QUALITY ASSURANCE PROJECT PLAN FOR ENVIRONMENTAL INVESTIGATIONS AT THE HARLEY-DAVIDSON MOTOR COMPANY OPERATIONS, INC., YORK FACILITY

SAIC Project 01-1633-00-6221-007

Prepared for:

Harley-Davidson Motor Company Operations, Inc.

York, PA

June 2006

Science Applications International Corporation
An Employee-Owned Company

6310 Allentown Boulevard, Harrisburg, PA 17112 • (717) 901-8100 • (800) 944-6778

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Respectfully submitted,

Stephen M. Snyder, P.G.
Project Director

Rodney G. Myers
Project Manager

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LIST OF ACRONYMS AND ABBREVIATIONS

%R	-	percent recovery
AMF	-	American Machine & Foundry Company
AMOED	-	AMO Environmental Decisions, Inc.
AOC	-	area of concern
ASTM	-	American Standard for Testing and Materials
°C	-	degrees Centigrade
COC	-	chain-of-custody
DOT	-	Department of Transportation
DQO	-	data quality objectives
EDD	-	electronic data deliverable
EPA	-	United States Environmental Protection Agency
FCO	-	field change order
FCR	-	field change request
FPC	-	facility project coordinator
FS	-	feasibility study
FUDS	-	Formerly Used Defense Sites
Harley-Davidson-		Harley-Davidson Motor Company Operations, Inc.
IDW	-	investigative-derived wastes
Langan	-	Langan Engineering and Environmental Services, Inc.
LCS	-	laboratory control sample
LOR	-	letter of receipt
M&TE	-	measuring and testing equipment
MDL	-	method detection limit
mm		millimeter
MOA	-	memorandum of agreement
MS/MSD	-	matrix spike/matrix spike duplicate
NCR	-	non-conformance report
NIOSH	-	National Institute for Occupational Safety and Health
NIR	-	notice of intent to remediate
NIST	-	National Institute of Standards and Testing
NPDES	-	National Pollutant Discharge Elimination System
PADEP	-	Pennsylvania Department of Environmental Protection
PCBs	-	polychlorinated biphenyls
PCE	-	tetrachloroethene
PID	-	photoionization detector
QA/QC	-	quality assurance/quality control
QAPP	-	Quality Assurance Project Plan
QCR	-	quality control report
RCRA	-	Resource Conservation and Recovery Act
RI	-	Remedial Investigation
RI/FS	-	Remedial Investigation/Feasibility Study
RPD	-	relative percent difference
SAIC	-	Science Applications International Corporation
SDG	-	sample delivery group
SOP	-	standard operation procedure
SSHO	-	site safety and health officer
SSHP	-	Site Safety and Health Plan

STL	-	Severn Trent Laboratories, Inc.
SVOC	-	Semi-volatile Organic Compound
SWMU	-	Solid Waste Management Unit
TCA	-	1,1,1-trichloroethane
TCE	-	trichloroethene
USACE	-	United States Army Corps of Engineers
VOC	-	volatile organic compounds
YNOP	-	York Naval Ordinance Plant

1.0 PROJECT DESCRIPTION

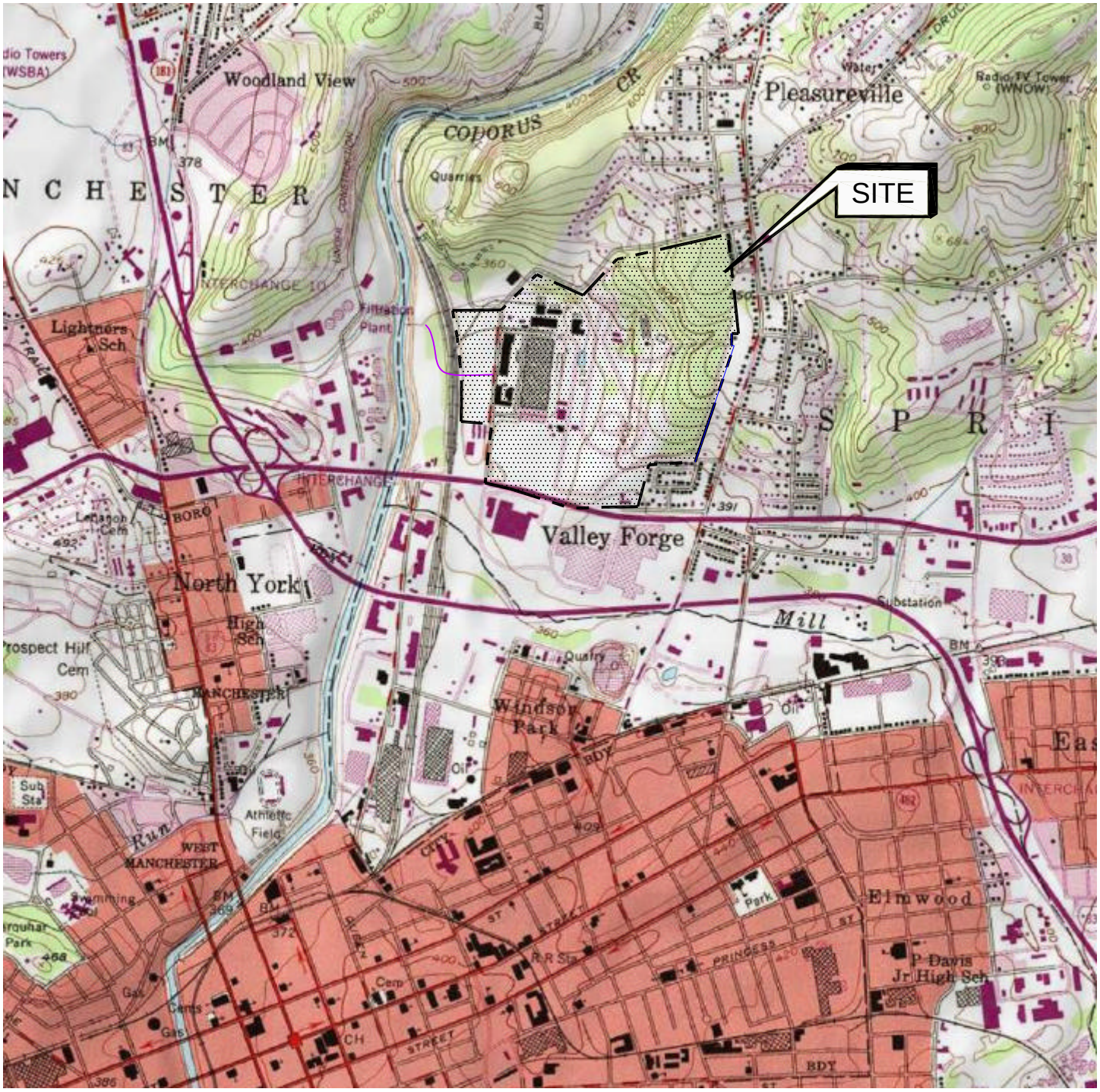
This Quality Assurance Project Plan (QAPP) is for activities to be performed during remedial environmental work at the Harley-Davidson Motor Company Operations, Inc. (Harley-Davidson) facility in York, Pennsylvania. This QAPP presents the organization, objectives, functional activities, and specific quality assurance (QA) and quality control (QC) activities. It describes the specific protocols that will be followed for sampling, sample handling and storage, chain-of-custody (COC), and laboratory analysis. This plan also presents details regarding data quality objectives for the project, sampling and preservation procedures for samples collected in the field, field and sample documentation, sample packaging and shipping, and laboratory analytical procedures for all media sampled.

All QA/QC procedures will be in accordance with applicable professional technical standards, United States Environmental Protection Agency (EPA) requirements, government regulations and guidelines, and specific project goals and requirements. This QAPP is prepared in accordance with EPA QAPP and United States Army Corps of Engineers (USACE) guidance documents; *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans* (EPA, 1991), *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (EPA, 1994a), *Requirements for the Preparation of Sampling and Analysis Plans* (USACE, 1994), *Chemical Quality Assurance for HTRW Projects* (USACE, 1997), and the *Shell for Analytical Chemistry Requirements* (USACE, 1998).

1.1 Site Setting, History and Contaminants

The Harley-Davidson facility is located in Springettsbury Township, in York, York County, Pennsylvania, and is currently an active motorcycle manufacturing facility situated on approximately 230 acres. The facility is bordered on the south by Route 30; on the west by Eden Road, a railroad line and Codorus Creek; and on the east and north by residential properties. A site location map is provided on Figure 1-1.

The site is underlain by fill (associated with site industrial and roadway construction), residual soil produced from the weathering of the underlying bedrock, and alluvium. Soils are comprised of sandy silt, and clayey silts and silt loam deposits from four primary soil classifications (Duffield, Glenelg, Elk and Chester). These soil formations are derived primarily from quartzite and limestone. Two geologic rock formations underlie the site. Solution-prone (karst), gray limestone underlies the flat lowland (western) portion of the site. Quartzitic sandstone underlying the more steeply sloping hills or upland area is present on the eastern part of the site. A detailed discussion of the geology and hydrogeology is included in Science Applications International Corporation's (SAIC's) February 1995 report titled, "Groundwater Extraction and Treatment System Annual Operations Report". Groundwater flow is generally westward, from the upland area at the eastern part of the site toward Codorus Creek; however, localized groundwater flow is also controlled by an active groundwater extraction and treatment system onsite.



NOTE: BASE MAP FROM THE YORK PA., USGS 7 1/2 MIN TOPOGRAPHIC QUADRANGLE (PR 1990).

2000' 0 2000'

SCALE IN FEET

N

PENNSYLVANIA

QUADRANGLE LOCATION

HARLEY-DAVIDSON MOTOR COMPANY OPERATIONS, INC

YORK FACILITY

SITE LOCATION MAP

drawn RAM	checked	approved	figure no. 1-1
date 03/27/03	date	date	
job no. 01-1633-00-0822-100		file no. 0822-002.dwg	

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The York facility was constructed in 1941 by the York Safe and Lock Company, a United States Navy contractor, for the manufacture, assembly and testing of 40 millimeter (mm) twin and quadruple gun mounts, complete with guns. In 1944, the Navy took possession of the York facility. The Navy owned and operated the facility as the York Naval Ordinance Plant (YNOP) until 1964, switching operations after World War II (WWII) to overhauling war-service weapons, making rocket launchers, and manufacturing 3-inch/50 caliber guns, 20 mm aircraft guns and power drive units for 5-inch/54 caliber guns. In 1964, the Navy sold the York facility to American Machine and Foundry Company (AMF), who continued similar manufacturing. In 1969, AMF merged with Harley-Davidson. In 1973, Harley-Davidson moved its motorcycle assembly operations to the York facility. In 1981, AMF sold the York facility to Harley-Davidson. Harley-Davidson has continued motorcycle assembly operations at the York facility since 1981.

Harley-Davidson has been performing remedial environmental activities at the site since 1986. In 1989, EPA performed a Resource Conservation and Recovery Act (RCRA) facility inspection of the facility. As a result of this inspection, 73 solid waste management units (SWMUs) were identified as areas of concern, needing further investigation. These SWMUs included:

- 28 SWMUs requiring No Action or Continued Compliance
- 13 SWMUs investigated and closed through RCRA procedures
- 13 SWMUs to be considered as part of Remedial Investigation/Feasibility Study (RI/FS)
- 19 SWMUs with action pending (RI/FS Work Plan Addendum)

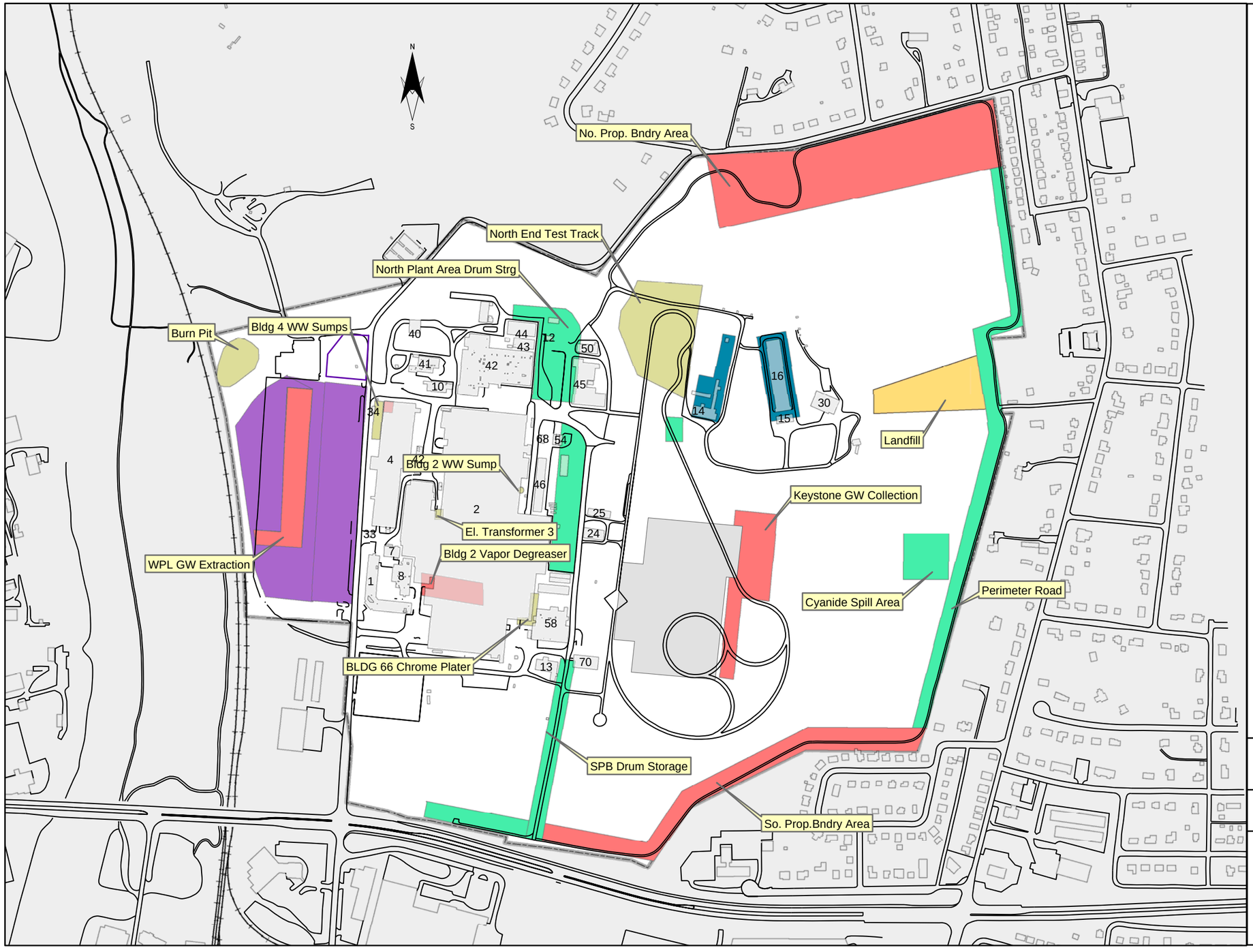
Harley-Davidson entered into a Settlement Agreement with the Department of Defense and the Department of the Navy (as facilitated by USACE) on January 24, 1995. That agreement established a cost sharing arrangement between Harley-Davidson, as the present site owner, and the United States, as the past owner, for costs incurred in the response to environmental contamination at the facility. A Trust Fund was established to handle the cost sharing of those response actions.

A site-wide RI/FS was initiated in 1998 and is presently ongoing. The objectives of the site-wide RI/FS are to evaluate potential sources of soil and groundwater impacts, determine the fate and transport characteristics of known constituents of concern, and evaluate the risk that the constituents of concern pose to human health and the environment. The results of the investigation are to be used to evaluate and define remedies that will minimize risks to human health and the environment. The resulting areas of concern (AOCs), were identified in the site-wide Remedial Investigation (RI) Report (Langan Engineering and Environmental Services, Inc. [Langan], 2003 [draft]). The general locations of the AOCs are shown on Figure 1-2.

Previous remedial activities at the site have indicated that the primary constituents of concern due to concentration, frequency, and potential for offsite migration, are chlorinated solvents, including tetrachloroethene (PCE), trichloroethene (TCE), and 1,1,1-trichloroethane (TCA) and degradation products of those compounds. Lesser frequencies of hexavalent chromium, lead, and cyanide have also been detected in selected site groundwater monitoring wells. The distribution of these constituents in groundwater suggests that they have originated from multiple sources.

Other constituents of concern encountered in site soil, include benzene, ethylbenzene, xylenes, nickel, and polychlorinated biphenyls (PCBs). These substances appear to be restricted to specific source locations, several of which have already been subjected or are being subjected to remedial actions.

