _____ Date/Time: _____

Client Sample Number/Description	Date Taken	Time On	Time Off	Rate (lpm)	Volume (Liters)	Area Wiped (ft^2)	Laboratory Sample No.	Lead Air	Lead Ambient Air	Lead Based Paint	Lead Soil	Lead Drinking Water	Lead Waste Water	Lead Wipe		TCLP Lead	TCLP RCRA Metals		Dust NIOSH 500	Dust NIOSH 600		Hexavalent Chromium		Other:

Comments: _____

ATTACHMENT 4
Example Chain of Custody for Asbestos Samples

STAT Analysis Corporation
2242 W. Harrison, Suite 200, Chicago, Illinois 60612 Phone: (312) 733-0551 Fax: (312) 733-2386
e-mail address: STATinfo@STATAnalysis.com

CHAIN OF CUSTODY RECORD Page : _____ of _____

Client:		Turn Around: Immediate: ☐ 4 Hrs: ☐ 8 Hrs: ☐ 24 Hrs: ☐ 1 Day: ☐ 2 Days: ☐ 3 Days: ☐ 5 Days: ☐	
Street Address:		Date Due: Time Due: Note: Not all turn around times are available for all analysis.	
City, State, Zip:		OFFICE USE ONLY BELOW:	Relinquished by: Date/Time:
Phone:		Batch No.:	Received by: Date/Time:
Fax:			Relinquished by: Date/Time:
e-mail/Alt. Fax:		Samples Acceptable: Yes: ☐ No: ☐	Received by: Date/Time:
Project Number:		Checked by (Initial/Date):	Relinquished by: Date/Time:
Project Name:		QC by (Initial/Date):	Received by: Date/Time:
Project Location:		Reported By (Initial/Date/Time/Method):	
Project Manager:			
P.O. Number:		Comments:	

Client Sample Number/Description	Date Taken	Time On	Time Off	Rate (lpm)	Volume (Liters)	Area Wiped (ft^2)	Laboratory Sample No.	PCM Asbestos	PLM Asbestos (Bulk)	PLM Point Count	PLM Gravimetric	TEM Air Asbestos	TEM Bulk Asbestos	TEM Gravimetric Ash	TEM Microvac Ash	TEM Water		Other							

Comments: _____

ATTACHMENT 5
Microbiology Chain of Custody

STAT Analysis Corporation
2242 West Harrison Street, Suite 200, Chicago, Illinois 60612 Phone: (312) 733-0551 Fax: (312) 733-2386
e-mail address: STATinfo@STATAnalysis.com

MICROBIOLOGY CHAIN OF CUSTODY RECORD Page : _____ of _____

Client:	**Office Use Only Below:**	Turn Around Time: <1 ☐ 1 ☐ 2 ☐ 3 ☐ Viable: 6-10 ☐
Street Address:	Work Order No.:	Other TAT: Date Due: Time Due:
City, State, Zip:		Relinquished by: Date/Time:
Phone:	Samples Acceptable: Yes: ☐ No: ☐	Received by: Date/Time:
Fax:	Analyzed By:	Relinquished by: Date/Time:
e-mail/Alt. Fax:	Date/Time:	Received for lab by: Date/Time:
Project Number:	Data File:	Relinquished by: Date/Time:
Project Name:	QC By:	Received by: Date/Time:
Project Location:	Reported By (Initial/Date/Time):	
Project Manager:	Verbal:	
P.O. Number:	Fax/e-mail:	

Client Sample Number/Description:	Date Taken	Time Taken	Volume (Liters)	Area Wiped (Units)^2	Laboratory Sample No.	Non-Viable	Air Cassette	Direct Exam-Tape	Direct Exam-Swab	Direct Exam-Bulk		Viable:	Air Impact	Swab	Bulk		Other:					

Comments: _____

Attachment 6
Example of Notice of Confidentiality for E-mail

Page 1 of 1

Craig

From: "Craig Chawla" <CChawla@STATAnalysis.com>
To: <CChawla@STATAnalysis.com>
Sent: Thursday, September 18, 2003 3:41 PM
Subject: Confidentiality Statement

Craig Chawla
STAT Analysis Corporation
(312) 563-0371

9/18/2003

Attachment 7
Example of Notice of Confidentiality for Facsimiles

STAT Analysis Corporation:
2242 West Harrison, Suite 200, Chicago, Illinois 60612
Tel: 312.733.0551; Fax: 312.733.2386; e-mail address: STATinfo@STATAnalysis.com

Fax Cover Sheet

DATE: **TIME:**

TO: **PHONE:**
FAX:

COMPANY:

FROM: **PHONE:**
FAX:

RE:

No. of Pages Including This Page:

NOTICE OF CONFIDENTIALITY

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Appendix F

Chain-Of-Custody Forms

ENVision Proj#:_____ Page _____ of _____

CHAIN OF CUSTODY RECORD

ENVision Laboratories, Inc. | 1439 Sadlier Circle West Drive | Indianapolis, IN 46239 | Phone: (317) 351-8632 | Fax: (317) 351-8639

Client:	Invoice Address:
Report Address:	Project Name:
Report To:	Lab Contact:
Phone:	Sampled by:
Fax:	P.O. Number:
Desired TAT: (Please Circle One) **1-2 days 3-6 days Std (7 bus. days)**	QA/QC Required: (circle if applicable) **Level III Level IV**

REQUESTED PARAMETERS

Sample Integrity:

Cooler Temp: _____°C (Circle)
Samples on Ice? Yes No
Samples Intact? Yes No
Custody Seal: Yes No
ENVision provided bottles: Yes No
VOC vials free of head-space: Yes No N/A
pH checked? Yes No N/A
Method 5035 collection used? Yes No
5035 samples received within 48 hr of Collection? Yes No

Please indicate number of containers per preservative below

Sample ID	Coll. Date	Coll. Time	Comp (C) Grab (G)	Matrix							HCl	HNO_3	H_2SO_4	NaOH	Other	None	ENVision Sample ID

Comments:

Relinquished by:	Date	Time	Received by:	Date	Time