On May 20, 2002, Harley-Davidson committed to EPA's "Facility Lead Program" under the RCRA Corrective Action program through a letter of commitment to EPA. Subsequently, Harley-Davidson has entered into the One Cleanup program established by the EPA (Region III) and the Pennsylvania Department of Environmental Protection (PADEP), which was outlined in a Memorandum of Agreement (MOA) dated April 24, 2004. Under the MOA, both agencies agreed to work with Harley-Davidson to complete RCRA Corrective Actions for the facility and meet Act 2 cleanup standards in accordance with Act 2 and Chapter 250 of Pennsylvania's Land Recycling and Environmental Remediation Standards Act. The One Cleanup program initiative began for Harley-Davidson on February 7, 2005, when Harley-Davidson submitted a Notice of Intent to Remediate (NIR) to PADEP.



Legend

- Railroad
- Roads
- Property Boundary
- Active/Planned GW Remed
- Envir. Mngmnt Area
- Further Study -Remed Poss
- Land Fill
- Ordnance/Explosives Area
- West Parking Lot
- Buildings
- Substation

0 250 500 1,000 Feet

1 inch equals 500 feet

Figure 1-2

Harley-Davidson
York Facility Vehicle Operations

Areas of Potential Environmental Concern

Drawn/Date:	Checked/Date:
SMS - 1-22-04	RGM - 1-22-04

Revisions:

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K:\GIS_Data\Harley\Projects\Supl RI\QAAP Fig 1-2.mxd

1.2 Summary of Existing Data

In 1998, a remedial investigation was initiated by Langan. The results of this study, including more detailed summaries of soil, groundwater, sediment and surface water sampling, is provided in a draft report titled "Interim Site-Wide Remedial Investigation Report, Harley-Davidson Motor Company, York, Pennsylvania Facility" (Langan, 2003). The purpose of the RI work was to characterize the site for the development of appropriate remedial measures. This was facilitated through the investigation of potential source areas, further development of the conceptual model, and evaluation of migration and exposure pathways.

1.3 Site-Specific Sampling and Analysis Problems

The site is an active industrial facility. Care must be utilized when working onsite to avoid underground utilities during all intrusive activities. The quantitation limits of the proposed sampling and the type of analyses requested do not present completion problems. Sampling for hexavalent chromium requires rapid submittal to the laboratory, due to short holding times.

1.4 Required Chemistry

Area- or task-specific work plans will provide the details of the project scope and objectives, sampling design, procedures, methods, and rationales. These work plans will also contain additional background information, along with past data collection activities and existing site data information. The anticipated sampling frequency, number of samples, frequency of QC samples, and types of analyses will also be provided in the work plan. Primary project organization and responsibilities for laboratory-related activities are presented in Section 2.0 of this QAPP.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The organizational chart shown on Figure 2-1 outlines the management structure that will be used to implement remedial environmental projects. The functional responsibilities of key roles are described in the following parts of this section.

2.1 Harley-Davidson Facility Project Coordinator (FPC)

As the Facility Lead, Harley-Davidson ensures the overall management and quality of Harley-Davidson's environmental activities. Sharon Fisher is identified as the Harley-Davidson Facility Project Coordinator (FPC) for the One Cleanup program and will ensure that all project goals and objectives are met in a high-quality and timely manner. Quality assurance and nonconformance issues will be addressed by this individual in coordination with the Contractor's Program Manager. Ms. Fisher's business address and telephone number is:

Harley-Davidson Motor Company Operations, Inc.
1425 Eden Road
York, Pennsylvania 17402
(717) 852-6544
(717) 852-6718 (Fax)

2.2 Trust Fund 3rd Party Coordinator

The Trust Fund 3rd Party Coordinator (Ralph Golia, AMO Environmental Decisions, Inc. [AMOED]) is the liaison between shared cleanup responsibility between Harley-Davidson and the federal government, and serves as the technical lead and point of contact with the USACE (Formerly Used Defense Sites [FUDS] Team Lead). These activities will also involve interfacing with EPA personnel, and tracking Trust Fund-related budgets and schedules. Mr. Golia's business address and telephone number is:

AMO Environmental Decisions, Inc.
4327 Point Pleasant Pike
Danboro, Pennsylvania 18916
(215) 230-8282
(215) 230-8283 (Fax)

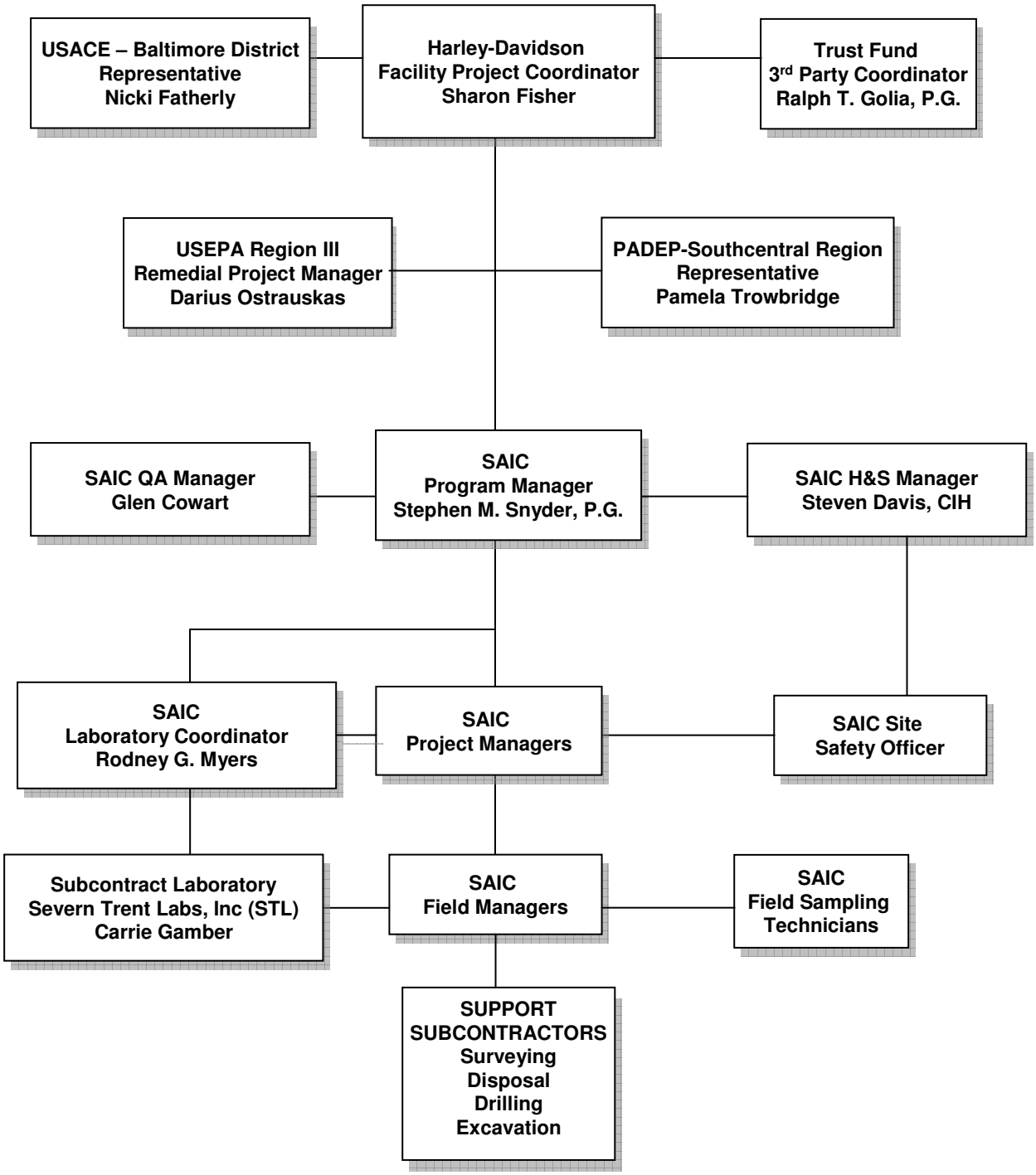
Figure 2-1

Project Organization Chart

Supplemental Remedial Investigations

Harley-Davidson Motor Company Operations, Inc.,

York Facility



2.3 USEPA Region III Remedial Project Manager

The USEPA Region III Remedial Project Manager for the project is Darius Ostrauskas. Mr. Ostrauskas works with the Harley-Davidson FPC and PADEP representative to provide regulatory review and federal oversight for the project. Specifically, the USEPA works directly with the PADEP to provide guidance for Harley-Davidson under the One Cleanup program. Mr. Ostrauskas is the primary lead for USEPA on the One Cleanup program at Harley-Davidson. Mr. Ostrauskas' business address and phone number is:

USEPA Region III
Pennsylvania Operations Branch (3WC22)
1650 Arch Street
Philadelphia, PA 19103-2029
(215) 814-3360
(215) 814-3113 (Fax)

2.4 PADEP Representative

The PADEP site representative is Pam Trowbridge. Ms. Trowbridge provides regulatory oversight to the project and represents the Commonwealth on environmental issues at Harley-Davidson. In addition, Ms. Trowbridge is the PADEP primary lead for the One Cleanup program initiative. The business address and phone number for Ms. Trowbridge is:

Pennsylvania Department of Environmental Protection
Southcentral Region
909 Elmerton Avenue
Harrisburg, PA 17110-8200
(717) 705-4851
(717) 705-4830 (Fax)

2.5 USACE Baltimore District Representative

The USACE, Baltimore District representative for the site is Nicki Fatherly. As the representative of the former site owner for the Navy, Ms. Fatherly reviews all matters with the Harley-Davidson FPC and the Trust Fund coordinator concerning investigation or remediation of environmental impacts from those past operations at the site. Ms. Fatherly's business address and phone number is:

United States Army Corps of Engineers
Baltimore District, CENAB-EN-HN
10 South Howard Street
Baltimore, MD 21201-1717
(410) 962-3542
(410) 962-2318 (Fax)

2.6 SAIC Program Manager

The SAIC Program Manager for the site (Steve Snyder, PG) is responsible for the overall coordination of all project activities at Harley-Davidson for SAIC. Mr. Snyder reports to the Harley-Davidson FPC. Mr. Snyder's business address and telephone number is:

Science Applications International Corporation
6310 Allentown Boulevard
Harrisburg, Pennsylvania 17112
(717) 901-8840
(717) 901-8102 (Fax)

2.7 SAIC Quality Assurance Manager

The SAIC QA Manager (Mr. Glenn Cowart) is responsible for the project QA/QC in accordance with the requirements of the project QAPP, other work plan documentation, and appropriate management guidance. The SAIC QA Manager, in coordination with the SAIC Project Managers, will be responsible for participating in the project field activity readiness review; approving variances during field activities before work continues; approving, evaluating, and documenting the disposition of Nonconformance Reports (NCRs); overseeing and approving any required project training; and designing audit/surveillance plans followed by supervision of these activities. The SAIC QA Manager reports to the SAIC Program Manager. Mr. Cowart's business address and telephone number is:

Science Applications International Corporation
151 Lafayette Drive
P.O. Box 2501
Oak Ridge, TN 37831
(865) 481-4630
(865) 482-7257 (Fax)

2.8 SAIC Project Managers

The SAIC Project Managers are responsible for implementation and documentation of all project QA/QC protocols during field activities. This will include but not be limited to: documentation of QAPP instructions to field personnel; oversight of field sampling and analytical activities; documentation of field QC activities; and oversight of field documentation. The SAIC Project Managers report to the SAIC Program Manager.

2.9 SAIC Health and Safety Manager

The SAIC Health and Safety Manager (Mr. Stephen Davis) is responsible for ensuring that health and safety procedures designed to protect personnel are maintained throughout the field activities. This will be accomplished by strict adherence to the project Site Safety and Health Plan (SSHP), which will be prepared as a separate document for each project. This individual, in conjunction with the Site Safety Officer, will have the authority to halt fieldwork if health or safety issues arise that are not immediately resolvable in accordance with the project SSHP. The Health and Safety Manager and Site Safety Officer report directly to the Project and Field Managers. Mr. Davis' business address and phone number is:

Science Applications International Corporation
151 Lafayette Drive
P.O. Box 2501
Oak Ridge, TN 37831
(865) 481-4755
(865) 481-4770 (Fax)

2.10 SAIC Laboratory Coordinator

The SAIC Laboratory Coordinator (Rodney Myers) is responsible for coordination of sample shipment to the laboratory(ies), and subsequent chemical analysis and reporting performed by the subcontract laboratories, in accordance with the requirement defined in the QAPP. This individual will be responsible for obtaining required sample containers from the laboratories for use during field sample collection, resolving questions the laboratory may have regarding QAPP requirements and deliverables, and coordination of data reduction, review, and documentation activities related to

sample data package deliverables received from the laboratories. The SAIC Laboratory Coordinator reports directly to the SAIC Program Manager. Mr. Myers' address and telephone contact information is:

Science Applications International Corporation
6310 Allentown Boulevard
Harrisburg, Pennsylvania 17112
(717) 901-8836
(717) 901-8102 (Fax)

2.11 SAIC Field Managers

The SAIC Field Managers are responsible for implementing all field activities in accordance with project-specific work plans and the QAPP. These individuals are responsible for: ensuring proper technical performance of field operations and sampling activities; adherence to required sample custody and other related QA/QC field procedures; coordination of field personnel and subcontractor activities; management of investigation-derived wastes (IDW); and checks of all field documentation, if required. The SAIC Field Managers report directly to the SAIC Project Managers except in regard to QA/QC matters that are reported directly to the SAIC QA Manager.

2.12 SAIC Field Personnel

In addition to the SAIC Field Managers, other field personnel participating in the implementation of field activities are anticipated to be field staff and sampling technicians. These individuals, in coordination with field subcontractor personnel, will be responsible for performance of excavation activities, drilling operations, collection of soil, surface water samples, etc. and preparation of field logbooks and other required documentation. These individuals will be responsible for performing all field activities in accordance with the work plan(s) and QAPP, and will report directly to the SAIC Field Managers.

2.13 Subcontracted Laboratory Support

The subcontract laboratory for this project is Severn Trent Laboratories, Inc. (STL) of Pittsburgh, Pennsylvania. The STL main point of contact for the work at Harley-Davidson is Carrie Gamber.

The Laboratory QA Manager at STL is Nasreen DeRubeis, while the Laboratory Director at STL is Albert (Rusty) Vicinie, III. The responsibilities of key personnel for the laboratory are described in the STL-Pittsburgh Laboratory QA Plan. The subcontracted laboratory shall report to the SAIC Laboratory Coordinator or their designee. The contact information for STL is:

STL-Pittsburgh
301 Alpha Drive
Pittsburgh, PA 15238
(412) 963-7058
(412) 963-2468 (Fax)

3.0 DATA QUALITY OBJECTIVES

The overall project objective is to complete the RI to allow implementation of the FS and selected final remedy(ies) at the former YNOP site. Various site- or area-specific investigations or cleanups may be implemented during this process. During the course of these activities the project must develop and implement procedures for field sampling, COC, laboratory analysis, and reporting, which will provide information for evaluation, assessment and remediation. Data must be technically sound and legally defensible. Procedures for sampling, COC, laboratory instrument calibration, laboratory analysis, reporting of data, internal QC, audits, preventive maintenance of field equipment, and corrective action are described in other sections of this QAPP. The purpose of this section is to address the objectives for data accuracy, precision, completeness, representativeness, and comparability.

Data Quality Objectives (DQOs) are qualitative and quantitative statements that specify the quality of data required to support decisions made during investigation activities, and are based on the end uses of the data being collected.

3.1 Project Objectives

Site- or area-specific work plans will identify specific task objectives as they relate to investigation action levels and remediation. General analytical objectives are:

- To provide data of sufficient quality and quantity to support ongoing supplemental remedial investigation efforts.
- To provide data of sufficient quality and quantity to support area-specific remediation goals (when applicable).
- To provide data of sufficient quality to meet applicable Commonwealth of Pennsylvania and Federal (EPA, Region III) risk-based goals, as required under the One Cleanup program.
- To ensure samples are collected using approved techniques and are representative of existing site conditions.

- To utilize QA/QC procedures for both field and laboratory methods that meet the EPA, PADEP and One Cleanup program guidance document requirements.

3.2 Quality Assurance Objectives for Measurement Data

An analytical DQO summary for these activities is presented in Tables 3-1 and 3-2. All QC parameters stated in the specific SW-846 methods (i.e., percent recoveries) will apply for each chemical listed.

Table 3-1. Solid /Soil Gas Investigative DQO Summary

Data Use	Sample Type	Analytical Method	Precision (RPD)[a]		Accuracy	Accuracy	Completeness
			Field Dups	Lab Dups	Lab LCS	Lab MS	
Screening for H&S plus sample site selection, dust monitoring	Discrete	FID/PID Volatile organics MiniRam	± comparison	NA	NA	NA	95%
Confirmation of contamination removal	Discrete	SW-8260B Volatile organics	<50 RPD	<40 RPD	75-125% recovery	60-140% recovery	90%
Identification of VOC source areas using Soil Gas	Discrete Soil Gas samples	TO-15	<40 RPD	<25 RPD	70-130% recovery	60-140% recovery	90%
Contaminant Measurement	Discrete or composite	SW8260B Volatile Organics	<50 RPD	<40 RPD	75-125%	60-140%	90%
		SW-8270C Semivolatile organics	<50 RPD	<40 RPD	50-130% recovery	30-140% recovery	90%
		SW-8082A PCBs	<50 RPD	<40 RPD	50-130% recovery	40-140% recovery	90%
		SW-6010A/7471A Metals	<50 RPD	<35 RPD	90-110% recovery	75-125% recovery	90%
		Hexavalent Chromium SW-846 7196a	<50 RPD	<35 RPD	90-110% recovery	75-125% recovery	90%
		SW-846 9012a Total Cyanide	<50 RPD	<35 RPD	90-110% recovery	75-125% recovery	90%
Waste characterization	Discrete (VOCs) or composite	SW-1311 TCLP analytes and waste characteristics	NA	<40 RPD	80-120%	75-125% recovery	80%

[a] Relative percent differences at values within five times the reporting level comparison are acceptable if values are plus or minus three times the reporting level.

NA = Not applicable.

Table 3-2. Liquid Investigative DQO Summary

Data Use	Sample Type	Analytical Method	Precision (RPD)[a]		Accuracy	Accuracy	Completeness
			Field Dups	Lab Dups	Lab LCS	Lab MS	
Screening for H&S plus sample site selection	Discrete	FID/PID Volatile organics (headspace)	NA	NA	± 0.1 ppm	NA	95%
Determination of basic water characteristics	Discrete	Conductivity - Horiba U22, field multi-meter OR EPA-120.1	<10 RPD	NA	± 0.1 µmhos/cm	NA	95%
		pH - Horiba U22, field multi-meter OR EPA-150.1	<10 RPD	NA	± 0.1 s.u.	NA	95%
		Temperature – Horiba U22, field multi-meter OR EPA-170.1	<10 RPD	NA	± 0.1□C	NA	95%
		Turbidity – Horiba U22, field multi-meter OR Turbidity meter	<10 RPD	NA	± 2 NTU	NA	95%
		Ox-red potential - Horiba U22, field multi-meter	<10 RPD	NA	± 30 eV	NA	95%
		Dissolved oxygen –Horiba U22, field multi-meter OR EPA-360.1	<10 RPD	NA	± 0.1 ppm	NA	95%
Contaminant Measurement	Discrete	SW-8260B Volatile organics	<30 RPD	<20 RPD	80-120% recovery	70-130% recovery	90%
	Discrete or composite	SW-8270C Semivolatile organics	<30 RPD	<20 RPD	60-120% recovery	30-140% recovery	90%
		SW-8082A PCBs	<30 RPD	<20 RPD	60-120% recovery	40-140% recovery	90%
		SW-6010A/7470 TAL metals	<30 RPD	<20 RPD	90-110% recovery	75-125% recovery	90%
		Hexavalent Chromium SW-846 7196a	<30 RPD	<20 RPD	90-110% recovery	75-125% recovery	90%
		EPA 335.5 Total Cyanide	<30 RPD	<20 RPD	90-110% recovery	75-125% recovery	90%
		SM 4500 CN E Free Cyanide	<30 RPD	<20 RPD	90-110% recovery	75-125% recovery	90%
		Miscellaneous Anions	<30 RPD	<20 RPD	90-110% recovery	75-125% recovery	90%
IDW characterization	Composite	TCLP analytes and Miscellaneous	NA	<40 RPD	80-120% recovery	70-130% recovery	90%

[a] Relative percent differences at values within five times the reporting level comparison are acceptable if values are plus or minus three times the reporting level.

NA = Not applicable.

As per the EPA guidance (1993a) and USACE EM 200-1-6, a combination of Screening Level and Definitive Level data will be required for this project. Screening data are generated by field operations or other relatively rapid turnaround analytical processes. Documentation and deliverables for screening data are expected to be minimal. Definitive data represent data generated under laboratory conditions using EPA or other nationally recognized analytical methodology. Data of this type, both qualitative and quantitative, are used for determination of source type and extent, for characterization to support evaluation of remedial technologies, and for final confirmatory analyses to document remedial actions. Documentation for definitive data is expected to be comprehensive.

3.2.1 Level of Quality Control Effort

To assess whether QA objectives have been achieved, analyses of specific field and laboratory QC samples will be required. These QC samples include field trip blanks, field duplicates, laboratory method blanks, laboratory control samples, laboratory duplicates, rinsate blanks, and matrix spike/matrix spike duplicate (MS/MSD) samples.

Trip blanks and rinsate blanks will be submitted for analysis along with field duplicate samples to provide a means to assess the quality of the data resulting from the field sampling program. Trip blanks (employed for volatile organic compound [VOC] analysis only) are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage. Rinsate blanks are used to assess the effectiveness of field decontamination processes in conjunction with field blanks of the site potable water source used for decontamination. Criteria and evaluation of blank determinations are provided in Tables 3-3 through 3-7 and Section 8.3. Field duplicate samples are analyzed to determine sample heterogeneity and sampling methodology reproducibility.

Laboratory method blanks and laboratory control samples are employed to determine the accuracy and precision of the analytical method implemented by the laboratory. Matrix spikes provide information about the effect of the sample matrix on the measurement methodology. Laboratory

sample duplicates and MSDs assist in determining the analytical reproducibility and precision of the analysis for the samples of interest.

The general level of QC effort will be at least one field duplicate for every 20 investigative samples and at least one per matrix if there are less than 20 samples collected for a given matrix. One VOC analysis trip blank consisting of analyte-free water will be included along with each shipment of VOC water samples.

MS/MSD samples are investigative samples. Soil MS/MSD samples require no extra volume for semi-volatile organic compounds (SVOCs) or metals. However, soil VOC samples may require additional samples to be collected for these purposes. Aqueous MS/MSD samples must be collected at triple the volume for SVOC, pesticide/PCB, and metals parameters. One MS/MSD sample will be analyzed for at least every 20 samples submitted to the laboratory per sample matrix (i.e., groundwater, soil).

Table 3-3
Project Reporting Levels for Volatile Organic Compounds

Compound	Analytical Method		Project Reporting Levels		Method Detection Limits	
	Liquid	Solid	Liquids (µg/L)	Solids (µg/kg)	Liquids (µg/L)	Solids (µg/kg)
1,1,1-Trichloroethane	5030/8260B	5035/8260B	5	5	1.0350	0.3479
1,1,1,2-Tetrachloroethane	5030/8260B	5035/8260B	5	5	0.8236	0.2713
1,1,2,2-Tetrachloroethane	5030/8260B	5035/8260B	5	5	1.6520	0.4504
1,1,2-Trichloroethane	5030/8260B	5035/8260B	5	5	0.5658	0.6785
1,1-Dichloroethane	5030/8260B	5035/8260B	5	5	0.8637	0.2877
1,1-Dichloroethene	5030/8260B	5035/8260B	5	5	1.1620	0.5895
1,2-Dibromoethane	5030/8260B	5035/8260B	5	5	0.3703	0.3024
1,2-Dichloroethane	5030/8260B	5035/8260B	5	5	0.5618	1.3500
Cis-1,2-Dichloroethene	5030/8260B	5035/8260B	5	5	1.2300	0.7471
Trans-1,2-Dichloroethene	5030/8260B	5035/8260B	5	5	1.1700	0.6527
1,2-Dichloropropane	5030/8260B	5035/8260B	5	5	1.3190	0.6269
1,4-Dioxane	5030/8260B	5035/8260B	1,000	1,000	742.7000	523.1000
2-Butanone	5030/8260B	5035/8260B	10	20	2.2750	1.3990
2-Hexanone	5030/8260B	5035/8260B	10	20	0.7090	0.8138
4-Methyl-2-pentanone (MIBK)	5030/8260B	5035/8260B	10	20	1.4470	0.8430
Acetone	5030/8260B	5035/8260B	20	20	5.0000	5.0000
Acrylonitrile	5030/8260B	5035/8260B	100	100	30.4100	26.5900
Benzene	5030/8260B	5035/8260B	5	5	1.2570	0.5467
Bromochloromethane	5030/8260B	5035/8260B	5	5	0.4973	0.8065
Bromodichloromethane	5030/8260B	5035/8260B	5	5	0.7805	0.2500
Bromoform	5030/8260B	5035/8260B	5	5	2.1700	0.6111
Bromomethane	5030/8260B	5035/8260B	10	10	1.3850	0.9321
Carbon disulfide	5030/8260B	5035/8260B	5	5	0.9000	0.3604
Carbon tetrachloride	5030/8260B	5035/8260B	5	5	0.5752	0.2500
Chlorobenzene	5030/8260B	5035/8260B	5	5	0.4206	0.8515
Chloroethane	5030/8260B	5035/8260B	10	10	3.6870	0.9413
Chloroform	5030/8260B	5035/8260B	5	5	0.7291	0.2500
Chloromethane	5030/8260B	5035/8260B	10	10	1.0500	0.2868
Cis-1,3-dichloropropene	5030/8260B	5035/8260B	5	5	0.9533	0.2870
Dibromochloromethane	5030/8260B	5035/8260B	5	5	1.8810	0.3073
Ethyl benzene	5030/8260B	5035/8260B	5	5	1.6790	0.9315
Methylene chloride	5030/8260B	5035/8260B	5	5	1.0500	0.2868
Methyl tertiary butyl ether	5030/8260B	5035/8260B	5	5	0.6809	0.4099
Styrene	5030/8260B	5035/8260B	5	5	2.0240	0.8002
Tetrachloroethene	5030/8260B	5035/8260B	5	5	0.6647	0.7673
Toluene	5030/8260B	5035/8260B	5	5	0.6115	0.5909
Trans-1,3-dichloropropene	5030/8260B	5035/8260B	5	5	0.2750	0.2759
Trichloroethene	5030/8260B	5035/8260B	5	5	1.3420	0.8609
Vinyl chloride	5030/8260B	5035/8260B	10	10	1.1440	0.6576
Xylenes (total)	5030/8260B	5035/8260B	5	5	5.8300	2.7320

Table 3-4
Project Reporting Levels for Semi-volatile Organic Compounds

Compound	Analytical Method		Project Reporting Levels		Method Detection Limits	
	Liquid	Solid	Liquids (µg/L)	Solids (µg/kg)	Liquids (µg/L)	Solids (µg/kg)
1,2,4-Trichlorobenzene	3510C/8270C	3540C/8270C	10	330	6.1226	6.745
1,2-Dichlorobenzene	3510C/8270C	3540C/8270C	10	330	7.4110	6.930
1,3-Dichlorobenzene	3510C/8270C	3540C/8270C	10	330	5.1880	5.784
1,4-Dichlorobenzene	3510C/8270C	3540C/8270C	10	330	5.1357	6.939
2,4,5-Trichlorophenol	3510C/8270C	3540C/8270C	10	330	3.9244	19.000
2,4,6-Trichlorophenol	3510C/8270C	3540C/8270C	10	330	3.0900	5.711
2,4-Dichlorophenol	3510C/8270C	3540C/8270C	10	330	3.3760	6.275
2,4-Dimethylphenol	3510C/8270C	3540C/8270C	10	330	3.5200	5.362
2,4-Dinitrophenol	3510C/8270C	3540C/8270C	50	1600	22.0994	833.300
2,4-Dinitrotoluene	3510C/8270C	3540C/8270C	10	330	5.2395	3.488
2,6-Dinitrotoluene	3510C/8270C	3540C/8270C	10	330	1.0980	4.744
2-Chloronaphthalene	3510C/8270C	3540C/8270C	10	330	5.9130	7.070
2-Chlorophenol	3510C/8270C	3540C/8270C	10	330	2.9200	5.260
2-Methylnaphthalene	3510C/8270C	3540C/8270C	10	330	2.1100	8.158
2-Methylphenol	3510C/8270C	3540C/8270C	10	330	2.6270	7.432
2-Nitroaniline	3510C/8270C	3540C/8270C	50	1600	8.5140	4.133
2-Nitrophenol	3510C/8270C	3540C/8270C	10	330	3.4250	5.994
3-Methylphenol	3510C/8270C	3540C/8270C	10	330	2.3240	40.900
4-Methylphenol	3510C/8270C	3540C/8270C	10	330	1.5080	40.900
3,3'-Dichlorobenzidine	3510C/8270C	3540C/8270C	50	1600	6.8729	8.227
3-Nitroaniline	3510C/8270C	3540C/8270C	50	1600	10.1620	167.700
4,6-Dinitro-2-methylphenol	3510C/8270C	3540C/8270C	50	1600	19.8560	833.300
4-Bromophenylphenyl ether	3510C/8270C	3540C/8270C	10	330	0.9960	16.670
4-Chloro-3-methylphenol	3510C/8270C	3540C/8270C	10	330	1.0842	7.250
4-Chloroaniline	3510C/8270C	3540C/8270C	10	330	1.0570	16.670
4-Chlorophenylphenyl ether	3510C/8270C	3540C/8270C	10	330	1.4220	6.812
4-Nitroaniline	3510C/8270C	3540C/8270C	50	1600	12.9160	4.655
4-Nitrophenol	3510C/8270C	3540C/8270C	50	1600	16.3813	4.472
Acenaphthene	3510C/8270C	3540C/8270C	10	330	6.4153	7.269
Acenaphthylene	3510C/8270C	3540C/8270C	10	330	4.4689	6.970
Anthracene	3510C/8270C	3540C/8270C	10	330	1.4932	7.617
Benzo(a)anthracene	3510C/8270C	3540C/8270C	10	330	1.4260	7.312
Benzo(a)pyrene	3510C/8270C	3540C/8270C	10	330	3.6460	5.591
Benzo(b)fluoranthene	3510C/8270C	3540C/8270C	10	330	1.3890	6.649
Benzo(g,h,i)perylene	3510C/8270C	3540C/8270C	10	330	2.7410	6.318
Benzo(k)fluoranthene	3510C/8270C	3540C/8270C	10	330	2.6450	6.535
Bis(2-chloroisopropyl)ether	3510C/8270C	3540C/8270C	10	330	3.9540	4.826
Bis(2-chloroethoxy)methane	3510C/8270C	3540C/8270C	10	330	2.4450	7.466
Bis(2-chloroethyl)ether	3510C/8270C	3540C/8270C	10	330	6.2120	6.476
Bis(2-ethylhexyl)phthalate	3510C/8270C	3540C/8270C	10	330	1.5790	20.680
Butylbenzylphthalate	3510C/8270C	3540C/8270C	10	330	2.8980	7.384
Carbazole	3510C/8270C	3540C/8270C	10	330	3.5740	7.665
Chrysene	3510C/8270C	3540C/8270C	10	330	1.3280	6.510
Di-n-butylphthalate	3510C/8270C	3540C/8270C	10	330	1.2710	40.650
Di-n-octylphthlalate	3510C/8270C	3540C/8270C	10	330	1.6220	7.688
Dibenzo(a,h)anthrancene	3510C/8270C	3540C/8270C	10	330	0.3750	5.444
Dibenzofuran	3510C/8270C	3540C/8270C	10	330	6.1000	7.505
Diethylphthalate	3510C/8270C	3540C/8270C	10	330	1.4580	6.725

Dimethylphthalate	3510C/8270C	3540C/8270C	10	330	1.2560	6.974
Fluoranthene	3510C/8270C	3540C/8270C	10	330	1.7730	7.065
Fluorene	3510C/8270C	3540C/8270C	10	330	1.5240	7.952
Hexachlorobenzene	3510C/8270C	3540C/8270C	10	330	6.8000	6.701
Hexachlorobutadiene	3510C/8270C	3540C/8270C	10	330	8.2210	6.521
Hexachlorocyclopentadiene	3510C/8270C	3540C/8270C	50	1600	1.0580	26.690
Hexchloroethane	3510C/8270C	3540C/8270C	10	330	7.1650	6.393
Indeno(1,2,3-cd)pyrene	3510C/8270C	3540C/8270C	10	330	2.3220	6.643
Isophorone	3510C/8270C	3540C/8270C	10	330	6.2820	6.371
n-Nitroso-di-n-propylamine	3510C/8270C	3540C/8270C	10	330	3.9240	6.761
n-Nitroso-diphenylamine	3510C/8270C	3540C/8270C	10	330	3.1510	69.140
Napthalene	3510C/8270C	3540C/8270C	10	330	2.4250	7.948
Nitrobenzene	3510C/8270C	3540C/8270C	10	330	2.3360	10.790
Pentachlorophenol	3510C/8270C	3540C/8270C	50	1600	21.2980	457.000
Phenanthrene	3510C/8270C	3540C/8270C	10	330	6.0280	7.960
Phenol	3510C/8270C	3540C/8270C	10	330	2.7640	6.853
Pyrene	3510C/8270C	3540C/8270C	10	330	3.9390	8.142

Table 3-5
Project Reporting Levels for PCB Compounds

Compound	Analytical Method		Project Reporting Levels		Method Detection Limits	
	Liquid	Solid	Liquids (µg/L)	Solids (µg/kg)	Liquids (µg/L)	Solids (µg/kg)
Arochlor-1016	3510C/8082	3540C/8082	1	33	0.4933	26.470
Arochlor-1221	3510C/8082	3540C/8082	1	33	0.4528	12.790
Arochlor-1232	3510C/8082	3540C/8082	1	33	0.5346	15.740
Arochlor-1242	3510C/8082	3540C/8082	1	33	0.2532	11.100
Arochlor-1248	3510C/8082	3540C/8082	1	33	0.3420	12.090
Arochlor-1254	3510C/8082	3540C/8082	1	33	0.3529	4.421
Arochlor-1260	3510C/8082	3540C/8082	1	33	0.5810	3.682

Table 3-6
Project Reporting Levels for Metals (ICP)

Compound	Analytical Method		Project Reporting Levels		Method Detection Limits	
	Liquid	Solid	Liquids (µg/L)	Solids (µg/kg)	Liquids (µg/L)	Solids (µg/kg)
Antimony	EPA 200.7	SW-846-3050A/6010B,6020, or 7000 series	10	1	3.196	0.31960
Arsenic	"	"	10	1	3.293	0.32930
Barium	"	"	200	20	1	0.10000
Beryllium	"	"	4	0.4	0.417	0.04170
Cadmium	"	"	5	0.5	0.6964	0.06964
Chromium, total	"	"	10	10	0.9316	0.09316
Chromium, hexavalent	SW-846- 7196A	SW-846- 7196A	10	0.4	0.9316	--
Copper	SW-846-3010A/6010B,6020 or 7000 series	SW-846-3010A/6010B,6020 or 7000 series	25	2.5	1.153	0.11530
Lead	"	"	3	0.3	1.586	0.15860
Mercury	SW-846-7470A	SW-846-7471A	0.2	0.033	--	--
Nickel	SW-846-6020, 3050A/601B, or 7000 series	SW-846-6020, 3050A/601B, or 7000 series	40	4	1.234	0.12340
Selenium	"	"	5	0.5	2.617	0.26170
Silver	"	"	5	0.5	0.2982	0.02982
Thallium	"	"	10	10	4.558	0.45580
Vanadium	"	"	50	5	1.039	0.10390
Zinc	"	"	20	2	1.687	0.16870
Cyanide, total	EPA 335.4	SW-846 9012A	10	0.5	--	--
Cyanide, free	SM 4500 CN I	NA	10	0.5	--	--

Table 3-7.
Project Reporting Levels for Waste Characteristics and Miscellaneous Parameters

Parameters	Analytical Methods	Project Reporting Levels[a]
Volatile Organic Compounds (VOCs) (TCLP Analyte List)	**SW 846-1311 (zero headspace ext.) SW 846-5030/8260B[b]**	**Leachate (µg/L)[c]**
Vinyl chloride		200
1,1-Dichloroethene		100
Chloroform		100
1,2-Dichloroethane		100
2-Butanone (methyl ethyl ketone)		200
Carbon tetrachloride		100
Trichloroethene		100
Benzene		100
Tetrachloroethene		100
Chlorobenzene		100
Semivolatile Organic Compounds (SVOCs) (TCLP Analyte List)	**SW 846-1311 (extraction) SW 846-3510C/8270C[b]**	**Leachate (µg/L)[c]**
1,4-Dichlorobenzene		200
2-Methylphenol (o-cresol)		200
3-Methylphenol (m-cresol)		200
4-Methylphenol (p-cresol)		200
Hexachloroethane		200
Nitrobenzene		200
Hexachlorobutadiene		200
2,4,6-Trichlorophenol		200
2,4,5-Trichlorophenol		200
2,4-Dinitrotoluene		200
Hexachlorobenzene		200
Pentachlorophenol		1000
Pyridine		200

Parameters	Analytical Methods	Project Reporting Levels[a]
Pesticides **(TCLP Analyte List)**	**SW 846-1311 (extraction) SW 846-3520/8081[b]**	**Leachate (µg/L)**
gamma-BHC (Lindane)		1.0
Heptachlor		1.0
Heptachlor epoxide		1.0
Endrin		1.0
Methoxychlor		2.0
Chlordane (technical)		10
Toxaphene		40
Herbicide Compounds (TCLP Analyte List)	**SW 846-1311 (extraction) SW 846-8151A[b]**	**Leachate (µg/L)**
2,4-D		80
2,4,5-TP (silvex)		20
Metals (TCLP Analyte List)	**SW 846-1311 (extraction) 3010A/6020, 3020A, or 7000 series[b]**	**Leachate (µg/L)**
Arsenic		20
Barium		200
Cadmium		20
Chromium		40
Lead		20
Mercury (CVAA)	SW 846-7470[b]	4
Selenium		100
Silver		20
Miscellaneous		
Cyanide, total	SW 846 9012A	0.5 mg/kg
Total Suspended Solids	EPA 160.2	4 mg/L
Total Petroleum Hydrocarbons	EPA 418.1	1 mg/kg
Total Organic Carbon	EPA 415.1	1 mg/L
Waste Characteristics		
pH	SW 846-9045[b]	NA
Cyanide Reactivity	SW 846-Chapter 7[b]	40 mg/kg
Sulfide Reactivity	SW 846-Chapter 7[b]	40 mg/kg
Ignitability	SW 846-1010[b]	NA

a These are expected quantitation limits based on reagent grade water or a purified solid matrix. Actual quantitation limits may be higher depending upon the nature of the sample matrix. The limit reported on final laboratory reports will take into account the actual sample volume or weight, percent solids (where applicable), and the dilution factor, if any. The quantitation limits for additional analytes to this list may vary, depending upon the results of laboratory studies.

b *Test Methods for Evaluating Solid Waste*, U.S. EPA, SW-846 Third Edition.

c Reporting Levels are set below regulatory levels at those normally provided by the assigned project laboratory.

d American Society for Testing and Materials, ASTM Standards, Vol. 04.08, Soil and Rock, 1995 and Vol. 11.04, Water and Environmental Technology, 1993.

Table 3-8
Project Reporting Levels for Soil Gas Sample Analysis

Volatile Organic Compounds in Air	TEST METHOD	PREP METHOD	MDL (ppbv)	RL (ppbv)
1,1,1-Trichloroethane	TO15	TO15 (6L)	0.058	0.20
1,1,1-Trichloroethane	TO15	TO15 (6L)	0.058	0.91
1,1,2,2-Tetrachloroethane	TO15	TO15 (6L)	0.071	0.20
1,1,2-Trichloroethane	TO15	TO15 (6L)	0.061	0.20
1,1-Dichloroethane	TO15	TO15 (6L)	0.054	0.20
1,2,4-Trichlorobenzene	TO15	TO15 (6L)	0.11	0.50
1,2,4-Trimethylbenzene	TO15	TO15 (6L)	0.046	0.20
1,2-Dibromoethane	TO15	TO15 (6L)	0.060	0.20
1,2-Dichlorobenzene	TO15	TO15 (6L)	0.064	0.20
1,2-Dichloroethane	TO15	TO15 (6L)	0.073	0.20
1,2-Dichloroethene (total)	TO15	TO15 (6L)	0.088	0.20
1,2-Dichloropropane	TO15	TO15 (6L)	0.080	0.20
1,2-Dichlorotetrafluoroethane	TO15	TO15 (6L)	0.046	0.20
1,3,5-Trimethylbenzene	TO15	TO15 (6L)	0.10	0.20
1,3-Butadiene	TO15	TO15 (6L)	0.17	0.50
1,3-Dichlorobenzene	TO15	TO15 (6L)	0.063	0.20
1,4-Dichlorobenzene	TO15	TO15 (6L)	0.080	0.20
1,4-Dioxane	TO15	TO15 (6L)	2.0	5.0
2,2,4-Trimethylpentane	TO15	TO15 (6L)	0.038	0.20
2-Chlorotoluene	TO15	TO15 (6L)	0.070	0.20
3-Chloropropene	TO15	TO15 (6L)	0.19	0.50
4-Ethyltoluene	TO15	TO15 (6L)	0.042	0.20
Acetone	TO15	TO15 (6L)	0.22	5.0
Benzene	TO15	TO15 (6L)	0.076	0.20
Bromodichloromethane	TO15	TO15 (6L)	0.066	0.20
Bromoethene	TO15	TO15 (6L)	0.055	0.20
Bromoform	TO15	TO15 (6L)	0.078	0.20
Bromomethane	TO15	TO15 (6L)	0.085	0.20
Carbon Disulfide	TO15	TO15 (6L)	0.070	0.50
Carbon Tetrachloride	TO15	TO15 (6L)	0.064	0.20
Chlorobenzene	TO15	TO15 (6L)	0.060	0.20
Chloroethane	TO15	TO15 (6L)	0.11	0.50
Chloroform	TO15	TO15 (6L)	0.031	0.20
Chloromethane	TO15	TO15 (6L)	0.18	0.20
cis, 1,3-Dichlororpropene	TO15	TO15 (6L)	0.087	0.20
cis-1,2-Dichloroethene	TO15	TO15 (6L)	0.083	0.20
Cyclohexane	TO15	TO15 (6L)	0.047	0.20
Dibromochloromethane	TO15	TO15 (6L)	0.057	0.20
Dichlorodifluoromethane	TO15	TO15 (6L)	0.047	0.50
Ethylbenzene	TO15	TO15 (6L)	0.091	0.20
Freon TF	TO15	TO15 (6L)	0.076	0.20
Hexachlorobutadiene	TO15	TO15 (6L)	0.060	0.20
Isopropyl Alcohol	TO15	TO15 (6L)	0.16	5.0
Methy tert-Butyl Ether	TO15	TO15 (6L)	0.097	0.50
Methyl Buytl Ketone	TO15	TO15 (6L)	0.082	0.50
Methyl Ethyl Ketone	TO15	TO15 (6L)	0.23	0.50
Methyl Isobutyl Ketone	TO15	TO15 (6L)	0.078	0.50
Methyl Methacrylate	TO15	TO15 (6L)	0.053	0.50
Methylene Chloride	TO15	TO15 (6L)	0.22	0.50
Naphthalene	TO15	TO15 (6L)	0.21	0.50
n-Heptane	TO15	TO15 (6L)	0.11	0.20
n-Hexane	TO15	TO15 (6L)	0.20	0.50
Styrene	TO15	TO15 (6L)	0.11	0.20
tert-Butyl Alcohol	TO15	TO15 (6L)	0.080	5.0
Tetrachloroethene	TO15	TO15 (6L)	0.096	0.20
Tetrahydrofuran	TO15	TO15 (6L)	0.095	5.0
Toluene	TO15	TO15 (6L)	0.076	0.20
trans, 1,3-Dichloropropene	TO15	TO15 (6L)	0.087	0.20
trans-1,2-Dichlroroethene	TO15	TO15 (6L)	0.072	0.20
Trichloroethene	TO15	TO15 (6L)	0.069	0.20
Trichlorofluoromethane	TO15	TO15 (6L)	0.041	0.20
Vinyl Chloride	TO15	TO15 (6L)	0.059	0.20
Xylene (m, p)	TO15	TO15 (6L)	0.19	0.50
Xylene (o)	TO15	TO15 (6L)	0.059	0.20

MDL= method detection limit
RL= reporting limit
ppbv= parts per million by volume

The level of QC effort for testing and analysis of parameters will conform to accepted methods, such as EPA SW-846 protocols (EPA, 1993b), American Society for Testing and Materials (ASTM) protocols, and National Institute for Occupational Safety and Health (NIOSH) protocols. The QC effort for in-field measurements, including temperature, conductivity, pH, and organic vapor concentrations, will include daily calibration of instruments using traceable standards and documented instrument manufacturer procedures. Field instruments and their method of calibration are discussed further in Section 7 of this QAPP.

3.2.2 Accuracy, Precision and Sensitivity

The fundamental QA objectives for accuracy, precision and sensitivity of laboratory analytical data are the QC acceptance criteria of the analytical protocols. The accuracy and precision required for the specified analytical parameters are incorporated in Tables 3-1 and 3-2 and are consistent with SW-846 analytical protocols and USACE *Shell* requirements. The sensitivities required for the analyses are identified in Tables 3-3 through 3-7.

Accuracy and precision goals for field measurements of pH, conductivity, temperature, turbidity, and organic vapor concentration are listed in Table 3-2.

Analytical accuracy is expressed as the percent recovery of an analyte that has been added to a blank sample or environmental sample at a known concentration before analysis. Accuracy will be determined in the laboratory through the use of MS analyses and laboratory control sample (LCS) analyses. The percent recoveries for specific target analytes will be calculated and used as an indication of the accuracy of the analyses performed.

Precision will be determined through the use of spike analyses conducted on duplicate pairs of environmental samples (MS/MSD) or comparison of positive duplicate pair responses. The relative percent difference (RPD) between the two results will be calculated and used as an indication of the precision of the analyses performed.

Sample collection precision will be measured in the laboratory by the analyses of field duplicates. Precision will be reported as the RPD for two measurements.

3.2.3 Completeness, Representativeness and Comparability

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under normal conditions. It is expected that laboratories will provide data meeting QC acceptance criteria for all samples tested. Overall project completeness goals are identified in Tables 3-1 and 3-2.

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter that depends upon the proper design of the sampling program and proper laboratory protocol. The sampling plan was designed to provide data representative of site conditions. During development of this plan, consideration was given to site history, past site practices, existing analytical data, physical setting and processes, and constraints inherent to this investigation. The rationale of the sampling design is discussed in detail in site-specific work plans.

Representativeness will be satisfied by ensuring that the work plan is followed, proper sampling techniques are used, proper analytical procedures are followed, and holding times of the samples are not exceeded. Representativeness will be determined by assessing the combined aspects of the QA program, QC measures and data evaluations.

Comparability expresses the confidence with which one data set can be compared with another. The extent to which existing and planned analytical data will be comparable depends upon the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data are expected to provide comparable data. These new analytical data, however, may not be directly comparable to existing data because of differences in procedures and QA objectives.

4.0 SAMPLING LOCATIONS AND PROCEDURES

It is anticipated that investigations performed at the Harley-Davidson site will produce soil, soil gas, sediment, groundwater, and surface water and liquid/solid waste sample data of definitive quality and field measurements of screening quality. IDW samples may also be collected for analyses. Additional samples will be collected to complete field QC duplicate, field blank, and QA split sample analyses. Specific numbers of samples (including parameters and methods) are incorporated into the work plan(s). Investigation samples will require VOC, SVOC, PCB, metal, and other general chemical determinations, as represented in Tables 3-1 through 3-7. Sampling procedures for the various media under investigation are discussed in the work plans.

Identification of the primary field equipment and supporting materials to be used for these investigations is presented throughout the site-specific work plans. Several different types of field measurements will be performed during these investigations. Soil field measurements may determine soil classification and characteristics or volatile organic headspace gas concentrations. Groundwater field measurements may determine groundwater characteristics (pH, specific conductance, and temperature, etc.) and static groundwater levels. A description of the field instruments and associated calibration requirements and performance checks to be used for field measurements is presented in Section 7.0 of this QAPP.

The locations of the sampling stations and sample media to be collected during these investigations, and the rationales for the selection of these stations, are presented in the area- or site-specific work plans.

4.1 General Information and Definitions

Contractor Laboratory

The laboratories subcontracted to perform analysis of samples have been selected through Harley-Davidson's procurement and review process prior to field mobilization.

QA and QC Samples

These samples are analyzed for the purpose of assessing the quality of the sampling effort and of the reported analytical data. QA and QC samples to be used for this project are duplicates, equipment rinsate blanks, trip blanks, and field blanks.

Field Duplicate QC Samples

These samples are collected by the sampling team for analysis by the contract laboratory. The identity of duplicate QC samples is held blind to the analysts and the purpose of these samples is to provide site-specific, field-originated information regarding the homogeneity of the sampled matrix and the consistency of the sampling effort. These samples are collected concurrently with the primary environmental samples and equally represent the medium at a given time and location. Duplicate samples will be collected from each media addressed by a project and be submitted to the contractor laboratory for analysis.

Trip Blank Samples

These samples consist of containers of organic-free reagent water that are kept with the field sample containers from the time they leave the laboratory until the time they are returned for analysis. The purpose of trip blanks is to determine whether samples are being contaminated during transit or sample collection. For this project, one trip blank will be placed into each cooler used to store and ship water samples designated for volatile organic analysis.

Equipment Rinsate Blanks

These samples will be taken from the water rinsate collected from equipment decontamination activities (when applicable). They will comprise samples of analyte-free water which have been rinsed over decontaminated sampling equipment, collected, and submitted for analysis of the parameters of interest. They are employed to assess the effectiveness of the decontamination

process, the potential for cross contamination between sampling locations, and incidental field contamination.

Field Blanks

When applicable, a sample from the site water supply used for equipment decontamination and other activities will be acquired and submitted for analysis with the primary samples. In addition, samples of onsite analyte-free water sources may also be submitted for analysis.

4.2 Sample Containers, Preservation Procedures, and Holding Times

Sample containers, sample preservation, and holding times for soils/solid samples and water samples collected during these investigations are described in Tables 4-1 and 4-2, respectively. The specific number of containers required for this study will be estimated and supplied by the analytical facilities. Additional sample volumes will be collected and provided, when necessary, for the express purpose of performing associated laboratory QC (laboratory duplicates, MS/MSD).

All sample containers will be provided by the analytical support laboratories, which will also provide the required types and volumes of preservatives with containers as they are delivered to the project. Temperature preservation will be maintained at 4 degrees Centigrade (°C) (±2°C) immediately after collection and will be maintained at this temperature until the samples are analyzed. In the event that sample integrity, such as holding times, cooler temperatures, etc., is compromised, re-sampling will occur as directed by the Harley-Davidson FPC. Any affected data will be flagged and qualified per data validation instructions and guidance.

Table 4-1. Container Requirements for Soil/Solid Samples and Soil Gas Samples

Analyte Group	Container	Minimum Sample Size	Preservative	Holding Time
Volatile Organic Compounds (VOC) for soil samples	4 – Encore™ sample containers with approx. 5 g of sample, and 1- 125 ml (4 oz) glass jar [for moisture determination]	5 g (Encore sampler)	Cool, 4°C	48 h for Encore™ samples
Volatile Organic compounds (VOC) for soil gas samples	Evacuated stainless steel SUMMA canister	6 Liters	None	7 d
Semivolatile Organic Compounds	1 – 250 ml (8 oz) glass jar with Teflon®-lined cap	50 g	Cool, 4°C	14 d (extraction) 40 d (analysis)
Polychlorinated biphenyls (PCBs)	Use same container as SVOCs	50 g	Cool, 4°C	14 d (extraction) 40 d (analysis)
Metals and CN	1 – 250 ml (8 oz) wide mouth plastic or glass jar	200 g	Cool, 4°C	180 d
Mercury – SW-846 7471A	Use same container as Metals	25 g	Cool, 4°C	28 d
Hexavalent Chromium -SW-846 7196A	Use same container as Metals	20 g	Cool, 4°C	7 d
Full TCLP Analysis	1 – 32 oz glass jar with Teflon®-lined cap	500 g	Cool, 4°C	14 d (extraction)
Reactivity	Use same container as full TCLP	500 g	Cool, 4°C	14 d (extraction)
Ignitability	Use same container as full TCLP	500 g	Cool, 4°C	14 d (extraction)
Corrosivity (pH)	Use same container as full TCLP	500 g	Cool, 4°C	14 d (extraction)
TCLP – VOC	1 – 8 oz.glass jar, with a screw cap and a silicone rubber coated with Teflon® septa	6 oz.	Cool, 4°C	14 d (extraction)

Table 4-2. Container Requirements for Water Samples

Analyte Group	Container	Minimum Sample Size	Preservative	Holding Time
Volatile Organic Compounds	3 - 40 mL glass vials with Teflon®-lined septum (no headspace)	40 mL	1:1 HCL to pH <2 Cool, 4°C	14 d
Semivolatile Organic Compounds	1 – L amber glass bottle with Teflon®-lined lid[a]	1000 mL	Cool, 4°C	7 d (extraction) 40 d (analysis)
Metals	1 - L glass or polybottle	100 mL, metals	HNO_3 to pH <2 Cool, 4°C	180 d
Mercury – SW-846 7470A	1 - L glass or polybottle	100 mL, metals	HNO_3 to pH <2 Cool, 4°C	28 d
Cyanide (total or free)	1 – L plastic or glass	500 mL	NaOH to pH >12, 0.6 gram ascorbic acid, Cool, 4°C	14 d
Hexavalent Chromium -SW-846 7196A	1- 200 mL high density polypropylene bottle or glass	125 mL[a]	Cool, 4°C	24 hr
TOC	100 mL glass bottle or 40 ml glass vials	100 mL	H_2SO_4 or HCl to pH <2 Cool, 4°C	28 d
pH	100 mL glass or polybottle	50 mL	None	Immediately in the field
TSS	250 mL – plastic or glass	100 mL ea.	Cool, 4°C	7 d

[a] One investigative water sample in twenty will require an additional volume for the laboratory to perform appropriate laboratory QC analysis. [i.e., matrix spike/matrix spike duplicate (MS/MSD)].

4.3 Field Documentation

4.3.1 Field Logbooks

Sufficient information will be recorded in the logbooks to permit reconstruction of all field sampling and other activities conducted. Information recorded on other project documents will not be repeated in the logbooks except in summary form where determined necessary. All field logbooks will be kept in the possession of field personnel responsible for completing the logbooks, or in a secure place when not being used during fieldwork. Upon completion of the field activities, all logbooks will become part of the final project file.

4.3.2 Sample Numbering System

A unique sample numbering scheme will be used to identify each sample designated for laboratory analysis. The purpose of this numbering scheme is to provide a tracking system for the retrieval of analytical and field data on each sample. Sample identification numbers will be used on all sample labels or tags, field data sheets or logbooks, COC records, and all other applicable documentation used during the project. A listing of all sample identification numbers will be maintained in the field logbook. The project database will be populated with sample numbers and information consistent with information found here and in the work plans.

The sample numbering scheme used for field samples will be employed for duplicate samples and other field QC such that they will not be readily discernable by the laboratory. A summary of the sample numbering scheme to be used for the project is presented in Table 4-3.

4.3.3 Documentation Procedures

Labels will be affixed to all sample containers during sampling activities. Information will be recorded on each sample container label at the time of sample collection. The information to be recorded on the labels will be as follows:

- Contractor name;
- Sample identification number;
- Sample type (discrete or composite);
- Site name and sample station number;
- Analysis to be performed;
- Type of chemical preservative present in container;
- Date and time of sample collection; and
- Sampler's name and initials.

Sample logbooks and COC records will contain the same information as the labels affixed to the containers. These records will be maintained and record all information related to the sampling effort and the process employed.

Table 4-3.
Sample Numbering Scheme

Sample Identification: XX-AAAA-mm-NNN-nn-z	
XX = Site Designator	Site designators used for the project will be as follows: Harley-Davidson Site =HD
AAAA= Area/Project Designator	An Area Designator will be used for a specific area investigation. Example project or area designators are as follows: Cyanide Spill (MW-2) Area = CSA Reforested Area = RA Site Perimeter Area = SPA Northeast Property Boundary Area = NPBA Former Lagoon Area = FLA Bunkers and Shell Ranges = B&SR North End Test Track = NETT Magnesium Burn Area = MGBA North Plant Area = NPA Old Waste Containment Area = OWCA Metal Chip Bin Area = MCBA South Property Boundary Area = SPBA West Parking Lot = WPL Burn Pile Area = BPA Eastern Landfill area = ELF Drum Storage Area = DSA Building 66 Chrome/Nickel/Zinc Plater = B66P North End of Building 4 – Former Northern Degreaser = B4ND North End of Building 4 – Former Southern Degreaser = B4SD North End of Building 4 – Former Methylene Chloride Area = B4MC North End of Building 4 – Wastewater Tanks = NB4W North End of Building 4 – Zinc Plater area = B4ZP Fire Water Pond area = FWP Building 2 Wastewater Sump Area = B2WW Building 2 Former Cutting Oil Tank Area = B2CO Building 2 Former Bomb Line Area Settling Tanks = B2BL Building 2 TCA Area = TCA Building 41 North Access Road = B41N Former Coal Storage Area (NW Bldg 10) = FCSA Building 67 Container Storage Area = B67C Building 41, IWTP = IWTP Building 40, Hazardous Waste Storage Area (Tank Farm) = B40T Building 16, Former Degreaser Area = B16D Building 57, Former Metals Fabrication = B57C

	Building 51, Former <90 day hazardous waste storage area = B51H
mm = Sample Station/Media Type	Examples Soil Boring = SB Surface Soil Sample = SS Sediment Sample = SD Test Pit = TP Monitoring Well = MW (or CW) Residential Well = RW Surface Water Sample = SW Spring = SP Soil Gas = SG Roll-off = RO Quality Control sample = QC
NNN = Sample Number	The Field Manager will maintain a listing of three digit station identifiers and correlate them to specific sampling/station locations.
nn = Sample Interval or Sampling Round	Examples 02 = 0 to 2 foot sample interval 04 = 2 to 4 foot sample interval 06 = 4 to 6 foot sample interval (or deepest depth) For groundwater and surface water samples, the sampling round shall be specified as “01”, "02", etc.
z = Sample Type	Examples 0 = Primary Investigative Sample 1 = Field Duplicate Sample 2 = Trip Blank 3 = Equipment Rinsate 4 = Site Source Water Blank 5 = Investigation Derived Waste (IDW)

4.3.4 Field Variance System

Procedures cannot fully encompass all conditions encountered during a field investigation. Variances from the operating procedures, field sampling plan, and/or safety and health plan may occur. All variances that occur during the field investigation will be documented on a field change request (FCR) form or a NCR and will be noted in the appropriate field logbooks. Examples of the FCR (Figure 4-1) and NCR (Figure 10-1) forms to be used for these investigations are presented in this QAPP. If a variance is anticipated (i.e., because of a change in the field instrumentation), the applicable procedure will be modified and the change noted in the field logbooks.

4.4 Decontamination of Sampling Equipment

Non-dedicated sampling equipment that comes into contact with contaminated soil, waste or groundwater will require decontamination. Typically, disposable sampling equipment will be used and decontamination will not be needed for many sampling activities.

When sampling from test pits, the backhoe bucket will be decontaminated between test pits by physically removing all loose materials from the bucket. A more thorough decontamination with water will be conducted prior to demobilization and between locations, at the discretion of the Field Manager. Rinsate from the backhoe decontamination must be containerized, and may be placed into roll-offs along with contaminated soil/solids.

Down-hole Geoprobe® tools will be decontaminated between boring locations. The non-disposable tools will be cleaned with a brush, water, detergent and a final deionized water rinse. Water level indicators and non-dedicated or disposable groundwater sampling equipment will be decontaminated with deionized water between measurements/sampling locations. If possible, measurements and sampling should be conducted from wells which are least contaminated first, followed by those which have higher contaminant concentrations to avoid potential cross-contamination. Water from these decontamination efforts will be collected into a bucket or other suitable container and returned to the onsite groundwater treatment plant for treatment.

Field Change Request (FCR)

FCR NO._____ DATE INITIATED_____

PROJECT_____

CONTRACT NO._____

REQUESTOR IDENTIFICATION

NAME_____ ORGANIZATION_____ PHONE_____

TITLE_____ SIGNATURE_____

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ○ Cost ○ Scope ○ Milestone ○ Method of Accomplishment
AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION)_____
DESCRIPTION OF CHANGE:

JUSTIFICATION:

IMPACT OF NOT IMPLEMENTING REQUEST:

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST:

COST ESTIMATE ($)_____ ESTIMATOR SIGNATURE_____

PHONE_____ DATE_____

PREVIOUS FCR AFFECTED ○ YES ○ NO; IF YES, FCR NO. _____

CLIENT PROJECT MANAGER _____ DATE_____

CLIENT QA SPECIALIST _____ DATE _____

SAIC H&S MANAGER SIGNATURE (IF APPLICABLE)_____ DATE _____

5.0 SAMPLE CUSTODY AND HOLDING TIMES

It is the policy and intent of this investigation to follow EPA policy regarding sample custody and COC protocols as described in *NEIC Policies and Procedures* (EPA, 1985). This custody is in three parts: sample collection, laboratory analysis, and final evidence files. Final evidence files, including originals of laboratory reports and electronic files are maintained under document control in a secure area. A sample or evidence file is under your custody when it is:

- In your possession;
- In your view, after being in your possession;
- In your possession and you place them in a secured location; or
- In a designated secure area.

5.1 Sample Documentation

The sample packaging and shipment procedures summarized below will ensure that samples will arrive at the laboratory with the COC intact. The protocol for specific sample numbering using case numbers and traffic report numbers (if applicable) and other sample designations will be followed.

5.1.1 Field Procedures

The field sampler is responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples. Each sample container will be labeled with a sample number, date and time of collection, sampler, and sampling location. Sample labels are to be completed for each sample. The Project Manager, in conjunction with the QA Manager, will review all field activities to determine whether proper custody procedures were followed during the fieldwork and to decide if additional samples are required.

5.1.2 Field Logbooks/Documentation

Samples will be collected following the sampling procedures documented in the work plan. When a sample is collected or a measurement is made, a detailed description of the location shall be recorded. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth at which the sample was collected, volume, and number of containers. A sample identification number will be assigned before sample collection. Field duplicate samples and QA split samples, which will receive an entirely separate sample identification number, will be noted under sample description. Equipment employed to make field measurements will be identified along with their calibration dates.

5.1.3 Transfer of Custody and Shipment Procedures

Samples are accompanied by a properly completed COC form. The sample numbers and locations will be listed on the COC form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record will document transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage area. An example of the COC form to be used for these investigations is illustrated on Figure 5-1.

All shipments will be accompanied by the COC record identifying the contents. The original record will accompany the shipment, and copies will be retained by the sampler for return to project management and the project file.

All shipments will be made through FedEx, in compliance with applicable U.S. Department of Transportation (DOT) regulations for environmental samples. The Field Manager and Laboratory Coordinator will discourage the shipping of samples on Fridays unless it is absolutely necessary, and the laboratory has assured the project that personnel will be present on Saturdays to receive and effect any necessary processing within the analytical holding times.

5.2 Laboratory Chain-of-Custody Procedures

Laboratory custody procedures will be described in the subcontract laboratory QA Plan. This document identifies the laboratory custody procedures for sample receipt and log-in, sample storage, tracking during sample preparation and analysis, and laboratory storage of data.

5.3 Final Evidence Files Custody Procedures

The Project Manager is the custodian of the evidence file and will maintain the contents of evidence files for this investigation, including all relevant records, reports, logs, field notebooks, pictures, subcontractor reports, correspondence, laboratory logbooks, and COC forms. The evidence file will be stored in a secure, limited-access area and under custody of the Field Manager during the field sampling effort.

Analytical laboratories will retain all original raw data information (both hard copy and electronic) in a secure, limited-access area and under custody of the Laboratory Project Manager.

STL Pittsburgh
301 Alpha Drive
RIDC Park
Pittsburgh, PA 15238
phone 412-963-7058 fax 412-963-2468

Chain of Custody Record

SEVERN TRENT STL

Severn Trent Laboratories, Inc.

Client Contact	**Project Manager:**	**Site Contact: Rodney Myers**	**Date:**	COC No:
Science Applications International Corporation	**Tel/Fax:**	**Lab Contact: Carrie Gamber**	**Carrier:**	_____ of _____ COCs
6310 Allentown Boulevard	**Analysis Turnaround Time**			Job No.
Harrisburg, PA 17112	Calendar (C) or Work Days (W) _____			
(717) 901-8100	TAT if different from Below _____			
(717) 901-8102	☐ 2 weeks			SDG No.
Project Name:	☐ 1 week			
Site:	☐ 2 days			
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample																	Sample Specific Notes:

Preservation Used: 1= Ice, 2= HCl; 3= H_2SO_4; 4=HNO_3; 5=NaOH; 6= Other _____

Possible Hazard Identification

☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* ☐ *Poison B* ☐ *Unknown*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For _____ Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

6.0 ANALYTICAL PROCEDURES

All samples collected during the investigation activities will be analyzed by laboratories with current certifications by the Commonwealth of Pennsylvania.

6.1 Laboratory Analysis

Samples collected during the project will be analyzed by EPA SW-846 methods and other documented EPA or nationally recognized methods. Laboratory standard operating procedures are based on the methods as published by the EPA in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW846*, Third Edition (November 1986; Revision 1, July 1992; Revision 2, November 1992; and Updates 1, 2, and 3). Analytical parameters, methods, and project reporting levels are listed in Tables 3-3 through 3-7.

Principal laboratory facilities will not subcontract or transfer any portion of this work to another facility, unless expressly permitted to do so in writing by the project and the Harley-Davidson FPC.

If contaminant concentrations are high, or for matrices other than normal waters and soils, analytical protocols may be inadequate. In these cases, sample analysis may require modifications to defined methodology. All analytical method variations will be identified in investigation-specific addenda. These may be submitted for regulatory review and approval when directed by the Harley-Davidson FPC.

These standard operating procedures (SOPs) must be adapted from and reference standard EPA SW-846 methods or appropriate national standard and thereby specify:

- Procedures for sample preparation;
- Instrument start-up and performance check;
- Procedures to establish the actual and required detection limits for each parameter;
- Initial and continuing calibration check requirements;
- Specific methods for each sample matrix type; and

- Required analyses and QC requirements.

6.2 Field Screening Analytical Protocals

Procedures for field measurement of pH, specific conductivity, temperature, photoionization detector (PID), and combustible gas monitoring are described in Section 7.0 of this QAPP. Tabulation of the methodologies appears in Tables 3-1 and 3-2.

7.0 CALIBRATION PROCEDURES AND FREQUENCY

This section describes procedures for maintaining the accuracy of all the instruments and measuring equipment that are used for conducting field tests and laboratory analyses. These instruments and equipment shall be calibrated before each use or on a scheduled, periodic basis according to manufacturer instructions.

7.1 Field Instruments/Equipment

Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. All field instruments for this purpose will have unique identifiers and each instrument will be logged in the Measuring and Testing Equipment (M&TE) Logbook before use in the field. The site safety and health officer (SSHO) or his/her designate will be responsible for performing and documenting daily calibration/checkout records for instruments used in the field.

Equipment to be used during the field sampling will be examined to certify that it is in operating condition. This will include checking the manufacturer's operating manual and instructions for each instrument to ensure that all maintenance requirements are being observed. Field notes from previous sampling trips will be reviewed so that the notation on any prior equipment problems will not be overlooked, and all necessary repairs to equipment will be carried out. Spare parts or duplication of equipment will be available to the sampling effort.

Calibration of field instruments is governed by the specific SOP for the applicable field analysis method, and it will be performed at the intervals specified in the SOP. If no SOP is available, calibration of field instruments will be performed at intervals specified by the manufacturer or more frequently as conditions dictate. Calibration procedures and frequency will be recorded in a field logbook.

Field instruments may include a pH meter, temperature probe, combustible gas monitor, particulate aerosol monitor, specific conductivity meter, and PID for organic vapor detection. If an internally calibrated field instrument fails to meet calibration/checkout procedures, it will be returned to the manufacturer for service and a back-up instrument will be calibrated and used in its place. Field instrument uses, detection levels, and calibration are summarized in Table 7-1.

Detailed instructions on the proper calibration and use of each field instrument follow the guidelines established by the manufacturer. The technical procedures for each instrument used on this project include the manufacturer's instructions detailing the proper use and calibration of each instrument.

Table 7-1.
Field Instrument Uses, Detection Limits, and Calibration

Instrument	Uses	Detection limits	Calibration	Comments
Total organic vapor meters	Sample screening for VOCs	PID - 0.2 ppm isobutylene	1 point - PID isobutylene daily	Action level must be stated in Health and Safety Plan
	Health and safety screening	FID - 1.0 ppm methane	1 point - FID methane daily	Instrument cannot differentiate naturally occurring compounds from contaminants
			Verification check every 20 samples	PID cannot detect compounds with ionization potentials > 11 eV
MiniRam	Aerosol and airborne particulate monitoring	0.05 – 99 mg/m^3	Set by manufacturer	None.
Horiba U22 or specific pH meters	Field screening of waters	N/A	2 point with standards at pH 7.0 and 4.0 or pH 7.0 and 10.0 daily	Accuracy is to +/- 0.5 pH units
Combustible Gas Meter (CGM)	Monitoring combustible compounds level in air	Varies by instrument	To manufacturer instructions	None.
Horiba U22 or Temperature meter	Determining water temperature	N/A	To manufacturer instructions	None.
Horiba U22 or Conductivity meter	Determining conductivity of water	N/A	1 point in KCL solution	Calculations and acceptance criteria must be available in the field

PID = photoionization detector
FID = flame ionization detector
N/A = not applicable

7.1.1 pH Meter Calibration

The pH meter will be calibrated according to the manufacturer's instructions using traceable standard buffer solutions before work in the field commences. Calibration will consider: that the temperature of sample and buffer solutions are equivalent; that at least two buffer solutions are utilized to calibrate the instrument; that readings are allowed to stabilize for a consistent period of time; that the electrode is properly rinsed between readings; and that the pH meter is re-calibrated every time it is turned off and turned back on, or if it starts giving erratic results.

Before use in the field, calibration of the pH meter will be checked against two standard buffer solutions. Calibration procedures, lot numbers of buffer solutions, and other pertinent calibration or checkout information will be recorded in the M&TE Logbook for the project. The calibrations performed, standard used, and sample pH values are to be recorded in the field notebook. Appropriate new batteries will be purchased and kept with the meters to facilitate immediate replacement in the field as necessary.

7.1.2 Temperature Calibration

Temperature measurements are carried out using a temperature probe. Mercury thermometers must be inspected before use to ensure that there is no mercury separation. Thermometers should be rechecked in the field before and after each use to see if the readings are logical and the mercury is still intact. All temperature probes should be checked biannually for calibration by immersing them in a bath of known temperature until equilibrium is reached. Temperature probes should be replaced if found to have more than 10 percent error. The reference thermometer used for bath calibration should be National Institute of Standards and Testing (NIST) traceable. Temperatures will be recorded in the M&TE Logbook, the Sample Logbook, or the Cooler Logbook, as appropriate.

7.1.3 Conductivity Meter Calibration

The conductivity cells of the specific conductivity meter will be cleaned according to manufacturer's recommendations and specifications and calibrated against known conductivity standard solutions before each sampling event. The instrument will be checked daily with NIST-traceable standard solutions. If the instrument is more than 10 percent out of calibration when compared with standard solutions, the instrument will be re-calibrated. If this cannot be done in the field, the instrument will be returned to the manufacturer or supplier for re-calibration and a back-up instrument will be used in its place. Daily calibration readings and other relevant information will be recorded daily in the M&TE Logbook.

Daily checks should be as follows:

- Fill a sample cup with the conductivity calibration standard solution.
- Set temperature knob for temperature of standard solution.
- Turn to appropriate scale and set the instrument for the value of calibration standard.
- Rinse out the cup with distilled water.

7.1.4 Organic Vapor Detector

Organic vapor detectors will be checked daily according to the manufacturer's instructions. PIDs will be calibrated daily with a gas of known concentration. All daily calibration information will be recorded in the M&TE Logbook.

7.1.5 Particulate Aerosol Monitor

Particulate (dust) aerosol monitors will be checked daily according to the manufacturer's instructions. Zeroing should be performed in a clean climate controlled room or utilizing one of the accessories provided by the manufacturer. All other calibrations cannot be performed in the field and require factory modifications. All daily calibration information will be recorded in the M&TE Logbook.

7.1.6 Combustible Gas Monitor

The combustible gas monitor provides field readings on explosive gases in the atmosphere and the percent of oxygen in the atmosphere. Many different combinations of sensors are available. The unit should be intrinsically safe, have an audible alarm when dangerous conditions are encountered, and be capable of operating for a full work shift without recharging of the battery. Calibration of these units is usually performed at the factory.

7.2 Laboratory Instruments

Calibration of laboratory instruments will be based on approved written procedures. Records of calibration, repairs, or replacement will be filed and maintained by laboratory personnel performing QC activities. These records will be filed at the location where the work is performed and will be subject to QA audit. Procedures and records of calibration will follow the laboratory-specific QA Plans.

In all cases where analyses are conducted according to the SW-846 protocols, the calibration procedures and frequencies specified in the applicable methods will be followed. For analyses governed by SOPs, refer to the appropriate SOP for the required calibration procedures and frequencies. All analytical calibrations and method QC will be consistent with the USACE *Shell for Analytical Chemistry Requirements* (1998).

Records of calibration will be kept as follows:

- Each instrument will have a record of calibration with an assigned record number.
- A label will be affixed to each instrument showing identification numbers, manufacturer, model numbers, date of last calibration, signature of calibrating analyst, and due date of next calibration. Reports and compensation or correction figures will be maintained with instrument.
- A written stepwise calibration procedure will be available for each piece of test and measurement equipment.

- Any instrument that is not calibrated to the manufacturer's original specification will display a warning tag to alert the analyst that the device should not be used.

8.0 INTERNAL QUALITY CONTROL CHECKS

8.1 Field Sample Collection

The assessment of field sampling precision and accuracy will be made by collecting field duplicates and trip blanks in accordance with the procedures described in the project work plan(s).

8.2 Field Measurement

QC procedures for most field measurements (i.e., pH, conductivity, temperature, activity levels, headspace, etc.) are limited to checking the reproducibility of the measurement by obtaining multiple readings on a single sample or standard and by calibrating the instruments. Refer to Section 7 of this QAPP for more regarding these measurements.

8.3 Laboratory Analysis

Analytical QC procedures for these investigations are specified in the individual method descriptions. These specifications include the types of QC checks normally required: method blanks, LCS, MS, MSD, calibration standards, internal standards, surrogate standards, tracer standards, calibration check standards, and laboratory duplicate analysis. Calibration compounds and concentrations to be used and the method of QC acceptance criteria for these parameters have been identified.

To ensure the production of analytical data of known and documented quality, laboratories associated with these investigations will implement all method QA and QC checks.

8.3.1 QA Program

All subcontracted analytical laboratories will have a written QA program that provides rules and guidelines to ensure the reliability and validity of work conducted at the laboratory. Compliance with the QA program is coordinated and monitored by the laboratory's QA department, which is

independent of the operating departments. For these investigations selected support laboratory Quality Assurance Plans will be referenced and implemented in their entirety.

The stated objectives of the laboratory QA program are to:

- Properly collect, preserve, and store all samples;
- Maintain adequate custody records from sample collection through reporting and archiving of results;
- Use properly trained analysts to analyze all samples by approved methods within holding times;
- Produce defensible data with associated documentation to show that each system was calibrated and operating within precision and accuracy control limits;
- Accurately calculate, check, report, and archive all data using the Laboratory Information Management System; and
- Document all the above activities so that all data can be independently validated.

All laboratory procedures are documented in writing as SOPs, which are edited and controlled by the QA department. Internal QC measures for analysis will be conducted with their SOPs and the individual method requirements specified.

8.3.2 QC Checks

Implementation of QC procedures during sample collection, analysis, and reporting ensures that the data obtained are consistent with its intended use. Both field QC and laboratory QC checks are performed throughout the work effort to generate data confidence. Analytical QC measures are used to determine if the analytical process is in control, as well as to determine the sample matrix effects on the data being generated.

Specifications include the types of QC required (duplicates, sample spikes, surrogate spikes, reference samples, controls, blanks, etc.), the frequency for implementation of each QC measure,

compounds to be used for sample spikes and surrogate spikes, and the acceptance criteria for this QC.

Laboratories will provide documentation in each data package that both initial and ongoing instrument and analytical QC functions have been met. Any non-conforming analysis will be reanalyzed by the laboratory, if sufficient sample volume is available. It is expected that sufficient sample volumes will be collected to provide for re-analyses, if required.

8.3.2.1 Analytical Process QC

8.3.2.1.1 Method Blanks

A method blank is a sample of a non-contaminated substance of the matrix of interest (usually distilled/deionized water or silica sand) that is then subjected to all of the sample preparation (digestion, distillation, extraction) and analytical methodology applied to the samples. The purpose of the method blank is to check for contamination from within the laboratory that might be introduced during sample preparation and analysis that would adversely affect analytical results. A method blank must be analyzed with each analytical sample batch.

Analytical sensitivity goals are identified in Tables 3-3 through 3-7 as project reporting levels. Method blank levels should be below these levels for all analytes, criteria are established at 2X these levels.

8.3.2.1.2 Laboratory Control Samples (LCS)

The LCS contains known concentrations of analytes representative of the contaminants to be determined and is carried through the entire preparation and analysis process. Commercially available LCSs or those from EPA may be used. LCS standards that are prepared in-house must be made from a source independent of that of the calibration standards. Each LCS analyte must be plotted on a control chart. The primary purpose of the LCS is to establish and monitor the

laboratory's analytical process control. An LCS must be analyzed with each analytical sample batch.

8.3.2.2 Matrix and Sample-Specific QC

8.3.2.2.1 Laboratory Duplicates

Laboratory duplicates are separate aliquots of a single sample that are prepared and analyzed concurrently at the laboratory. This duplicate sample should not be a method blank, trip blank, or field blank. The primary purpose of the laboratory duplicate is to check the precision of the laboratory analyst, the sample preparation methodology, and the analytical methodology. If there are significant differences between the duplicates, the affected analytical results will be reexamined. One in 20 samples will be a laboratory duplicate, with fractions rounded to the next whole number.

8.3.2.2.2 Surrogate Spikes

A surrogate spike is prepared by adding a pure compound to a sample before extraction. The compound in the surrogate spike should be of a similar type to that being assayed in the sample. The purpose of a surrogate spike is to determine the efficiency of recovery of analytes in the sample preparation and analysis. The percent of recovery of the surrogate spike is then used to gauge the total accuracy of the analytical method for that sample.

8.3.2.2.3 Isotopic Tracers

An isotopic tracer is prepared by adding a unique isotope of the same or similar element to a sample before preparation and analysis. The purpose of this isotopic tracer is to determine the efficiency of recovery of the targeted isotope or isotopes in the sample preparation and analysis. The percent of recovery of the tracer is then used to gauge the total accuracy of the analytical method for that sample and to compensate for the quantification of the analyte of interest.

8.3.2.2.4 Matrix Spike (MS) and Matrix Spike Duplicates (MSD)

A MS is an aliquot of a sample spiked with known quantities of analytes and subjected to the entire analytical procedure. It is used to indicate the appropriateness of the method for the matrix by measuring recovery or accuracy. Accuracy is the nearness of a result or the mean of a set of results to the true or accepted value. An MSD is a second aliquot of the same sample with known quantities of compounds added. The purpose of the MSD, when compared to the MS, is to determine method precision. Precision is the measure of the reproducibility of a set of replicate results among themselves or the agreement among repeat observations made under the same conditions. MSs and MSDs are typically performed per 20 samples of similar matrix.

8.3.2.2.5 Method-Specific QC

The laboratory must follow specific quality processes as defined by the method. These will include measures such as calibration verification samples, instrument blank analysis, internal standards implementation, tracer analysis, method of standard additions utilization, serial dilution analysis, post-digestion spike analysis, chemical carrier evaluation, etc.

9.0 CALCULATION OF DATA QUALITY INDICATORS

9.1 Field Measurements Data

Field data will be assessed by the Field Manager. The Field Manager will review the field results for compliance with the established QC criteria that are specified in the QAPP and work plan(s). Accuracy of the field measurements will be assessed using daily instrument calibration, calibration check, and analysis of blanks. Precision will be assessed on the basis of reproducibility by multiple reading of a single sample.

Field data completeness will be calculated using Equations (1a) and (1b).

Sample Collection (1a):

$$\text{Completeness} = \frac{\text{Number of Sample Points Sampled}}{\text{Number of Sample Points Planned}} \times 100\% \quad \textbf{(1a)}$$

Field Measurements (1b):

$$\text{Completeness} = \frac{\text{Number of Valid Field Measurements Made}}{\text{Number of Field Measurements Planned}} \times 100\% \quad \textbf{(1b)}$$

9.2 Laboratory Data

Laboratory results will be assessed for compliance with required precision, accuracy, completeness, and sensitivity as follows.

9.2.1 Precision

The precision of the laboratory analytical process will be determined through evaluation of LCS analyses. The standard deviation of these measurements over time will provide confidence that implementation of the analytical protocols was consistent and acceptable. These measurements will establish the precision of the laboratory analytical process.

Investigative sample matrix precision will be assessed by comparing the analytical results between MS/MSD for organic analysis and laboratory duplicate analyses for inorganic analysis. The RPD will be calculated for each pair of duplicate analysis using Equation (2) and produce an absolute value for RPD. This precision measurement will include variables associated with the analytical process, influences related to sample matrix interferences, and sample heterogeneity.

Where:

$$RPD = \frac{S - D}{\frac{(S + D)}{2}} \, x \, 100, \qquad \textbf{(2)}$$

S = first sample value (original or MS value),
D = second sample value (duplicate or MSD value).

9.2.2 Accuracy

The accuracy of the laboratory analytical measurement process will be determined by comparing the percent recovery for the LCS versus its documented true value.

Investigative sample accuracy will be assessed for compliance with the established QC criteria that are described in Section 3.0 of this QAPP using the analytical results of method blanks, reagent/preparation blank, MS/MSD samples, field blank, and bottle blanks. The percent recovery (%R) of MS samples will be calculated using Equation (3). This accuracy will include variables associated with the analytical process, influences related to sample matrix interferences, and sample heterogeneity.

Where:

$$\%R = \frac{A - B}{C} \, x \, 100, \qquad \textbf{(3)}$$

A = the analyte concentration determined experimentally from the spiked sample,
B = the background level determined by a separate analysis of the unspiked sample,
C = the amount of the spike added.

9.2.3 Completeness

Data completeness of laboratory analyses will be assessed for compliance with the amount of data required for decision making. The completeness is calculated using Equation (4).

$$\text{Completeness} = \frac{\text{Number of Valid Laboratory Measurements Made}}{\text{Number of Laboratory Measurements Planned}} \times 100\% \quad \textbf{(4)}$$

9.2.4 Sensitivity

Achieving method detection limits (MDLs) depends on sample preparation techniques, instrumental sensitivity, and matrix effects. Therefore, it is important to determine actual method detection limits through the procedures outlined in 40 *CFR* 136, Appendix C. MDLs should be established for each major matrix under investigation (i.e., water, soil) through multiple determinations, leading to a statistical evaluation of the MDL.

It is important to monitor instrument sensitivity through calibration blanks and low concentration standards to ensure consistent instrument performance. It is also critical to monitor the analytical method sensitivity through analysis of method blanks, calibration check samples, and LCSs, etc.

9.3 Project Completeness

Project completeness will be determined by evaluating the planned versus actual data. Consideration will be given for project changes and alterations during implementation. All data not flagged as rejected by the review, verification, validation, or assessment processes will be considered valid. Overall, the project completeness will be assessed relative to media, analyte, and area of investigation. Completeness objectives are listed in Table 3-1 (solid) and Table 3-2 (liquid).

9.4 Representativeness/Comparability

Representativeness expresses the degree to which data accurately reflect the analyte or parameter of interest for the environmental media examined at the site. It is a qualitative term most concerned

with the proper design of the sampling program. Factors that affect the representativeness of analytical data include appropriate sample population definitions, proper sample collection and preservation techniques, analytical holding times, use of standard analytical methods, and determination of matrix or analyte interferences. Sample collection, preservation, analytical holding time, analytical method application, and matrix interferences will be evaluated by reviewing project documentation and QC analyses.

Comparability, like representativeness, is a qualitative term relative to a project data set as an individual. These activities will employ narrowly defined sampling methodologies, site audits/surveillances, use of standard sampling devices, uniform training, documentation of sampling, standard analytical protocols/procedures, QC checks with standard control limits, and universally accepted data reporting units to ensure comparability to other data sets. Through proper implementation and documentation of these standard practices, the project will establish confidence that data will be comparable to other project and programmatic information.

Additional input to determine representativeness and comparability may be gained through statistical evaluation of data populations, chemical charge balances, compound evaluations, or dual measurement comparisons.

10.0 CORRECTIVE ACTIONS

Corrective actions may be required for two major types of problems: analytical/equipment problems and noncompliance with criteria. Analytical and equipment problems may occur during sampling, sample handling, sample preparation, laboratory instrumental analysis, and data review.

Noncompliance with specified criteria and analytical/equipment problems will be documented through a formal corrective action program at the time the problem is identified. The person identifying the problem is responsible for notifying the SAIC Project Manager and the Harley-Davidson FPC. When the problem is analytical in nature, information on these problems will be promptly communicated to the SAIC Laboratory Coordinator. Implementation of corrective action will be confirmed in writing.

Any non-conformance with the established QC procedures in the work plan will be identified and corrected in accordance with the QAPP. The QA Manager or his/her designee will issue an NCR for each nonconforming condition, Figure 10-1.

Corrective actions will be implemented and documented in the field record book. No staff member will initiate corrective action without prior communication of findings through the proper channels. If corrective actions are deemed insufficient, work may be stopped through a stop-work order issued by the SAIC Project Manager and the Harley-Davidson FPC.

10.1 Sample Collection/Field Measurements

Technical staff and project personnel will be responsible for reporting all suspected technical and QA non-conformances or suspected deficiencies of any activity or issued document by reporting the situation to the QA Manager or his/her designee. The QA Manager will be responsible for assessing the suspected problems in consultation with the Field Manager to make a decision based on the potential for the situation to impact the quality of the data. When it is determined that the situation warrants a reportable non-conformance and corrective action, then an NCR will be initiated by the QA Manager.

The QA Manager will be responsible for ensuring that corrective actions for non-conformances are initiated by:

- Evaluating all reported non-conformances;
- Controlling additional work on non-conforming items;
- Determining disposition or action to be taken;
- Maintaining a log of non-conformances;
- Reviewing NCRs and corrective actions taken; and
- Ensuring that NCRs are included in the final site documentation project files.

If appropriate, the QA Manager will ensure that no additional work dependent on the non-conforming activity is performed until the corrective actions are completed.

NONCONFORMANCE REPORT

DATE OF NCR

NCR NUMBER

LOCATION OF NONCONFORMANCE

PAGE ____ OF ____

INITIATOR (NAME/ORGANIZATION/PHONE)

FOUND BY

DATE FOUND

RESPONSIBLE ORGANIZATION/INDIVIDUAL

PROGRAM

PROJECT

DESCRIPTION OF NONCONFORMANCE

CATEGORY: _____ _____ _____ _____ _____

A

INITIATOR _____ DATE _____

QA/QC OFFICER _____ DATE _____

CAR REQ'D YES ☐ NO ☐

DISPOSITION:

PROBABLE CAUSE:

ACTIONS TAKEN TO PREVENT RECURRENCE:

B

PROPOSED BY: _____ NAME _____ DATE

JUSTIFICATION FOR ACCEPTANCE

C

INITIATOR: _____ NAME _____ DATE

VERIFICATION OF DISPOSITION AND CLOSURE APPROVAL

REINSPECTION/RETEST REQUIRED YES ☐ NO ☐ IF YES; _____ DATE _____ RESULT

D

QUALITY ASSURANCE: _____ NAME _____ DATE

Corrective action for field measurements may include:

- Repeating the measurement to check the error;
- Checking for all proper adjustments for ambient conditions such as temperature;
- Checking the batteries;
- Re-calibrating equipment;
- Checking the calibration;
- Modifying the analytical method including documentation and notification (i.e., standard additions);
- Replacing the instrument or measurement devices; and
- Stopping work (if necessary).

The Field Manager or his/her designee is responsible for all site activities. In this role, he/she may at times be required to adjust the site activities to accommodate site-specific needs. When it becomes necessary to modify a program, the responsible person notifies the Project Manager of the anticipated change and implements the necessary changes after obtaining the approval of the SAIC Project Manager and the Harley-Davidson FPC. All changes in the program will be documented on the Field Change Order (FCO) that will be signed by the initiators and the SAIC Project Manager. The FCO for each document will be numbered serially as required. The FCO shall be attached to the file copy of the affected document. The SAIC Project Manager must approve the change in writing or verbally before field implementation. If unacceptable, the action taken during the period of deviation will be evaluated in order to determine the significance of any departure from established program practices and action taken.

The Field Manager is responsible for the controlling, tracking, and implementation of the identified changes. Reports on all changes will be distributed to all affected parties, including the Harley-Davidson FPC. Harley-Davidson will be notified whenever program changes in the field are made.

10.2 Laboratory Analyses

Each project investigation laboratory QA plan provides systematic procedures to identify out-of-control situations and corrective actions. Corrective actions shall be implemented to resolve problems and restore malfunctioning analytical systems. Laboratory personnel have received QA training and are aware that corrective actions are necessary when:

- QC data are outside warning or control windows for precision and accuracy.
- Blanks contain target analytes above acceptable levels and must be investigated.
- Undesirable trends are detected in spike recoveries or RPD between duplicates.
- There are unusual changes in detection limits.
- Deficiencies are detected by internal audits, external audits, or from performance evaluation samples results.
- Inquiries concerning data quality are received.

Corrective action procedures are often handled at the bench level by the analyst who reviews the preparation or extraction procedure for possible errors, checks the instrument calibration, spike and calibration mixes, instrument sensitivity, and so on. If the problem persists or cannot be identified, the matter is referred to the Laboratory Supervisor, Laboratory Manager, and/or Laboratory QA Department for further investigation. Once resolved, full documentation of the corrective action procedure is filed with project records and the Laboratory QA Department, and the information is summarized within case narratives.

Corrective actions may include:

- Re-analyzing the samples, if holding time criteria permit;
- Evaluating blank contaminant sources, elimination of these sources, and re-analysis;
- Modifying the analytical method (i.e., standard additions) with appropriate notification and documentation;
- Re-sampling and analyzing;
- Evaluating and amending sampling procedures; or

- Accepting data and acknowledging the level of uncertainty.

If re-sampling is deemed necessary due to laboratory problems, the Project Manager will identify the necessary cost recovery approach to implement the additional sampling effort.

The following corrective action procedures will be required:

- Problems noted during sample receipt will be documented in the appropriate laboratory letter of receipt (LOR). The SAIC Project Manager and the Harley-Davidson FPC will be contacted immediately to determine problem resolution. All corrective actions will be thoroughly documented.
- When sample extraction/digestion or analytical holding times are not within method required specifications, the SAIC Project Manager and Harley-Davidson FPC will be notified immediately to determine problem resolution. All corrective actions will be thoroughly documented.
- All initial and continuing calibration sequences that do not meet method requirements will result in a review of the calibration. When appropriate, re-analysis of the standards or re-analysis of the affected samples back to the previous acceptable calibration check is warranted.
- All appropriate measures will be taken to prepare and clean up samples in an attempt to achieve the practical quantitation limits as stated. When difficulties arise in achieving these limits, the laboratory will notify the SAIC Laboratory Coordinator and the Harley-Davidson FPC to determine problem resolution. All corrective actions will be thoroughly documented.
- Any dilutions impacting the practical quantitation limits will be documented in case narratives along with revised quantitation limits for those analytes affected. Analytes detected above the method detection limits, but below the practical quantitation limits, will be reported as estimated values.
- Failure of method-required QC to meet the requirements specified in this project QAPP shall result in review of all affected data. Resulting corrective actions may encompass those identified earlier. The SAIC Project Manager and the Harley-Davidson FPC will

be notified as soon as possible to discuss possible corrective actions, particularly when unusual or difficult sample matrices are encountered.

- When calculation and reporting errors are noted within any given data package, reports will be re-issued with applicable corrections. Case narratives will clearly state the reasons for re-issuance of reports.

11.0 DATA REDUCTION, ASSESSMENT, AND REPORTING

11.1 Data Reduction

11.1.1 Field Measurements and Sample Collection

Raw data from field measurements and sample collection activities will be appropriately recorded in field logbooks. Data to be used in project reports will be reduced and summarized. The methods of data reduction will be documented.

The Field Manager or his/her designee is responsible for data review of all field-generated data. This includes verifying that all field descriptive data are recorded properly, that all field instrument calibration requirements have been met, that all field QC data have met frequency and criteria goals, and that field data are entered accurately in all logbooks and worksheets.

11.1.2 Laboratory Services

All samples collected for these investigations will be sent to qualified laboratories. Data reduction, evaluation, and reporting for samples analyzed by the laboratory will be performed according to specifications outlined in the laboratory's QA plan. Laboratory reports will include documentation verifying analytical holding time compliance.

Laboratories will perform in-house analytical data reduction under the direction of the Laboratory QA Officer. The Laboratory QA Officer is responsible for assessing data quality and informing the SAIC Laboratory Coordinator or Project Manager and the Harley-Davidson FPC of any data which are considered "unacceptable" or require caution on the part of the data user in terms of its reliability. Data will be reduced, evaluated, and reported as described in the laboratory QA plan. Data reduction, review, and reporting by the laboratory will be conducted as follows:

- Raw data are produced by the analyst who has primary responsibility for the correctness and completeness of the data. All data will be generated and reduced following the QAPP defined methods and implementing laboratory SOP protocols.
- Level 1 technical data review is completed relative to an established set of guidelines by a peer analyst. The review shall ensure the completeness and correctness of the data while assuring all method QC measures have been implemented and were within appropriate criteria.
- Level 2 technical review is completed by the area supervisor or data review specialist. This review includes the data for attainment of QC criteria as outlined in the established methods and for overall reasonableness. The Level 2 review ensures that all calibration and QC data are in compliance by checking at least 10 percent of the data calculations. This review shall document that the data package is complete and ready for reporting and archival.
- Upon acceptance of the raw data by the area supervisor, the report is generated and sent to the Laboratory Project Manager for Level 3 administrative data review. This review will ensure consistency and compliance with all laboratory instructions, the laboratory QA plan, the project laboratory SOW, and the project QAPP.
- The Laboratory Project Manager will complete a thorough review of all reports.
- Final reports will be generated and signed by the Laboratory Project Manager.
- Data will then be delivered to the project for data assessment.

The data review process will include identification of any out-of-control data points and data omissions, as well as interactions with the laboratory to correct data deficiencies. Decisions to repeat sample collection and analyses may be made by the SAIC Project Manager based on the extent of the deficiencies and their importance in the overall context of the project. The laboratory will provide flagged data to include items such as: (1) concentration below required detection limit; (2) estimated concentration due to poor spike recovery; and, (3) concentration of chemical also found in laboratory blank.

The laboratory will prepare and retain full analytical and QC documentation for the project. Such retained documentation will be both hard (paper) copy and electronic storage media (i.e., magnetic

tape) as dictated by the analytical methodologies employed. As needed, laboratories will supply hard copies and electronic copies of the retained information.

Laboratories will provide the following information to the project in each analytical data package submitted:

- Cover sheets listing the samples included in the report and narrative comments describing problems encountered in analysis;
- Tabulated results of inorganic, organic, and miscellaneous parameters identified and quantified;
- Analytical results for QC sample spikes, sample duplicates, initial and continuous calibration verifications of standards and blanks, standard procedural blanks, LCSs and other deliverables as identified in Section 11.3; and
- Tabulation of instrument detection limits determined in pure water.

11.2 Data Quality Assessment

11.2.1 Data Assessment Approach

A systematic process for data verification and assessment will be performed to ensure that the precision and accuracy of the analytical data are adequate for their intended use. The greatest uncertainty in a measurement is often a result of the sampling process and inherent variability in the environmental media rather than the analytical measurement. Therefore, analytical data assessment will be performed only to the level necessary to minimize the potential of using false positive or false negative results in the decision-making process (i.e., to ensure accurate identification of detected versus non-detected compounds). This approach is consistent with the DQOs for the project, with the analytical methods, and for determining contaminants of concern and calculating risk.

Samples will be analyzed through implementation of "definitive" analytical methods. "Definitive data" will be reported consistent with the deliverables identified in Section 11.3, Tables 11-1

and 11-2. This report content is consistent with what is understood as a comprehensive data deliverable (data forms including laboratory QC, calibration information, and raw data). This "Definitive data" will then be evaluated through the review process presented in Section 11.2.2. DQOs identified in Section 3.0 and method-specified criteria will be reviewed. Complete analytical documentation will be retained by the subcontract laboratory.

Data assessment will be accomplished by comparing the contents of the data packages and QA/QC results to requirements contained in the requested analytical methods. The assessment support staff will be responsible for these activities.

Assessment support staff will conduct a systematic review of the data for compliance with the established QC criteria based on the following categories:

- Holding times;
- Blanks;
- LCSs;
- Surrogate recovery (organic methods);
- Internal standards (primarily organic methods);
- ICP or atomic absorption QC;
- Calibration;
- Sample reanalysis;
- Secondary dilutions; and
- Laboratory case narrative.

Consistent with the data quality requirements as defined in the DQOs, all project data and associated QC will be evaluated on these categories and qualified as per the outcome of the review.

Table 11-1. Standard Data Deliverables (Hard Copy)

Method Requirements	Deliverables
Requirements for all methods:	
- Holding time information and methods requested	Signed chain-of-custody forms
- Discussion of laboratory analysis, including any laboratory problems	Case narratives
- LCS (run with each batch of samples processed)	Results (control charts when available)
Organics: GC/MS analysis	
- Sample results, including TICs	EPA Form 1 or equivalent
- Surrogate recoveries	EPA Form 2 or equivalent
- Matrix spike/spike duplicate data	EPA Form 3 or equivalent
- Method blank data	EPA Form 4 or equivalent
- GC/MS tune	EPA Form 5 or equivalent
- GC/MS initial calibration data	EPA Form 6 or equivalent
- GC/MS continuing calibration data	EPA Form 7 or equivalent
- GC/MS internal standard area data	EPA Form 8 or equivalent
Organics: GC analysis	
- Sample results	EPA Form 1 or equivalent
- Surrogate recoveries	EPA Form 2 or equivalent
- Matrix spike/spike duplicate data	EPA Form 3 or equivalent
- Method blank data	EPA Form 4 or equivalent
- Initial calibration data	EPA Form 6 or equivalent
If calibration factors are used	A form listing each analyte, the concentration of each standard, the relative calibration factor, the mean calibration factor, and the %RSD
- Calibration curve if used	Calibration curve and correlation coefficient
- Continuing calibration data	EPA Form 9 or equivalent
- Positive identification (second column confirmation)	EPA Form 10 or equivalent
Metals	
- Sample results	EPA Form 1 or equivalent
- Initial and continuing calibration	EPA Form 2 or equivalent, dates of analyses and calibration curve, and the correlation coefficient factor
- Method blank	EPA Form 3 or equivalent and dates of analyses
- ICP interference check sample	EPA Form 4 or equivalent and dates of analyses
- Spike sample recovery	EPA Form 5A or equivalent
- Postdigestion spike sample recovery for ICP metals	EPA Form 5B or equivalent
- Postdigestion spike for GFAA	EPA Form 5B or equivalent
- Duplicates	EPA Form 6 or equivalent
- LCS	EPA Form 7 or equivalent
- Standard additions (when implemented)	EPA Form 8 or equivalent
- Holding times	EPA Form 13 or equivalent
- Run log	EPA Form 14 or equivalent
Wet Chemistry	
- Sample results	Report result
- Matrix spike recovery	% Recovery
- Matrix spike duplicate or duplicate	% Recovery and % RPD
- Method blank	Report results
- Initial calibration	Calibration curve and correlation coefficient
- Continuing calibration check	Recovery and % difference
- LCS	LCS result and control criteria

GC = gas chromatography
GFAA = graphite furnace atomic absorption
ICP = inductively coupled plasma
LCS = laboratory control standard
MS = mass spectrometry
PCB = polychlorinated biphenyl
RPD = relative percent difference
RSD = relative standard deviation
TIC = tentatively identified compound

Table 11-2. Standard Electronic Data Deliverables (EDD)

EDD Fields (Max Length)	Description
SMP_ID (15)	The original client sample identification number. For Lab QC samples this field may be left empty or filled with a place holder like 'QC' or 'NA' for LCS and blanks. The original client sample ID should be used for MS, MSD, and SUR samples.
LAB_ID (15)	The laboratory's sample identification number.
DATE_REC (10)	The date the sample was received by the laboratory (MM/DD/YYYY).
DATE_EXT (10)	The date the sample was extracted (MM/DD/YYYY). The extraction refers to any preparatory techniques such as extraction, digestion, and separation.
DATE_ANA(10)	The date the sample was analyzed (MM/DD/YYYY).
TIME_ANA(5)	The time the sample was analyzed (HH:MM).
MATRIX (10)	The sample matrix. Valid values are Water, Solid, or Air.
METHOD (21)	The method requested by the client (i.e., SW846 8080). This should not be the lab method number.
RES_TYPE (4)	The laboratory result type. Currently the loading routine only handles the following values:
	REG-results of a primary analysis of a client sample
	REA- results of a reanalysis of a client sample
	DIL- results of an analysis of a diluted client sample
	LCS-results of a laboratory control sample as %recovery
	LCST-expected (true) result of a laboratory control sample as a concentration
	LCSF-actual (final) result of a laboratory control sample as a concentration
	SUR-surrogate recovery as % recovery
	MS-matrix spike recovery as a % recovery
	MST- expected (true) result of a matrix spike sample as a concentration
	MSF- actual (final) result of a matrix spike sample as a concentration
	MSD-matrix spike duplicate recovery as relative percent difference
	MSDT- expected (true) result of a matrix spike duplicate sample as a concentration
	MSDF- actual (final) result of a matrix spike duplicate sample as a concentration
	BLK-result of a laboratory blank sample.
CAS_NUM (15)	The CAS number or blank if no CAS number is available.
PARAMTR (50)	Chemical name for the analytic parameter.
RESULTS (N)	The analytic result
UNITS (15)	The units for the result.
LABQUAL (6)	The qualifiers assigned by the laboratory.
DET_LIMIT (N)	The Contract-Required Detection Limit for the analyte being measured. It should be reported in the same units as the result.
UNC (N)	The 2 sigma error in the net count rate for radiological analyses. Should be expressed in the same units as the analytic result.
DILUTION (N)	The overall dilution of the sample aliquot. A value of one should correspond to nominal conditions for the method. Values less than one correspond to concentrations.
SMP_WT (N)	The weight or volume of the sample used for the analysis.
WT_UNITS (2)	The units for the sample weight or volume.
FILTERED (1)	Must have 'F' if the sample was filtered either by the lab or in the field.
PCT_SOL (N)	Percent solids
TIC (10)	Enter 'TIC' or retention time for tentatively identified compound. Blank if not a TIC.

The laboratory EDD may be delivered either as an Excel spreadsheet or as a comma or tab delimited file readable by Excel. The file name must include the SDG number or equivalent. For example, if multiple files were submitted for the same SDG, the filename could be the SDG number followed by a sequential number for each file in the SDG. A file cannot contain more than one SDG. Multiple analytic fractions may be present in the file. The first row of the file should contain the field names. The expected field names and comments about them are listed below. Fields do not have to be present in the order specified and additional fields may be included; however, columns must be present for all fields identified below.

N-Indicates that the field requires a numeric entry

11.2.2 Primary Analytical Data Assessment Categories

11.2.2.1 Holding Times

Evaluation of holding times ascertains the validity of results based on the length of time from sample collection to sample preparation or sample analysis. Verification of sample preservation must be confirmed and accounted for in the evaluation of sample holding times. The evaluation of holding times is essential to establishing sample integrity and representativeness. Concerns regarding physical, chemical, or biochemical alteration of analyte concentrations can be eliminated or qualified through this evaluation.

11.2.2.2 Blanks

The assessment of blank analyses is performed to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks applies to any blank associated with the samples, including field, trip, equipment, and method blanks. Contamination during sampling or analysis, if not discovered, results in false-positive data.

Blanks will be evaluated against reporting levels as specified in Tables 3-3 through 3-7. Analytical method blanks should be below 2X these levels. Field, trip, and equipment rinsate blanks will be evaluated against 5X these levels for most analytes and 10X these levels for common laboratory solvent analytes.

11.2.2.3 Laboratory Control Samples

The LCS serves as a monitor of the overall performance of the analytical process, including sample preparation, for a given set of samples. Evaluation of this standard provides confidence in or allows qualification of results based on a measurement of process control during each sample analysis.

11.2.2.4 Surrogate Recovery

System compounds are added to every sample, blank, MS, MSD, and standard. They are used to evaluate extraction, cleanup, and analytical efficiency by measuring recovery on a sample-specific basis. Poor system performance as indicated by low surrogate recoveries is one of the most common reasons for data qualification. Evaluation of surrogate recovery is critical to the provision of reliable sample-specific analytical results.

11.2.2.5 Internal Standards

Internal standards are utilized to evaluate and compensate for sample-specific influences on the analyte quantification. They are evaluated to determine if data require qualification due to excessive variation in acceptable internal standard quantitative or qualitative performance measures. For example, a decrease or increase in internal standard area counts for organics may reflect a change in sensitivity that can be attributed to the sample matrix. Because quantitative determination of analytes is based on the use of internal standards, evaluation is critical to the provision of reliable analytical results.

11.2.2.6 Furnace Atomic Absorption QC

Duplicate and furnace post-digestion spikes are evaluated to establish precision and accuracy of individual analytical determinations. Because of the nature of the furnace atomic absorption technique and because of the detailed decision tree and analysis scheme required for quantitation of the elements, evaluation of the QC is critical to ensuring reliable analytical results.

11.2.2.7 Calibration

The purpose of initial and continuing calibration verification analyses is to verify the linear dynamic range and stability of instrument response. Relative instrument response is used to quantify the analyte results. If the relative response factor is outside acceptable limits, the data quantification is uncertain and requires appropriate qualification.

11.2.2.8 Sample Re-analysis

When instrument performance-monitoring standards indicate an analysis is out of control, the laboratory is required to re-analyze the sample. If the re-analysis does not solve the problem (i.e., surrogate compound recoveries are outside the limits for both analyses), the laboratory is required to submit data from both analyses. An independent review is required to determine which one is the appropriate sample result.

11.2.2.9 Secondary Dilutions

When the concentration of any analyte in any sample exceeds the initial calibration range, a new aliquot of that sample must be diluted and re-analyzed. The laboratory is required to report data from both analyses. When this occurs, an independent review of the data is required to determine the appropriate results to be used for that sample. An evaluation of each analyte exceeding the calibration range must be made, including a review of the dilution analysis performed. Results chosen in this situation may be a combination of both the original results (i.e., analytes within initial calibration range) and the secondary dilution results.

11.2.2.10 Laboratory Case Narratives

Analytical case narratives are reviewed for specific information concerning the analytical process. This information is used to direct the data validator to potential problems with the data.

11.3 Project Analytical Data Set

Analytical data for this project will be screened electronically and reviewed by qualified chemists. Flags signifying the usability of data will be noted and entered into an analytical database. Deficiencies in data deliverables will be corrected through direct communication with the field or laboratory, generating immediate response and resolution. All significant data discrepancies noted during the validation process will be documented through NCRs, which are sent to the laboratory for clarification and correction. Decisions to repeat sample collection and analyses may be made by

the SAIC Project Manager based on the extent of the deficiencies and their importance in the overall context of the project.

All data generated for investigations will be computerized in a format organized to facilitate data review and evaluation. The computerized data set will include data flags in accordance with the above-referenced protocols as well as additional comments of the Data Review Team. The associated data flags will include such items as: (1) estimated concentration below-required reporting limit; (2) estimated concentration due to poor calibration, internal standard, or surrogate recoveries; (3) estimated concentration due to poor spike recovery; and (4) estimated concentration of chemical that was also determined in the laboratory blank.

Data assessment will be accomplished by the joint efforts of the data assessor and the QA Manager. Data assessment by data management will be based on the criteria that the sample was properly collected and handled according to the work plan(s) and Sections 4.0 and 5.0 of this QAPP. An evaluation of data accuracy, precision, sensitivity, and completeness, based on criteria in Section 9.0 of this QAPP, will be performed by a data assessor. This data quality assessment will indicate that data are: (1) usable as a quantitative concentration; (2) usable with caution as an estimated concentration; or (3) unusable due to out-of-control QC results. Project investigation data sets will be available for controlled access by the SAIC Project Manager and authorized personnel. Each data set will be incorporated into investigation reports as required.

11.4 Data Reporting

The laboratory will prepare and submit analytical and QC data reports to the project in compliance with the requirements of this QAPP, including data forms listed in Table 11-1. The laboratory electronic data deliverable (EDD) may be delivered either as an Excel spreadsheet or as a comma or tab delimited file readable by Excel. The file name must include the sample delivery group (SDG) number or equivalent. For example, if multiple files were submitted for the same SDG, the file name could be the SDG number followed by a sequential number for each file in the SDG. A file cannot contain more than one SDG. Multiple analytic fractions may be present in the file. The first row of the file should contain the field names. The expected field names and comments about them

are listed in Table 11-2. Fields do not have to be present in the order specified and additional fields may be included; however, columns must be present for all fields identified below. An acceptable configuration is presented in Table 11-2 with all QA/QC sample data being provided in a companion ASCII file.

The subcontract analytical laboratory will prepare and retain full analytical and QC documentation. Such retained documentation will include all hard copies and other storage media (i.e., magnetic tape). As needed, the subcontract analytical laboratory will make available all retained analytical data information.

11.5 Records Retention

All project records and files should be retained in compliance with EPA policy. For retention of RCRA Corrective Action, the retention period should be for up to 5 years following the closure of the RCRA unit. These files may be destroyed 10 years following the closure of those units. Any records pertaining to the treatment, storage or disposal facilities at Harley-Davidson must be retained until the facility closes. National Pollutant Discharge Elimination System (NPDES) compliance records need only to be retained for a period of 3 years (5 years for sewage sludge records).

12.0 PREVENTIVE MAINTENANCE PROCEDURES

12.1 Field Instruments and Equipment

The field equipment for this project may include temperature probes; pH meters; conductivity meters; dust meters; organic vapor detectors (i.e., PID); and geophysical equipment. Specific preventative maintenance procedures to be followed for field equipment are those recommended by the manufacturers. These procedures are included in the technical procedures governing the use of these instruments.

Field instruments will be checked and/or calibrated before they are shipped or carried to the field. Each field instrument will be checked daily against a traceable standard or reference with a known value to ensure that the instrument is in proper calibration. Instruments found to be out of calibration will be re-calibrated before use in the field. If the instrument cannot be calibrated, it will be returned to the supplier or manufacturer for re-calibration and a back-up instrument will be used in its place. Calibration checks and calibrations will be documented on the Field Meter/Calibration Log Sheets in the M&TE Logbook. Any maintenance conducted on field equipment must be documented in the M&TE Logbook.

Critical spare parts such as tapes, papers, pH probes, electrodes, and batteries will be kept onsite to minimize down time of malfunctioning instruments. Back-up instruments and equipment should be available onsite or within one-day shipment to avoid delays in the field schedules.

12.2 Laboratory Instruments

As part of their QA/QC Program, a routine preventive maintenance program will be conducted by all investigation-associated laboratories to minimize the occurrence of instrument failure and other system malfunctions. All laboratory instruments will be maintained in accordance with manufacturer's specifications and the requirements of the specific method employed. This maintenance will be carried out on a regular, scheduled basis and will be documented in the laboratory instrument service logbook for each instrument. Emergency repair or scheduled

manufacturer's maintenance will be provided under a repair and maintenance contract with factory representatives.

13.0 PERFORMANCE AND SYSTEM AUDITS

Performance and system audits of both field and laboratory activities will be conducted to verify that sampling and analysis are performed in accordance with the procedures established in the work plan(s) and QAPP. Audits of laboratory activities will include both internal and external audits.

13.1 Field Audits

Internal audits of field activities (sampling and measurements) will be conducted by the QA Officer and/or QA Manager, as deemed appropriate by the QA Officer. The audits will include examination of field sampling records, field instrument operating records, sample collection, handling and packaging in compliance with the established procedures, maintenance of QA procedures, COC, etc.

Performance audits will follow to ensure deficiencies have been corrected and to verify that QA practices/procedures are being maintained throughout the duration of the project work effort. These audits will involve reviewing field measurement records, instrumentation calibration records, and sample documentation.

13.2 Laboratory Audits

Internal performance and system audits of laboratories will be conducted by the Laboratory QA Officer as directed in the laboratory QA plan. These system audits will include examination of laboratory documentation of sample receiving, sample log-in, sample storage, COC procedures, sample preparation and analysis, instrument operating records, etc. Internal performance audits are also conducted on a regular basis. Single-blind performance samples are prepared and submitted along with project samples to the laboratory for analysis. The Laboratory QA Officer will evaluate the analytical results of these single-blind performance samples to ensure that the laboratory maintains acceptable performance.

14.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

14.1 Quality Control Reports

During large environmental inspection activities or large construction/remediation projects performed at this facility, Quality Control Reports (QCRs) may be prepared. These reports will be signed and dated by the Field Manager. An example of the QCR format to be used is illustrated on Figure 14-1. The contents of each QCR will include a summary of activities performed at the project site, weather information, activities performed including field instrument calibrations, departures from the approved Work Plan, problems encountered during field activities, and any instructions received from government personnel. Any deviations that may affect the project data quality objectives will be immediately conveyed to the Harley-Davidson FPC.

14.2 Laboratory Quality Assurance Reports

Each laboratory will provide LORs and analytical QC summary statements (case narratives) with each data package. All COC forms will be compared with samples received by the laboratory and a LOR will be prepared and sent to the project describing any differences in the COC forms and the sample labels or tags. All deviations will be identified on the receiving report such as broken or otherwise damaged containers. This report will be forwarded to the Project Laboratory Coordinator within 24 hours of sample receipt and will include the following: a signed copy of the COC form; itemized project sample numbers; laboratory sample numbers; cooler temperature upon receipt; and itemization of analyses to be performed.

Summary QC statements will accompany analytical results as they are reported by the laboratory in the form of case narratives for each sample delivery group.

Any departures from approved plans will receive prior approval from the Harley-Davidson FPC and will be documented with field change orders. These field change orders will be incorporated into the project evidence file.

The project will maintain custody of the project evidence file and will maintain the contents of files for this project, including all relevant records, reports, logs, field logbooks, pictures, subcontractor reports, correspondence, and COC forms, until this information is requested or transferred to the Harley-Davidson FPC. These files will be stored under custody of the SAIC Project Manager. The analytical laboratory will retain all original analytical raw data information (both hard copy and electronic) in a secure, limited access area and under custody of the laboratory Project Manager.

Figure 14-1
DAILY QUALITY CONTROL/INSPECTION REPORT
Environmental Inspection Activities
Harley-Davidson Motor Company Report No.
York, Pennsylvania Page 1 of __

SAIC Project No. _____ Day:_____ Date:_____

	Weather	Temperature	Precipitation	Wind
AM	_____	_____	_____	_____
Noon	_____	_____	_____	_____
PM	_____	_____	_____	_____

1. Key Personnel On-Site:
Harley-Davidson:
SAIC:

Contractor(s):

Visitor(s) [include time and purpose of visit]:

2. Work Performed Today by Contractors:

Primary Equipment On-Site:

3. Health and Safety Meetings, Levels and Activities:

An Employee-Owned Company

15.0 REFERENCES

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